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Original Article

Road Traffic Trauma and Disability: Some Depriving Experiences

Md. Mehedi Hassan[1]

ABSTRACT:

Road traffic trauma is a global problem which is severe in the developing countries like Bangladesh. In consequence, road trauma has now been recognized as one of the significant diseases of this country. The main aim of this study is to investigate the depriving experiences of road traffic trauma victims and explore the socio-psychological consequences. This cross- sectional study, carried out during July to December 2015 in the Dhaka city corporation areas. It was designed based on the quantitative and qualitative techniques, such as, questionnaire survey and case study methods. A purposive sampling technique was used to reach the target population. All the targeted floating populations were covered as samples (100) under the total questionnaire survey. The results show that the age distributions of the disabled accident victims range from 22-55 years. The wider age distribution of the participants, where 50% of them are within the age range from 31-40 years. The study also shows 31% of the respondents worked in the small working sector and it is their main source of earning, and 33% of them were engaged in beggar's profession. The study indicates that the interlinking between disability and the experiences of deprivation that starts from the moment of a traumatic incident. Then to health seeking behavior follows to end the consequences. Trauma related disability brings not only bad luck, but it also brings lot of complexities in human life. The findings demand necessary interventions to be developed by the organizing and conducting institutions and the concerned authority should step forward to design rehabilitation schems among the road traffic trauma victims.

Key words: Trauma, Disability, Rehabilitation

INTRODUCTION

The road traffic trauma is a growing severe problem world wide that is having gruesome impacts on the peoples of the developing countries like Bangladesh. Current statistics shows that each year, 1.3 million people are killed and 50 millions injured by horrific road accidents all over the world. More than 85 percent of these casualties occur in low and middle income countries[1]. The economic costs of road crashes, which range from 1 percent to 3 percent of GDP in Asia, have a disproportionate impact on lower income groups[2]. According to a study, the numbers of fatalities had increased from 1,009 in 1982 to 2,082 in 2011 in Bangladesh[3]. Another study report shows that buses and trucks were responsible for 35% and 29% fatal accidents, respectively, in the country[4]. Almost 80 percent of fatalities are vulnerable road users e.g. pedestrians, bicyclists and motorcyclists[5].The aforesaid heavy vehicles are mainly responsible for the most of the fatal accidents that occur. As a consequence, road trauma has been now recognized as one of the serious diseases in industrial societies, and it is an increasingly public health hazard and economic burning issue in the developing countries. The economic costs of road crashes have a disproportionate impact on the lower income groups, thus contributing to the persistence of poverty.

A physically disabled person does not only affect health and well-being of the household members as individuals. They also have an strained impact on all relationships among the members. The illness harms the immediate family. As long as disability continues, it has a negative impact on the household structure and functioning. The household that has a physically disabled member often has to take an intensive care-giving responsibility. One study has dig out the consequences of the disabilities of the poor peoples who lost their human capital, social happiness and became distressed and shaken poverty[6]. To have a physically disabled member in the family is often extremely taxing and exhausting. Other members of

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the household often face the sufferings of social isolation, lack of time for self and friends, and unrelieved physical and mental stress of care-giving. The experience of having a physically disabled member within the household is a continuous and complex process that present a new way of living seriously affected by disability.The main aim of this study is to investigate into the experiences of hardships or deprivation of the poor and disabled accident victims in the light of serious road traffic truma and explore the socio-psychological consequences on the ultimate victims and their families.

MATERIALS AND METHODS

The study was conducted in the urban slum areas of the Dhaka City Corporation where the poor urban slum dwellers were the major target groups. Mainly the study populations were the poor accident victims who are disabled living at different slum of the North City Corporation area. This is cross-sectional study was carried out during the period of July-December, 2015. It was designed based on the quantitative and qualitative techniques, such as, questionnaire survey and case study methods. A purposive sampling technique was used to reach the target population. All the targeted floating populations were covered as samples (100) under the total questionnaire survey. Face-to-face interviews were coducted for collecting the socio-economic background and demographic characteristics of the study population as well as to identify more vulnerable participants for case studies. In total seven case studies were conducted. Based on the survey interview, conducted by skilled research assistants and sequentially identified seven most disabled victims for case studies to reflect the experiences of deprivation. A software package of SPSS was used to analyze the collected data.

RESULTS

For most of the cases, the victims did not get any early treatment and it took 2-12 hours to get even the first aid because of distance, shortage of money, lack of availability of the medical aid, lack of mass awareness, etc. Under the harsh reality of discriminating and unaffordable health service provisions, better treatment could not be arranged due to economic inability of the poor victims. Even in many cases to afford treatment costs, many victims families gradually became impoverished. Dependency on others gives them a sense that they are useless and powerless, which threatens the individual's autonomy and existence. Marital relationships were found at a greater risk due to disability and biophysical changes, had significant social consequences, as the bodies of the victims did not function normally so their interaction with the social world became interrupted and made them isolated.

Socio-economic characteristics of the disabled victims

This section has defined the age distribution of the accident victims who were disabled. Their education, occupations and living standards were also defined. The socio-economic parameters have intense influence on the disabled person's livelihood status.

Table -I

Distribution of the respondents by age group, gender and education (n=100)

Variable	Number	Percentage
Age group		
22-30	06	6
31-40	50	50
41-50	30	30
51-55	14	14
Gender		
Male	97	97
Female	03	03
Educational status		
Illiterate	25	25
Primary	50	50
Secondary	20	20
SSC	02	02
HSC	02	02
BA	01	01

The Table-1mentioned above shows that the age distributions of the disabled accident victims range from 22-55 years. The Table also represents the wider age distribution of the participants, where 50% of them are within the age range from 31-40 years and only 6% of the disabled remain from 22-30 years age group. About 14% of the disabled have found the category of age (51-55 years). The Table further indicates that the respondents are 97% males and 3% females. Out of 100 the respondents, 97% are males and 3% are females reported. It is observed that a significant portion of the total respondens 25% of them were not enrolled in education system, about 50% passed in primary education. In secondary level, 20% of them were enrolled in education system and 2% of them passed SSC.

Table -II

Distribution of the respondents by occupation, monthly income and insolvency status of the family: (n=100)

Variable	Number	Percentage
Occupational status		
Small Business person	31	31
Housewife	02	02
Beggar	33	33
Farmer	03	03
Govt. Service holder	03	03
Private Service holder	14	14
Unemployed	14	14
Monthly Income (in Taka)		
Up to 2,000	16	16
2,001-4,000	53	53
4,001-6,000	09	09
6,001-8,000	10	10
8,001-10,000	11	11
10,001 and above	01	01
Insolvency status		
Yes (hard of)	96	96
No (by all means)	04	04

The Table-2 shows various working sectors of the respondents, 31% of the respondents worked in the small working sector and it is their main source of earning, and 33% of them were engaged in beggar's profession. It is also found that 3% of them were engaged in thegovernment services, 14% of them were engaged in private services, and 14% of them were unemployed.The Table also shows that the average monthly income status of different levels of households range from Taka 2,000 to 10,001 and above. About 16% of the families have incomes of Taka up to 2,000 per month, 9% of the families have Taka 4,000 - 6,000 per month, whereas a significant number of the families, 53% of them have Taka 2,000 - 4,000 income per month. It is observed that, only 4% of the families have by all means condition where they could manage household expenditure by minimizing their monthly income. The true picture is that a significant portion of the total families (around 96%) have faced severe hardships of family maintaining by using all means of monthly incomes.

Trauma, disability and depriving expariences: some selected case studies

By analyzing the trauma incidences and the way of being gone under any sort of treatment, the scenario of health-seeking behavior and depriving experiences of the victims might also be understood from the case studies that have been mentioned below:

CASE STUDY: 1

One victim said, when my physical condition was normal, I used to maintain my whole family. I was responsible for all the expenses of my family members, and they were dependent on me. Now due to this miserable condition, I cannot maintain them any more. I am no more a help for them rather I have become a burden on them. After becoming disabled, I had to spend all the money we had. Nowadays, it has become difficult for me to maintain the family expenses. I will not be able to serve them any longer. Even I wish it, none can give it to me, if they wish. Furthermore, due to my disability, I won't be able to serve my family any more. Because i am not able to move, so, i have to depend on others for my movement and care. Now I cannot plan my future, without their help. The victim said again, I could move to wherever I wish to. I could eat and dance freely. I could earn money as well. But now my disability has put an end to all my activities. I can not perform anything single-handed. Now I am dependent on other. It's a curse for a man to depend on others.This ill-fated life is not expected. But it does not matter. I like it or not, life has to go on the same bad way. Nobody can cure my disability. Even none will be able to give me back my past normal life. So, whenever I ponder alone, my eyes burst into tears, feeling bad about my disability (respodent no. 5, male, age: 35).

CASE STUDY: 2

"When I was normal I was the only hope of my parents. The money that I used to earn form my service was enough for our family maintenance. Besides, looking after my parents, I used to teach my younger brother and provide him pocket money. Later, I got married to Sharmin and used to maintain it. Sharmin was a very simple and nice girl. She had no extra demand other than her necessity. That's why I did not have to take any extra pressure. She managed my family nicely. She paid attention to small savings. She had a plan to have a baby by next one year. My parents were also interested to see our baby. Altogether we were very happy. This accident fell on us as a bolt from the blue. Before understanding anything, all on a sudden, it just dark.The small amount of money we had was finished for the first day treatment, and things got more disastrous. I could not have higher studies, but I had a desire to get my younger brother highly educated. But after this accident, his study was stopped. For our survival,

he had to start working with my previous garage. In the meantime, my father also became sick and he could not be treated timely. Eventually, he died due to lack of treatment. Having no other alternative, Sharmin came forward and took a job at a garments factory. She also started to look after me. Thus, a new struggle for life began. Nothing remained like as before. Previously, we took food three times a day but now take two times a day. Still I am grateful to our Creator that Sharmin is beside me. I am sick and disabled, but still happy that my mother or Sharmin is with me. Sometimes, I think what would happen to me, if they were not beside me. Maybe I would have died (respodent no. 22, male, age: 39).

CASE STUDY: 3

Earlier, I told you that my brother and sisters were not available for help though they were there. Our mother took a lot of pains to bring up us. Our father had died before we grew up. During my marriage, everyone was there, after that, me and my wife continued to help our family. During that time, my income was satisfactory. First, I have a son, after that we have had twin girl kids. Since then, our family expenditure began to increase, and it was difficult to maintain it with my single earning. Then I started to work to increase my income. I became a driver from a helper. I fell as a victim at the last stage of training. Now, it has been about five years that I have been in such a miserable condition. I became dependent on others as I had no leg, and my wife maintains my family by borrowing money. When she became fed-up in maintaining our family, often she used to quarrel with me, although we have much feeling for each other. When the condition of my leg was critical, many people used to think that I was suffering from septic. The cash money that I had already finished. Then some relatives and my employer gave me some money for my treatment. But still it was not enough. About 30 to 40 thousand Taka was spent for my treatment. I did not have necessary money in my hand, so, I had to sell my land. Then it became difficult for me to maintain my family expenses. At that time, one of my brothers from my locality helped me with some money. I could at least survive by his kindness. During the primary stage of my leg, doctors used to pay less attention to my treatment as I could not pay them duly. When I paid them properly, they looked after me properly. Money is important in every stage. If one of my legs would not have been cut off, I would have lost the other one (respodent no. 39, male, age: 30).

CASE STUDY: 4

I did not alone bear all the expenses of the family. My wife also contributed a lot. The income that I got from Ganguli and religious songs and that my wife used to earn from her day labour were enough for our livelihood. But when my right leg became inactive, my eyesight became feeble. Now, I only think myself as a burden on my family and am contemplating about death. Though, I have to depend on others for my movement and care still I run my family, but not like before. Somehow, I am maintaining it. As there is no one else in my family who can earn, so anyhow I have to manage it. There is no other person who can help me financially. Once I used to earn and maintain my family. Currently, I am disabled and completely helpless. I feel sad that due to my disability, I cannot do the things I could do before (respodent no. 55, male, age: 30).

CASE STUDY: 5

There is nothing left to say about this any more. Still I have to say that I used to live by myself. Now I have to depand on others income. What can be more painful than this situation? Life cannot go like this way; it is going now.Though it is passing if somehow I can continue my life that would be a consolation for me. Previously I used to maintain my family by myself and feel happy. My kids used to ask different things from me, and I used to try my best to fullfill their needs. But now I am a burden on others, and feel so unhappy that I cannot do anything for my family. Maybe this was my fate. Otherwise, why it would have been so? I never did any harm to others. After becoming sick, the relationship with my wife is not good. I do not blame her for it. What she would do? She has to maintain the family alone; though she is sometimes fed-up she does like it (respondent no. 65, male, age: 51).

CASE STUDY: 6

Basically, when I think of my past days, I feel very sad to think that I have to be dependent on others' income at this stage of my life. I have to depend on others for the rest of my life. It seems to me that death is preferable to living this type of life. I have to live like a living death. When I think of my current life, I feel that I should die. Each disabled person is somehow dependent on others. There are so many disabled persons who cannot go outside their homes and just lie down on their beds. During my normal life, I used to do a good job. Besides, I used to run a rice store and several workers were there. My income was very satisfactory. I had a plenty of properties. Afterall, my family was solvent. But after my accident, all my wealth finished. Then my wife collected some sewing machines by the help of a donor agency. Few people work there and earn money. Somehow my family is running. I do not need to move around the streets, but the most portion of our income

is spent for our family maintenance and my medication. So, no saving is possible (respondent no. 65, male, age: 51).

CASE STUDY: 7

After talking with the interviewee there are some horrible scenarios revealed. As they were not able to lead a normal life, they need to lead a limited life, so they always compare between their present and previous life styles. Now they are suffering from severe mental distress. This limited life has decreased their productivity and increased their dependency on the society. The feedbacks are stated as, "Now I pass all my time at my house. Sometimes watch television at the drawing room. I am not able to wear my cloths and take my bath. Before my accident, I frequently moved here and wouldthere would do all my activities, but now I can't stand up at my own leg. I pass my time by laying on bed or in wheel chair. I can't walk; even I need help to take bath. Within my house I move by wheel chair. Earlier I would do all my activities by my own but now I need others help. As I am a housewife I used to do all domestic chores, but after accident, I can't help others. I can't do my minimum activities like moving, taking bath, wearing cloths. I need to move by wheel chair. My life is now so much miserable. (respondent no. 95, female, age: 41).

DISCUSSION

The study shows that the interlinking between disability and the experiences of deprivation that starts from the moment of an accidental incident. Then to health seeking behavior follows to end the consequences. Trauma related disability brings not only bad luck, but it also brings lot of complexities in human life. This study reveals the facts that how the interviewees had to face such incidents. Once they used to lead their normal life, but after an accident, all their dreams shattered. All the informants of the study were victims, but their experiences of health seeking behavior and sufferings were not to be same. These unexpected situations appeared as a nightmare to their life. They have to suffer their whole life and will never get back their natural life. The unbearable sorrows, adverse situations and dependency on society are lifelong phenomena. The rest of their life, they have to blame on their fate with mental and psychological sufferings. Most of the time, the health seeking decision totally depends on the surrounding people at the accidental places, their knowledge, awareness and existing facility and capacity regarding proper treatment of the victims.

CONCLUSION

To prevent severe traumatic condition among the road accident victims, delay of treatment must be reduced by providing first aid within a very short time, and to do so, mass awareness campaign is necessary. Moreover, necessary measures should be taken to ensure free public health services to treat the long-term disabled condition of the poor road traffic accident victims. The fillowing issues should be considered:

i) the organizations and educational institutions should note the incidences and case studies for the unaware people who neglect people during driving and whimsically committing accidents;

ii) the information may be used for general mass awareness raising and it may be also used for new project formulation and designing for implementation according to the desire and reflection of the disabled persons;

iii) the recommendations and the limitation of the study will also indicate future operational guidelines that will signify the operational dimensions and inputs for execution, and

iv) the findings demand necessary interventions to be developed by the organizing and conducting institutions and the concerned authority should step forward to design rehabilitation schems for the reduction of disability among the road traffic accident victims.

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Original Article

Outcome of Modified Quad Surgical Procedure in Patients with Obstetric Brachial Plexus Palsy

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ABSTRACT

Obstetric brachial plexus palsy (OBPP) remains an unfortunate possible consequence of a difficult childbirth, despite advances in the prenatal planning and assessment. Children whose injury does not resolve completely by 3 to 4 months of age will end up with a specific series of arm restriction caused by a muscle imbalance between re innervated muscles. Significant improvement can be achieved in these patients by Mod Quad procedure. A prospective study was carried out at NITOR on 16 patients (10girls and 6boys) with obstetric brachial plexus palsy that had not fully recovered by the age of 6 months. all the patent under went Mod Quad procedure on average of 6.75yrs (range 3-10 yrs.) over the time period of 2 years. Result was evaluated the basis of mallet grading system for shoulder function. out come was measured comparing the post operative score to taunt of the preoperative score. All patient had significant improvement in abduction and external rotation and Mallet score improved one to two grade. Mod Quad procedure can bring about significant improvement in shoulder movement in terms of abduction and external rotation.

Keywords: Modified Quad Surgical rocedure, Brachial Plexus Palsy, Obstetric Patients

INTRODUCTION

OBPP has been reported to be associated with prolonged labour, breech presentation, shoulder dystocia, macrosomia, high birth weight, previous deliveries resulting in brachial plexus injuries, multiparous pregnancies, assisted (forceps, vacuum) or difficult deliveries, maternal diabetes, cephalopubic disproportion. OBPP is not uncommon in uncomplicated delivery.[1,7,11,14] It has been reported that 80% to 95% of all injuries are mild [12,13]and infants with mild OBPP recover upper extremity function spontaneously.[14] But rate of spontaneous recovery is debated and is variable[20]. It is reported as high as (70 to 92%) by some authors[15-17] to as low as 7 to 50% by other authors[18-21]. While about 15% will beseverely handicapped and remaining 35% of the patients will have a satisfactory outcome, but with some shoulder functional limitation.[10] External rotation isusually the main problem, and these patients show excessive shoulder abduction (trumpet sign) while attempting to put hand to mouth[1,9,10]. Residual muscle weakness in obstetric brachial plexus palsy results in soft-tissue contractures which limit the functional range of movement.[1] These children can often benefit from release of the contracted muscles to maximize the range of motion.

Many traditional procedures have been described to treat obstetric brachial plexus sequelae. Here, we report the clinical outcome of OBPP patients, who had undergone the Mod Quad surgical procedure[1].

MATERIAL AND METHODS:

A prospective study conducted in our institute consisting with 16 patients (10 girls and 6 boys) with obstetric brachial plexus palsy that had not fully recovered by the age of 6 months. The patients in this study had significant

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abduction deformity with contractures of the latissimus dorsi, the teres major, the pectoralis major and the subscapularis muscles. Of these, 13 patients had a C5-C6 injury, 3 had a C5-C7 injury. Age range was between 3 and 10 (mean age 6.75), who have got adequate physiotherapy before surgery. They all have had modified Quad surgical treatment between 2015 and 2016 in NITOR. All patients were evaluated pre and post operatively by Mallet scores(table 1). 2 patients with incomplete follow-up were excluded from the study.

Operative technique:

The procedure was under taken under general anesthesia and the combination of release and transfer followed as described by Nath

Steps of operation:

Release of subscaplaris,

Z lengthening of pectoralis major,

Latissimus dorsi muscle transfer to teres minor,

Debulking of teres major and

Decompression and neurolysis of axillary nerve.

Postoperative care:Slab was applied in statue of liberty fashion. Drain removed on 2nd POD. Dressing checked on 7th POD. Stitches were removed on 14th POD and slab was replaced by statue of liberty splint. Splint removed on 28th POD and shoulder movement was allowed. Splint used at nighttime only up to 8 weeks.

Table 1 *(The Mallet grading system for shoulder function.)*

Grade	Description
I	Flail shoulder
II	Active abduction ≥30° Zero degrees of external rotation Hand to back of neck impossible Hand to back impossible Hand to mouth with marked trumpet sign
III	Active abduction 30–90° External rotation up to 20° Hand to back of neck with difficulty Hand to back with difficulty Hand to mouth possible with partial trumpet sign (over 40° of shoulder abduction)
IV	Active abduction over 90° External rotation over 20° Hand to back of neck easy Hand to back easy Hand to mouth easy with less than 40° of shoulder abduction
V	Normal shoulder

RESULT:

Result was evaluated postoperatively by Mallet grading system(table1) for shoulder function and compared with pre operative score. There was a significant improvement in abduction and external rotation. All Mallet functions were found improved in these patients after at least 1-year follow-up. At a follow-up of 1 year, the postoperative total Mallet score increased one grade 11 cases and two grades in 3 cases.

Table-II

(The Mallet grading system applied to 16 children)

	Case no	Age	Sex	Preoperative	Postoperative	Grade imrovement
Grade I = no cases Grade II = 5 children Grade III = 7 children Grade IV = 4 children Grade V = no cases	1	10	M	III	IV	1
	2	7	F	III	IV	1
	3	5	F	IV	V	1
	4	8	F	II	IV	2
	5	6	M	III	IV	1
	6	8	F	II	III	1
	7	9	M	III	IV	1
	8	4	F	IV	V	1
	9	7	M	II	IV	2
	10	6	F	III	IV	1
	11	4	M	II	IV	2
	12	3	F	IV	V	1
	13	3	F	III	IV	1
	14	6	M	IV	V	1
	15	5	F	III	IV	1
	16	9	F	II	III	1



Fig.-1

DISCUSSION:

The most important secondary squeal associated with OBPP to the upper plexus is contracture related to the resultant weakness of the deltoid and external rotators of the shoulder.In spite of good strength of shoulder abduction the patient has poor range of shoulder abduction. This is probably is because of the fact that the shoulder adductors have recovered much earlier than the abductors and hence the late recovering and weaker abductors are actually not allowed to recover to their full potential by the stronger antagonist muscle. This suppression effect is made worse by the development of the co-contraction between the abductors & adductors and external and internal rotators. Hence the activity of the abductors and external rotator is completely masked.

Many soft-tissue and bony procedures have been described in attempts to treat these secondary deformities. Those are combination of release of contracted internal rotators, the pectoralis major, teres major, and with latissimusdorsi release and transfer.[1,2] L' Episcopo[3] advocated transfer of the insertion of teres major first and of latissimusdorsi later from the anteromedial to the posterolateral aspect of the humerus, suturing the tendons in their new position under an osteoperiosteal flap. Improvement was reported with transfers of latissmusdorsi along with other release.[2-8,21] Phipps and Hoffer[2] introduced a modification whereby the contracted internal rotators, the pectoralis major, teres major, and latissimusdorsi are released and attached to the part of the rotator cuff where the infraspinatus normally inserts. In 1996 Nath and Paizi reported the procedure, and coined the term modified Quad, which is as follows:

Transfer of the latissimusdorsi muscle to give external rotation and abduction; Transfer of the teres major muscle to stabilise the scapula; Release of the subscapularis, pectoralis major and minor contractures;

Decompression and neurolysis of the axillary nerve.

The focus was on the shoulder as Shoulder movements are important as more distal functions depend on it. Activities requiring raising the arm, such as hair grooming, eating and overhead reaching will be difficult or not possible. This causes dysfunction with activities of daily living or recreational activities that require hand use above the level of the shoulder.

The patients in our present study are all below 10 years who have suffered obstetric brachial plexus palsy at birth. The weakness of the deltoid, infraspinatus and supraspinatus, and teres minor in combination with the strength of the relatively spared large internal rotator and adductor muscles causes progressive muscle imbalance, resulting in loss of abduction range and external rotation. All the patients in our present study underwent surgical contracture releases and tendon transfers as described in the modified Quad protocol in methods.

Compression of the axillary nerve in the quadrangular space is a common cause for impairment in these patients[1]. Therefore, we performed decompression of the axillary nerve and released the long head of the triceps, which address the periarticular tightness in these patients. Latissimusdorsi transfers to the teres minor enhance the stabilizing effect of the rotator cuff. This enables the deltoid to act more effectively. There was great improvement in all Mallet functions in addition to abduction, especially external rotation and supination (Fig 2) at least a year after the modified Quad surgery. Other investigators have demonstrated improvement in external rotation by performing the tendon transfers higher and more laterally in the shoulder than those performed in our study. Although these published surgical techniques have improved external rotation, yet they have inhibited the abduction and flexion achievable. Our Modified Quad procedure considers not only abduction but also other shoulder functions, specifically external rotation and supination.

CONCLUSION:

The modified Quad procedure greatly improves not only the active abduction but also other shoulder functions, as this outcome is the combined result of decompression and neurolysis of the axillary nerve and the release of the contracted internal rotators of the shoulder.

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Original Article

Evaluation of Subungual Glomus Tumour of the Fingers

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ABSTRACT

Glomus tumour is a benign but debilitating neoplasm arising from the neuromyoarterial plexus concentrated beneath the nail. Misdiagnosis and delayed diagnosis of the tumour is common. That is why patients with glomus tumour may spend many years with excruciating pain and distress. Diagnosis is often always clinical. Once a diagnosis is made, complete surgical excision results in complete symptomatic relief. Recurrences may occur due to incomplete excision or the growth of a new glomus tumour. This article outlines the knowledge relating to the pathophysiology, diagnosis and treatment of glomus tumours of the fingers. So that, the lesion can be recognized and treated earlier.

Key words: Subungual Glomus Tumour.

INTRODUCTION

Glomus tumor was first described by Wood as early as 1821, but the characteristic histological description was given by Masson.[1] Glomus tumors are more common in women between 30 and 50 years of age, are not known to be associated with any other condition, and occur spontaneously. They are usually solitary but a multiple glomus tumor syndrome has been described that is transmitted in an autosomal dominant pattern.[2]

The glomus body is made up of glomus cells with smooth muscle properties and hence has the ability to contract, playing a part in thermoregulation by controlling blood flow to the skin. Glomus bodies are highly concentrated in the digits, palm and soles of the feet. Glomus tumour, a neoplasm of the glomus body, is generally a benign tumour, although malignant glomus tumour has also been described.[3,4]

The classic symptom presentation is a triad of pinpoint tenderness, paroxysmal pain and hypersensitivity to cold.[5] Changes in temperature cause contraction of myofilaments resulting in an increase in intracapsular pressure and cause the perception of pain.[5] The rarity of glomus

tumours makes them difficult to diagnose, and patients may spend years seeing different doctors before the right diagnosis is made, and appropriate treatment offered.

MATERIALS AND METHODS

We retrospectively reviewed the medical records of all patients treated at our institution between 2010 and 2016. Eleven records with a histopathological diagnosis of glomus tumour in the hand were found and the records were traced. One patient folder was untraceable. Although, the tumour can occur in various parts of the body like ear, elbow, arm, calf muscle etc. We exclude them and include the glomus tumour of the finger only. The data including: age, sex, site of lesion, presentation time with the initial complaints, first clinical consultation and time of diagnosis, presenting symptoms and clinical signs, radiological imaging modalities employed, outcome of treatment and complications.

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RESULTS

Table showing the patients data.

No	Age	Sex	Site of lesion	Delay of consultation (months)	Symptoms	Signs	Radiology	Treatment	Diagnsis made by
1	32	F	Right Index finger	13	Pain & swelling	Love's & cold-sensitivity test positive	No bony change	Excision biopsy	Clinical diagnosis
2	29	M	Left Ring finger	8	Pain	No sign	No bony change	Excision biopsy	HPE report
3	46	F	Left Middle finger	23	Pain, swelling & discoloration	Love's & Hildreth's test positive	No bony change	Excision biopsy	HPE report
4	38	F	Left thumb	11	Pain & swelling	Love's & cold-sensitivity test positive	No bony change	Excision biopsy	Clinical diagnosis
5	41	F	Right Ring finger	19	Pain & swelling	Love's & Hildreth's test positive	No bony change	Excision biopsy	Clinical diagnosis
6	53	M	Left Little finger	6	Pain	No sign	No bony change	Excision biopsy	HPE report
7	48	F	Right Middle	10	Pain	Love's test positive	No bony change	Excision biopsy	HPE report
8	49	M	Left Index finger	31	Pain, swelling & deformity	Love's & Hildreth's test positive	Distal phalanx erosion	Excision & currattage	HPE report
9	31	F	Right Little finger	11	Pain	Love's & cold-sensitivity test positive	No bony change	Excision biopsy	HPE report
10	40	F	Left Ring finger	17	Pain & swelling	Love's test positive	No bony change	Excision biopsy	HPE report

There were 7 female and 3 male in the study population. The mean age was 40.7 years and the age range was between 29-53 years. The sites of lesion were: 3 in ring finger, 2 in middle finger, 2 in index, 2 in little and 1 in thumb. The patients presented to physician after the appearance of the first symptom was in average 14.9 months. After the first physician visit the average time taken to come to a diagnosis was 15.3 months.

Nine patients (90%) presented with pain associated with localized tenderness and six patients (60%) had a clinically noticeable swelling at the site of pain. Only one patient

(10%) presented with deformity of the nail plate and one patient (10%) presented with an associated discoloration.

The Love's test (pin point tenderness), which is the most common clinical sign was positive in 8 (80%) of the patients. Three patients complained of cold intolerance. The second test we had performed was Hildreth test, which was positive in 3 (30%) of the patients. The third one was cold sensitivity test, which was also positive in 3 (30%) of the patients. We had not performed Transillumination tests on any patients.

All patients underwent plain radiolography. Almost all cases show no bony changes except one. Which shows bony erosion in distal phalanx. We have not done MRI, CT angiography, and ultrasonography. Otherwise, diagnosis was made on the basis of: clinical presentation, 3; histopathological confirmation, 7; and radiological appearance, 1. Clinical diagnosis was made much earlier if the patient was seen by a hand surgeon.

We completely remove of the tumour following use of the transungual approach One patient (10%) had clinical recurrence for which repeat excision was performed. The differential diagnosis included neuroma, subungual exostosis, ganglion, inclusion cyst, melanoma, osteoarthritis, Reynaud's phenomenon, pyogenic granuloma and haemangioma.

DISCUSSION

Recognition and diagnosis of glomus tumours is very important, because misdiagnosis or delayed diagnosis may resulting in exacerbation of a patient's symptoms. Clinical examination tests along with imaging support the correct diagnosis of these tumours.

The classical triad of glomus tumour symptoms includes severe pain, pinpoint pain, and cold sensitivity.[6] The tumour itself may not be obvious to the naked eye. There are three main clinical tests that help in diagnosing glomus tumours. The first is Love's pin test, in which a pinhead is used to apply pressure to the suspected area. The point at which intense pain is registered confirms the affected area containing the glomus tumour. The second test is Hildreth's test. In this test, transient ischemia is induced along the arm by using a tourniquet. Owing to the temporarily restricted blood supply, a positive test would be noted if the patient experiences a slight or full withdrawal of pain from the affected area. The reduction or absence of pain by repeating Love's pin test with the tourniquet also indicates a positive result. When the tourniquet is removed, the patient will feel a sudden return of pain. The third test is the cold-sensitivity test. In this test, cold water or an ice cube is applied to the affected area.[7] The patient experiencing increased pain would indicate a positive result.

Pain is the most common presentation of glomus tumor. Our patient had the classical triad of symptoms - temperature sensitivity, severe pain and localized tenderness. This can be noted in 63-100% of the patients.[1] Bhaskaranand and Navadgi reviewed different clinical tests to diagnose glomus tumors and opined that cold sensitivity test is the most accurate test to diagnose glomus tumors.[8] Our patient also had positive cold sensitivity, confirming their view. Positive cold sensitivity is also reported by Vasisht *et al*. in 84% of their patients.[3] Erythronychia and distal onycholysis were seen in all the glomus tumor patients studied by Dominguez-Charit *et al*.[9]

Fazwi R et al.[10] found that the average time to diagnosis in their series was 3.3 years with the longest being 10 years. They also stated that the clinical diagnosis was obtained much earlier in patients seen by the resident hand surgeon and those seen at their institution later in the study period. This reflects the importance of clinical experience and awareness regarding the diagnosis of the condition.

Bhaskaranand K et al.[8] & Ghaly RF et al.[4] stated that glomus tumours might be classified as solitary or multiple. Commonly located in the fingertips, solitary tumours were often encapsulated. The more rare multiple glomus tumours had earlier onset, and were inherited in an autosomal dominant manner with incomplete penetrance. Fazwi R et al.[10] stated that on basis of its 3 typical components, i.e., glomus cells, vasculature, and smooth muscle cells, glomus tumours might be classified as solid glomus tumour (with poor vasculature and a scant smooth muscle component), glomangioma (with a prominent vascular component), or glomangiomyoma (with prominent vascular and smooth muscle components).

Lee IJ et al.[11] stated that histopathologically, glomus cells presented with round to oval nuclei and striking eosinophilic cytoplasm after haematoxylin adenosine staining. Immunohistochemically, these tumours stain positively for vimentin, neuron-specific enolase and muscle actin, but negatively for cytokeratin and S100. Folpe AL et al.[12] stated that malignant glomus tumours are rare. These glomangiosarcomas are often located in the lower extremity or deep viscera, with approximately 8 cases reported in the hand. Oh SD et al.[13] stated that these tumour cells are strongly and diffusely positive for vimentin, smooth muscle actin and muscle-specific actin, and focally positive for the antiapoptotic marker bcl-2. Metastasis is rare, and

wide excision is curative with a low recurrence rate. Keles B et al.[14] stated that recommended treatment for glomus tumours is complete surgical excision. In our series, the recurrence rate was 10%. Fazwi R et al.[10] stated that true recurrence appeared within weeks of surgery and usually represents inadequate excision. Those that reappeared years later were believed to be a result of the development of a new tumour near the site of the excision.

There are multiple surgical approaches have been described in the literature, such as the transungual, lateral subperiosteal and the Keyser-Littler approach.[3,15,16] With the transungual approach, the nail plate is removed and an incision is made on the nail bed, the nail bed is elevated adequately exposing the tumor for removal and is followed by meticulous repair. In the lateral subperiosteal approach, an incision is made dorsal to the mid-lateral line. Dissection is carried down to the distal phalanx and a dorsal flap consisting of skin, nail plate, nail bed and germinal matrix tissue is elevated in a single layer.[3] The Keyser-Littler approach is also a lateral approach made through a high mid-lateral approach below the paronychial fold. The distal phalangeal ligament, which provides lateral support to the nail matrix and nail plate, is identified and retracted. The nail matrix is then elevated over the ligament and the dorsal cortex of the distal phalanx.[16] The transungual approach affords better exposure.[15] With the lateral subperiosteal approach nail deformities are better avoided. We have no experience with the lateral subperiosteal approach. For removal of the tumour following use of the transungual approach none of our patients have nail deformities.

CONCLUSIONS

To conclude, although glomus tumours are uncommon tumours, symptoms and signs are relatively sensitive and specific when used in combination. Owing to its small size, diagnosis of this tumour should be considered when patients present with severe pain in the fingers without any obvious lesion. Complete surgical excision is the treatment of choice. But keep it mind that there are chance of reccurence upto 10%.

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Original Article

Titanium Elastic Nailing in Paediatric Femoral Diaphyseal Fractures in the Age Group of 6-13 Years - A Short Term Study

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ABSTRACT

Management of femoral diaphyseal fracture in the age group of 6-13 years is controversial. The purpose of this study is to demonstrate the effectiveness of intramedullary fixation of femoral shaft fractures by using titanium elastic nailing system (TENS). 14 pediatric patients (10 boys, 4 girls) aged 6-13 years with diaphyseal femoral fractures were treated by retrograde Titaneum Elestic Nail.13 patients underwent surgery within seven days of their injury.The result were evaluated using Flynns scoring criteria.All fractures were radiologically united at 8-10 weeks period(mean 9 weeks) and full weight bearing was possible in a mean time of 9.5 weeks.The result were excellent in 12 patients and satisfactory in 2 patients.All patients had early return to school. Intramedullary fixation by Titaneum Elastic Nailing is an effective treatment of diaphyseal fractures of the femur in properly selected patients of the 6-13 age group.

Keywords: Titanium elastic nailing, paediatric femoral diaphyseal fractures, A short term study

INTRODUCTION

Femoral shaft fracture is an incapacitating pediatric injury[1,2]. To a great extent, the treatment options vary according to the surgeon's preference.[3] Because of rapid healing and spontaneous correction of angulation most of the femoral shaft fractures in children younger than six years of age can be treated conservatively[4,5]. Above six years of age all such fractures, when treated nonoperatively could have, loss of reduction, malunion, intolerance and complications associated with plaster. Near the end of skeletal maturity accurate reduction is necessary as angular deformity is no longer correctable by growth.[6] Availability of locked intramedullary nail has made the treatment of femoral shaft fractures in skeletally matured children well established. However, the best treatment between six and 13 years of age is a matter of debate[7]. Since the last two decades, there has been a growing tendency towards a more operative approach in patents over six years of age[3,6.8]. Titanium Elastic Nailing, which is variously known as Elastic Stable Intramedullary Nailing, has become the choice of stabilization in pediatric long bone fractures, particularly the femoral shaft fractures.[9,10] The perceived advantage of this technique includes early union due to repeated micromotion at fracture site, respect for the physis, early mobilization, early weight bearing, scar acceptance, easy implant removal and high patient satisfaction rate[1,3,9,11].

MATERIALS AND METHODS

Between January 2015 and December2016, 14 pediatric patients (10 boys, 4 girls) aged 6-13 years with diaphyseal femoral fractures were treatedby retrograde TENS fixation.

All Fracturesare closed,Transverse mid shaft fracture 13, Distal 1/3rd fracture 1 .The final results were evaluated by using Flynn's criteria.

Most of the fractures were due to road traffic accidents (n=11, 78.5%). Right-sided involvement was seen in 9 cases (64.2%). The patients (n=9) underwent surgery within seven days of their injury. The surgery was performed under general anesthesia with the patient on the fracture table in supine position. Two Titanium Elastic Nails of

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identical diameter were used. The diameter of the individual nail was selected as per Flynn *et al*'sformula[1] (Diameter of nail = Width of the narrowest point of the medullary canal on Anteroposterior and Lateral view × 0.4 mm) and intraoperative assessment. The diameter of the nail was chosen so that each nail occupies at least one-third to 40% of the medullary cavity. Fractures were reduced using fluoroscopic guidance. Fractures were inserted in retrograde fashion with medial and lateral incision 2.5-3.5 cm above the physis. . The nails were prebent sufficiently so that apex of the bowed nails rested at the same level on the fracture site to ensure a good equal recoil force. Open reduction was required in three cases due to soft tissue interposition and failure to negotiate one nail to the proximal fragment. The nails were driven proximally so that both were divergent and the tips got anchored minimum 1 cm distal to the physis. Postoperatively patients were nursed in supine position with the operated leg elevated on a pillow.Patients were mobilized without weight bearing on the fifth to seventh day postoperatively. Partial weight bearing was started at three weeks and full weight bearing by six to eight weeks depending on the fracture configuration, callus response and associated injuries.

The results were evaluated using Flynn *et al*'s scoring criteria for TEN.[12]Nails were removed six to eight months post surgery when the fracture line was no longer visible radiologically.

RESULTS:

The mean duration of follow-up was 18 months (range 3-21 months). All fractures were radiologically united with grade 3 callus formation at 8-10 weeks period (mean 9 weeks) and full weight bearing was possible in a mean time of 9.5 weeks. According to Flynn's criteria, excellent result was found in 12 patients (85.71%) and satisfactory in 2 patients (14.28%). Limb lengthening was noticed in 1cases, varus mal-alignment was in 1 cases and rotational mal-alignment was seen in 1 cases. Peri-operative difficulties encountered were failure of closed reduction in 4 cases. The median duration of surgery was 70 min (50-120 min). The mean hospital stay was 9.8 days (8-21 days)

Table-I

Scoring criteria Titanium Elastic Nail

Limb length	Excellent	Successful	Poor
discrepancy	<1cm	<2cm	>2cm
Sequence Disorder	5^0	10^0	$>10^0$
Pain	Absent	Absent	Present
Complication	Absent	Mild	Major complication

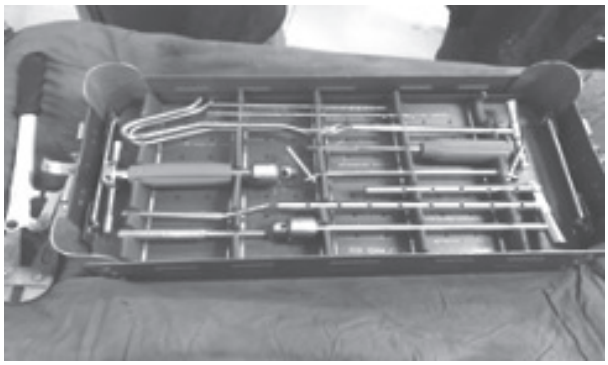


Fig.-1: *Clinical photograph showing*

Table-II

Clinical details of patients

Age yrs/sex	Nail diameter (mm)	Radiological union (Wks)	Full(wt) Bearing and return to school (Wks)	Hospital days	Follow up (Month)
8M	3	8	8	10	6
10F	3.5	10	10	13	12
6M	3	8	8	15	12
12M	3.5	10	10	14	14
13M	3.5	12	12	14	16
7F	3	8	8	15	9
11M	3	10	10	19	16
10M	3.5	10	10	16	14
6F	2.5	8	8	17	7
10M	3	8	8	13	15
12M	3.5	10	10	12	16
7M	3	8	8	15	10
12M	3.5	12	12	13	15
9F	3	8	8	15	13

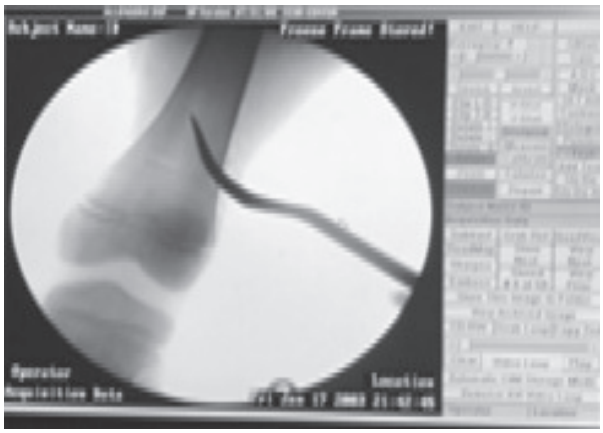


Fig.-2: *Clinical photograph showing Insertion of Awl under fluoroscopic control*

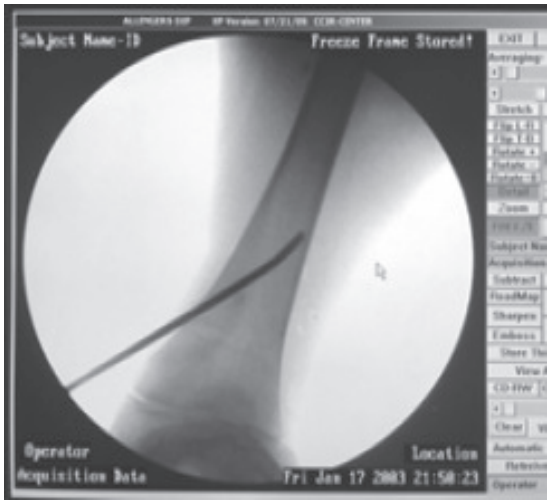


Fig.-3: *Clinical photograph showingInsertion of nail under fluoroscopic control*



Fig.-4: *Clinical photograph showing Post operative x-ray*



Fig.-5:*Clinical photograph showing x-ray after radiological union*

DISCUSSION

Although femoral shaft fractures constitute fewer than 2% of all pediatric fractures, the choice of treatment has remained a constant challenge to the orthopedics fraternity. Until recently conservative treatment was the preferred method for the treatment of diaphyseal fractures in children and young adolescents. However, to avoid the effects of prolonged immobilization, to reduce the loss of school days and for better nursing care, the operative approach has been gaining popularity for the last two decades.Various methods of treatment have been advocated in the form of closed reduction and above elbow plaster cast application, primary closed reduction and percutaneous pinning and open reduction and internal fixation by Kirschner wires. Hence closed reduction and percutaneous pinning is the preferred treatment in grade II and grade III displaced supracondylar fractures.

Titanium elastic nail seems advantageous over other surgical methods particularly in this age group because it is simple, is a load-sharing internal splint that doesn't violate open physis, allows early mobilization and maintains alignment. Micromotion conferred by the elasticity of the fixation promotes faster external bridging callus formation. The periosteum is not disturbed and being a closed procedure there is no disturbance of the fracture hematoma, thereby less risk of infection. Flynn *et al*. found TEN advantageous over hip spica in treatment of femoral shaft fractures in children[7].

Ligier *et al*. treated 123 femoral shaft fractures with elastic stable intramedullary nail. All fractures united. Thirteen children developed entry site irritation.[22] Similarly, Narayanan *et al*. found good outcome in 79 femoral fractures stabilized with TEN[3].

Transverse, short oblique and minimally comminuted fractures are suitable for TEN as stated by Flynn *et al*.[1] Narayanan *et al*.[3] stated that transverse, short oblique, short spiral fractures with minimum comminution in the 5-12 years age group were the best indications for TEN. Lascombes *et al*.[24] stated that TEN could be indicated in all femoral diaphyseal fractures of children above six years of age till epiphysis closed

The most common complication of Titanium elastic nail is entry site irritation and pain.[3][12]Other complications include limb length discrepancy, angulation of fracture, refractures and infection. Entry site irritation in our series was seen in three cases.

CONCLUSIONS

TENS is a safe and effective method for the treatment of pediatric femoral shaft fractures, because it is minimally invasive, relatively easy to use and shows very good functional and cosmetic results.

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Use of the AO Hook-plate for Treatment of Unstable Fractures of the Distal Clavicle – Functional Outcome in 10 Cases

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Abstract:

Treatment of displaced lateral clavicular fracture is difficult. There are different modalities of treatment, but no one is superior. In the last decade ,the clavicular hook plate has been used extensively. But in our country no study has been reported yet. We evaluated acute displaced lateral clavicle fractures, treated with the AO hook plate. This was a prospective study carried out in Dhaka Medical College hospital and different clinic in Dhaka, Bangladesh during the period from July 2013 to June 2015.A total number of 10 patients were selected consecutively. Mean age was 35 years (range 15-54),all are male patients. All patients had an Neer Type II fracture. All fractures eventually achieved solid bony union within 4 months after surgery. No complications were seen. Clinical results were excellent with a mean Constant-Murley score of 89 points at final follow-up. AO clavicle hook-plates are useful fixative implants for unstable fractures of the distal clavicle. It facilitates early mobilization of the shoulder postoperatively and results in a high percentage of union.

Key words: Clavicle fracture, AO hook plate .

INTRODUCTION

About 15 % cases of lateral clavicular fracture is displaced (Neer Type 2). Three types of clavicular fracture have been demonstrated based on the relationship of the fracture line to the coracoclavicular ligaments and acromioclavicular joint[1,2] (Figure1). Type I fracture occurs distal to the coracoclavicular (CC) ligaments (ie, trapezoid, conoid) and involves minimal fracture displacement. The acromioclavicular (AC) joint remains intact. Type III fracture occurs distal to the CC ligaments and extends into the AC joint[2]. Neer type II fractures occur more medial to the coracoclavicular ligaments and often result in major displacement because of complete or incomplete rupture of the coracoclavicular ligaments, resulting in higher rates of nonunion ranging from 21% to 44% with nonsurgical management[1,2]. It is Difficult to treat. There are different modalities of treatment, but no one is superior.

We evaluated the clinical and radiographic results of AO clavicular hook plate fixation for Neer type II distal clavicular fractures.

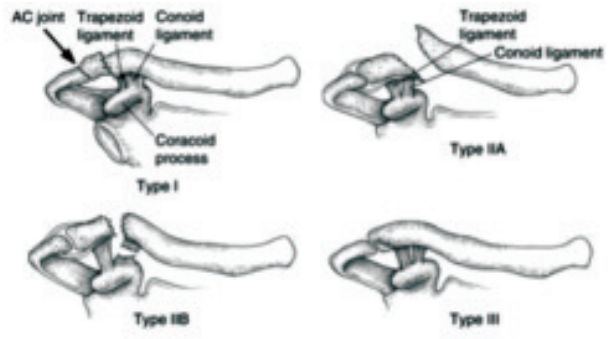


Fig.-1: *Illustration of the Neer classification of distal clavicle fractures*

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METHODS

This was a prospective study carried out in Dhaka Medical College hospital,Dhaka, Bangladesh during the period from July 2013 to June 2015..A total number of 10 patients were selected consecutively. Mean age was 35 years (range 15-54),all are male patients. Three patients had a right sided and Two are left sided fracture. All patients had an Neer Type II fracture. All patients had suffered a monotrauma. Unrestricted passive and active range of motion was performed as soon as possible after the operation. Clinical and radiological union was assessed at 2 weekly for 1 month, 4 weekly for next 2 monts then 6 weekly until radiological union.Thereafter 6 monthly follow up given.

THE IMPLANT

The clavicle hook plate is a pre-contoured stainless steel, dynamic compression plate with a wider anterolateral end and a lateral extension into a hook which is placed below the acromion. The holes accept 3.5 mm cortical bone screws and 4.0 mm cancellous bone screws.



Fig.-2: *The Clavicle Hook Plate*

Surgical Technique

Surgical technique consisted of application of basic reduction and plating methods. The patients were operated in beach chair position under general anaesthesia . The fracture was reduced and temporarily fixed with K-wires . No repair of the torn ligaments was performed..No opening of the AC joint, Hook depth was passed below the acromion. The shaft of the plate was placed on the superior aspect of the clavicle and checked for alignment. The plate was then secured to the shaft with four 3.5 mm cortical screws approximating the plate to the clavicle. The wound was closed in layers over the plate.

RESULTS

All ten patients diagnosed with a displaced lateral clavicle fracture between July 2013 to June 2015., were treated with the clavicle hook plate.

Mean pre- operation time was 5 days (range 0-14 days) and the operating time was 43 minutes (35-70 minutes).

All patients were discharged on the third post-operative day .

Mean follow up period was 10 months (range 2-24 months),

All fractures eventually achieved solid bony union within 4 months after surgery.

No complications were seen.

Clinical results were excellent with a mean Constant-Murley score of 89 points at final follow-up.

DISCUSSION

Although 15% of all clavicle fractures consist of lateral clavicle fractures, only a third of these fractures are displaced (Neer Type 2/Edinburgh Type 3B1) Which are unstable fractures. Conservative management has been advocated by several authors. Robinson and Cairns[4] retrospectively followed up on 101 patients. They reported a non union of 37%. Only 35% of these patients required an operation because of symptoms.

Several operative methods have been described. Transacromial wire fixation was popularized by Neer[5] and is a commonly used method. Kona et al[6] reported an unacceptably high complication rate (47%) with the use of K-wires and advised against its use. Another operative treatment option is indirectly reducing the fracture by coracoclavicular fixation. Using several techniques . Ballmer and Yamaguchi reported good results with the Bosworth screw fixation. The indirect reduction method requires extensive dissection around the fracture and bore holes through the clavicle and the coracoid process. Erosion of these structures and fracture of the clavicle and the coracoid are well recognized complications.



Fig 3: *a). pre-operative Xray. b)Per operative pic. c)Post operative Xray d) Final follow up Xray at 3months e) Shoulder movement at final followup.*

The results of Treatment with the clavicle hook plate published in several studies shows good results in terms of bony union and in terms of shoulder function. Shoulder function is measured most frequently by the Constant-Murley scores. Non union occurs only seldom, below 10% in most series. Compared to the K-wire fixation and the Bosworth screw fixation, it facilitates earlier regain of previous activities .Muramatsu et al[7] found Impingement, subacromial bursitis and subacromial osteolysis on x-ray are signs of a mismatch between the plate and the anatomy of the patient. These complications can be minimized by performing an anatomic fit of the plate during the procedure.

In our patient group, we had no impingement complants and subacromial osteolysis. None of these patients developed a frozen shoulder or required early plate removal.

CONCLUSION

AO clavicle hook-plates are useful fixative implants for unstable fractures of the distal clavicle. It facilitates early mobilization of the shoulder postoperatively and results in a high percentage of union early removal of the implant is recommended to avoid complications.

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Original Article

Evaluation of the Results of Open Reduction and Internal Fixation (ORIF) of T-Y Condylar Fracture of Distal Humerus in Adult by Condylar Locking Plate and Medial Condyle by K-wire

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Abstract

The purpose of this study was to evaluate the results of the results of open reduction and internal fixation (ORIF) of T-Y condyler fracture of distal humerus in adult by Condylar locking plate and medial condyle by k-wire. This study was conducted at NITOR, Dhaka from January, 2014 to December, 2015. The result of current study demonstrates that mean age of the patients included in the study was 34 years and SD was ± 9.7 and the youngest and the oldest patients were 18 years and 50 years respectively. series it was observed that majority 10(55.66%) of the patients were female where 8(44.44%) of the patients were male, which indicates the female was predominant in this study. In the current study it was observed that majority 9(50.00%) of injuries were caused by MVA, 7(38.89%) due to fall and 2(11.11%) due to fall from height.In this study it was observed that 7(38.89%) of the patients were housewife, 6(33.33%) were businessman. In the present series, the left side was more 12(66.67%) affected than right side 6(33.33%). Regarding time interval between injury and operation, it was observed in this study most 11(61.11%) of the patients were operated within 1 week of injury and the rest 7(38.89%) were operated between 1 to 2 weeks and Mean ± SD was 7.83 ± 3.46. In the current study only 1(5.56%) case did not show union, 2(11.11%) were delayed union and 15(83.33%) were timely united. Vinit Gupta et al., 2010 reported 22(85%) of 26 cases showed timely union at 18 weeks. In the current study 15(83.33%) of 26 cases showed timely union at 18 weeks. In the current study, patients were assessed by using the joint specific Mayo Elbow Performance Index (MEPI), which measures motion, pain, stability and function. In this study, 8(44.44%) were excellent, 6 (33.33%) were good, 3 (16.67%) were fair and 1(5.56%) was poor result. Keeping in view the results of other authors as well as the results of this study finally concluded that the treatment of T-Y condylar fracture of the distal end of the humerus in adults with open reduction and rigid internal fixation by reconstruction plate in lateral column and tension band wiring in medial column provide adequate stability to allow for the early start of post operative functional rehabilitation with predictably high rate of fracture union, there by better functional and anatomical results. In this study, no osteotomy nonunion was encountered in 18 patients who were treated with the Muller extrarticular transolecranon approach. The olecranon osteotomy is better in the visualization of more complex articular injuries, and allows accurate articular reduction.

Keywords: Condylar fracture, locking plate, k-wire fixation

INTRODUCTION:

Since the original description by Desault in 1881, the intercondylar fracture of the distal end of the humerus has remained one of the most difficult of all fractures to manage. Recommendations for treatment have ranged widely, from essentially no treatment to operative reduction and extensive internal fixation.T he problem of management made difficult by the fact that the fracture is relatively uncommon.[1]

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The preferred treatment for displaced, intercondylar fractures of the distal part of the humerus is open reduction and internal fixation. Adequate exposure is critical for visualization of the fracture fragments during reduction and fixation, and it is generally agreed that the best exposure of both columns of the distal part of the humerus and articular surface is achieved through posterior approach. This approach requires reflection os the extensor mechanism, typically through a triceps splitting approach or an olecranon osteotomy.[2]

Intra articular fractures of the distal humerus are rare and difficult to treat.The recent trend has been immediate open reduction,stable internal fixation and early post operative active range of motion. By adherering to the basic principles of atraumatic soft tissue technique, stable anatomic reduction of the fracture, and early postoperative mobilization, aappoximately 75% good to excellent results can be expected[9].

Comminuted intra articular fractures of the distal humerus have received relatively little attention in the orthopedic literature. Perhaps because they are rather uncommon injuries. In 1965 , Miller reported a yearly average of between four and six of these injuries. In 1969, Riseborough and Radin noted an incidence of three to four fractures yearly[4].

Fractures of the distal end of the humerus have long been subjective to discussion regarding the the best method of treatment, especially when they involve the elbow joint. Losed external fixation, sling immobilization, continuous extension, function bracing, and operative stabilization have been suggested with varying success. It is the aim of this paper to show that in most fractures early internal fixation will achieved good results when the indication is correction, surgical technique adequate, and follow-up treatment appropriate.[10]

AIMS AND OBJECTIVES

General

To find out the effectiveness of results of open reduction and internal fixation (ORIF) of T-Y condyler fracture of distal humerus in adult by Condylar locking plate and medial condyle by k-wire.

Specific

1. To observe causes of injury.
2. To observe prevalence of age and sex distribution
3. To see postoperative complications
4. To see the range of motion of elbow joint.

CLASSIFICATION OF INTERCONDYOLAR FRACTURE:

Riseborough and Radin (1996) classified this type of fracture, based upon its roentgen graphic appearance. This classification provides some guide to management and prognosis (four types):-

Type I: Undisplaced fracture between the capitulum and trochlea.

Type II: separation of the capitulum and trochlea without appreciable rotation of the fragments in the frontal line

Type III: separation of the fragments with rotator deformity

Type IV:Severe comminution of the articular surface with wide separation of the humeral condyle

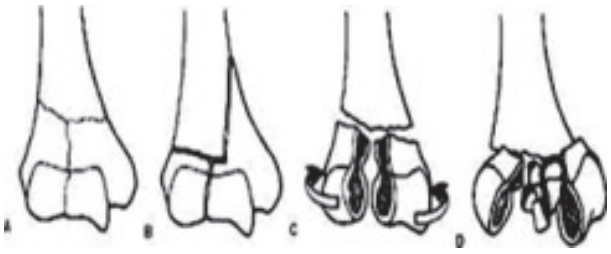


Fig.-1: *Riseborough and Radin classification of distal humerus.*[5]

MANAGEMENT:

Olecranon osteotomy approach:

An olecranon osteotomy approach is useful for accessing complex intraarticular fractures because it provides the most extensive exposure to the articular surface. One anatomic study found that 57% of the articular surface could be visualized with an olecranon osteotomy, whereas only 35% and 46% of the surface could be visualized with triceps splitting and triceps-sparing approaches, respectively. A chevron osteotomy is done using an oscillating saw 2.5 to 3 cm from the olecranon tip down to subchondral bone and is completed with an osteotome. The osteotomy should exit in the non articular "bare area" between the olecranon articular facet and the coronoid articular facet. The olecranon osteotomy can be repaired later with a tension band technique, compression plating, or cancellous lag screw (which can be predrilled)[11].

Plate on lateral column and tension band wiring on medial column:

Medial condyle of the most of T-Y condylar fracture is very small. Application of reconstruction plate in small fragment of medial condyle is very difficult. So tension

band wiring in medial column and reconstruction plate in lateral column is used in this study to see the functional outcome of these fractures.

Technical Pearls for Surgical Fixation of Distal Humerus Fractures:-

1. Every screw in the distal fragments should pass through a plate
2. Engage a fragment on the opposite side that is also fixed to a plate
3. As many screws as possible should be placed in the distal fragments
4. Each screw should be as long as possible
5. Each screw should engage as many articular fragments as possible
6. The screws in the distal fragments should lock together by interdigitation, creating a fixed-angle structure
7. Plates should be applied such that compression is achieved at the supracondylar level for both columns -The plates must be strong enough and stiff enough to resist breaking or bending before union occurs at the supracondylar level.

MATERIALS AND METHODS

This was an interventional study.The study was conducted at the National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR), Sheer-e-Bangla Nagar, Dhaka.The study was carried out during the period from January, 2014 to December, 2015. Patients suffering from recent T-Y condylar fracture of distal humerus were selected for the study with definite inclusion and exclusion criteria.

LOCAL EXAMINATION:

A detailed local examination was then carried out with particular attention to:

1. Attitude of the limb, deformity and status of elbow.
2. Estimation of neurovascular injury, if any.
3. Any associated injury.

RADIOLOGICAL EVALUATION:

- Pain-X-ray: Initial radiographic assessment includes antero-posterior (AP) and lateral spine films.
- CT-Scan

RESULTS:

Figure-I: Occupation

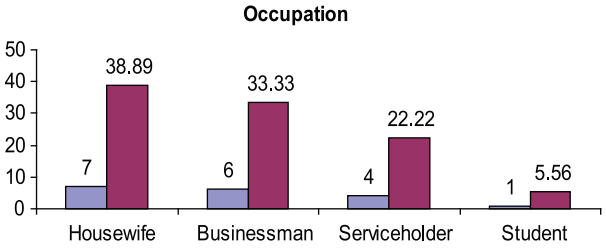


Fig.-2: *Bar diagram showing occupational distribution of the patients (n=18).*

Maximum patients were housewife 7 (38.89%), however a significant number of patients were business 6 (33.33%), service holder 4 (22.22%), student 1 (5.56%).

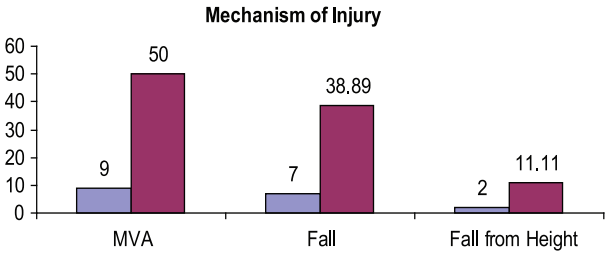


Fig.-2: *Mechanism of injury:*

Majority 9(50.00%) of the injuries were caused by motor vehicle accident, 7(38.89%) due to fall and the rest 2(11.11%) of the injuries due to fall from height

Table-I

Distribution of the patients by time interval between injury and operation (n=18).

Time Interval	No of patient	Percentage (%)
<1 week	11	61.11
> 1 Week	7	38.89
Total	18	100

In this study 11(61.11) cases was operated within 1 week of occurrence of fracture while the rest 7(38.89%) of cases was operated after 1 week .The mean interval between injury and operation was 8 days, where minimum and maximum interval were 4 days and 14 days respectively. Mean time interval was 7.83 and SD was ± 3.46

Table II

Distribution of the patients by complication (n=18)

Complication	No. of patient	Percentage (%)
Infection	3	16.66
Implant loosening	2	11.11
Wound scar	1	5.55
Delayed union	2	11.11
Non union	1	5.55

During the course of the study 3(16.66%) patients developed superficial infection and 2(11.11%) patients were developed implant loosening, 2(11.11%) were delayed union, 1(5.55%) were wound scar, 1(5.55%) was non union and the rest of them have no significant complication.

Table- III

Distribution of the patient according to the motion arc of elbow (n=18)

Motion	Frequency	Percentage (%)
Arc > 100^0	10	55.56
Arc (50 to 100^0)	08	44.44
Arc < 50^0	00	00
Total	18	100

According to Mayo Elbow Performance Scoring criteria the arc of motion of elbow was >100^0 in 10(55.56%) patients, arc (50 to 100)^0 in 8(44.44%) patients and motion arc < 50^0 in 0(00%) patients

Table IV

Evaluation of time of Radiological union (n=18).

Time in weeks	No. of patients	Percentage
6-12	9	50.00
13-18	6	33.33
>18	2	11.11
Non union	1	5.56
Total	18	100

During the course of the study union o09 (50.00%) were occurred at 6-12 weeks

Table- V

Distribution of patient according to status of union (n=18):

Status of union	Frequency	Percentage (%)
Timely union	15	83.33
Delayed union	2	11.11
Non union	1	5.6
Total	18	100

At final follow up 15(83.33%) of patients showed timely union of the fracture and 2(11.11%) of the patients were delayed united and 1(5.56%) of the patient was non united..

Table-VI

Distribution of the patients according to the Mayo Elbow Performance Scores (n=18)

Grading	Frequency	Percentage
Excellent(>90)	8	44.44
Good (75 to 89)	6	33.33
Fair (60 to 74)	3	16.67
Poor (<60)	1	5.56
Total	18	100

The final outcome of the patient was graded according to Mayo Elbow Performance Score; criteria as excellent 8(44.44%) of patients, good 6(33.33%), fair 3(16.67%) and poor 1(5.56%) of patients.

Table-XV

Evaluation of outcome at final follow up (n=18)

Outcome	Number of patients	Percentage (%)
Satisfactory	14	77.78
Unsatisfactory	4	22.22
Total	18	100

Finally, satisfactory result was found 14 (77.78%) & unsatisfactory was 4 (22.22%).

DISCUSSION:

The present study has been undertaken in NITOR from January, 2014 to December, 2015 to evaluate the results of the results of open reduction and internal fixation (ORIF) of T-Y condyler fracture of distal humerus in adult by Condylar locking plate and medial condyle by k-wire.

In this study patients are assessed according to Mayo Elbow Performance score to evaluate the overall functional

result, which is based on the belief that it is important for the specific functional index used in clinical practice that represent all functions of the elbow joint as accurately as possible.[7]

Treatment for distal humerus fractures aims to make the elbow stable and painless with satisfactory function. This requires anatomic reconstruction of the articular surface, restitution of the overall geometry of the distal humerus, and stable fixation of the fracture fragments to allow early and full rehabilitation. Although these goals are now widely accepted by the orthopedic community, they may be technically difficult to achieve, especially in the presence of substantial osteoporosis or comminution (Jun-jian Liu et al., 2009).

The result of current study demonstrates that mean age of the patients included in the study was 34 years and SD was ± 9.7 and the youngest and the oldest patients were 18 years and 50 years respectively. From this study it is evident that the close comminuted intrarticular fractures of distal humerus in our country seems to occur in early middle aged population and most commonly in young active people. In this present series it was observed that majority 10(55.66%) of the patients were female where 8(44.44%) of the patients were male, which indicates the female was predominant in this study. In the current study it was observed that majority 9(50.00%) of injuries were caused by MVA, 7(38.89%) due to fall and 2(11.11%) due to fall from height.

In this study it was observed that 7(38.89%) of the patients were housewife, 6(33.33%) were businessman. In the present series, the left side was more 12(66.67%) affected than right side 6(33.33%). Regarding time interval between injury and operation, it was observed in this study most 11(61.11%) of the patients were operated within 1 week of injury and the rest 7(38.89%) were operated between 1 to 2 weeks and Mean ± SD was 7.83 ± 3.46**.**

In the current study only 1(5.56%) case did not show union, 2(11.11%) were delayed union and 15(83.33%) were timely united. Vinit Gupta et al., 2010 reported 22(85%) of 26 cases showed timely union at 18 weeks. In the current study 15(83.33%) of 26 cases showed timely union at 18 weeks.

In the current study, patients were assessed by using the joint specific Mayo Elbow Performance Index (MEPI), which measures motion, pain, stability and function. In this study, 8(44.44%) were excellent, 6 (33.33%) were good, 3 (16.67%) were fair and 1(5.56%) was poor result.

CONCLUSION

Keeping in view the results of other authors as well as the results of this study finally concluded that the treatment of T-Y condylar fracture of the distal end of the humerus in adults with open reduction and rigid internal fixation by reconstruction plate in lateral column and tension band wiring in medial column provide adequate stability to allow for the early start of post operative functional rehabilitation with predictably high rate of fracture union, there by better functional and anatomical results. In this study, no osteotomy nonunion was encountered in 18 patients who were treated with the Muller extrarticular transolecranon approach. The olecranon osteotomy is better in the visualization of more complex articular injuries, and allows accurate articular reduction.

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Original Article

Functional Outcome of Proximal Humeral Locking Plate Fixation in Neer's Two and Three Part Proximal Humerus Fractures: A Prospective Study on Fifteen Patients

Md. Saidul Islam[1], Md. Golam Sarwar[1], GM Jahangir Hossain[2], Shah Jawaher Jahan Kabir[2], Shofiqul Islam[3], Md. Mobarak Hossain[4]

ABSTRACT

Open reduction and internal fixation of displaced proximal humeral fracture is a challenge to conventional plate fixation.The aim of present study was to assess the functional outcome following internal fixation with the PHLP (proximal humeral locking plate) for Neer's two and three parts proximal humeral fractures. Total 15 patients was operated in different hospital in Dhaka from January 2013 to December 2015.. Functional outcome was determined with Constant Murley score. Average age of the patients was 48 years (range, 28-60 years). The average overall Constant score was 84.06. The functional outcome was very good in younger patients and it declined with increasing age. It was concluded that open reduction and internal fixation of Neer's two and three part fractures with proximal humeral locking plates (PHLP) achieves favorable fixation for proximal humeral fractures for early fracture union, early rehabilitation of shoulder and less complications especially when fracture is comminuted and osteoporotic

Keywords: Proximal humeral fractures, locking plate for proximal humeral fractures, Proximal humeral locking plate

INTRODUCTION

Fractures of the proximal humerus constitute about 26 % of humeral fractures[1]. In elderly patients usually result from low velocity indirect trauma while as in younger age group due to high velocity trauma like road traffic accidents[2]. These fractures have been managed by both non-surgical as well as surgical interventions, each having specific indications. Different surgical methods for reduction and fixation either by closed, minimally invasive or open technique have been used. Complications are associated with each modality but are least with locking plates. Locking plates (PHLP and PHILOS) designed to match proximal humeral anatomy, act as a rigid fixed angle construct for stable fixation of proximal humeral fractures to allow early rehabilitation without risk of screw loosening and failure as seen with conventional plates and screws[3]. Proximal end of the plate for multiple locking screw placements in convergent and divergent manner into the humeral head which gives additional stability[4]. Both proximal humeral locking plate(PHLP) and proximal humeral interlocking osteosynthesis(PHILOS) work on same basic principle with difference in number of holes for screw placement[2].

The objective of our study was to determine the efficacy of proximal humeral locking plate and the functional outcome of the treatment.

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MATERIAL AND METHODS

This prospective study was conducted on patients with Neer's two or three part fractures

of the proximal humerus managed surgically by PHLP from January 2013 to December 2015.

Inclusion criteria were as follows:

1. Neer's two or three part fractures
2. Age between 18 and 80 years.

Exclusion criteria included:

1 Open fracture

2 Open growth plates

All the patients had been operated through a standard delto-pectoral approach in supine position on a radiolucent table . The fracture fragments had been meticulously reduced to best possible anatomical position and temporarily stabilized with k wires.Reduction was checked with C- Arm. Definitive fixation was done with proximal humeral locking plate positioned at least 5 mm distal to the upper end of greater tuberosity and at least 2 to 3 mm lateral to the bicipital groove .Plate was first fixed with K wire through the holes. Then multidirectional locking screws were used to fix proximal fragments. locking or cortical screws were used to stabilize the plate with the diaphysis.

Post operatively Shoulder was immobilized in Elbow bag for 5 to 7 days following which passive and pendulum exercises were started . Full ROM with active exercises was started at 4 weeks. In the postoperative period the patients were followed every two weekly with clinical examination and radiographs for 2 months then 4 weekly, till evidence of radiological union of the fracture lines. In all the cases final follow up was carried out after one year and the final clinical and functional outcome was evaluated with Constant- Murley Score (CMS) [5]. Functional outcome as per CMS was graded as poor (0-55) moderate (56 – 70), good (71 –85), excellent (86 – 100)[10].

RESULTS

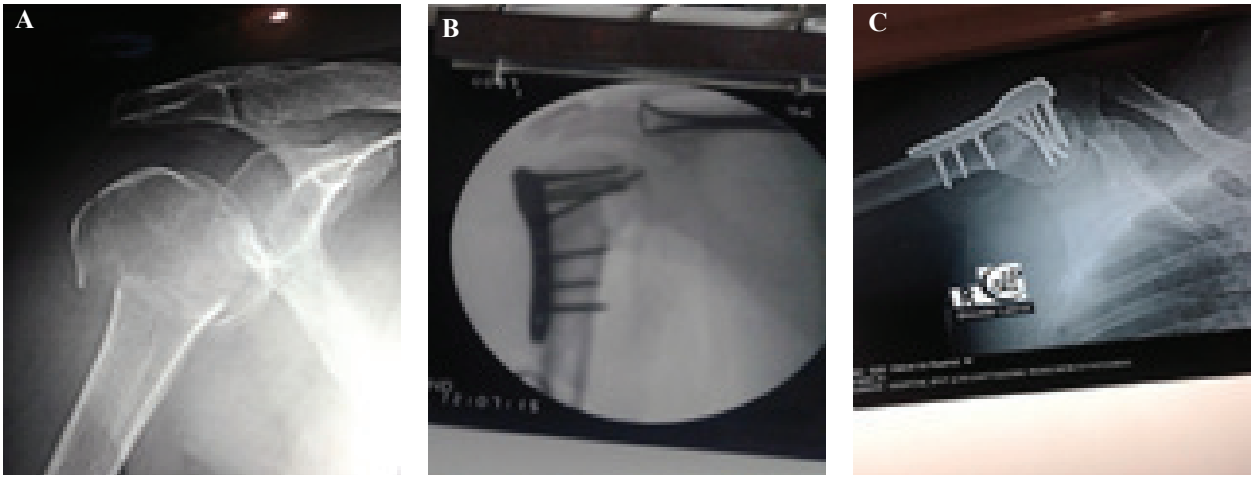


Figure - 1: *Neer's three part fracture. A) Pre operative. B) Post-operative. C) Final follow up radiograph*

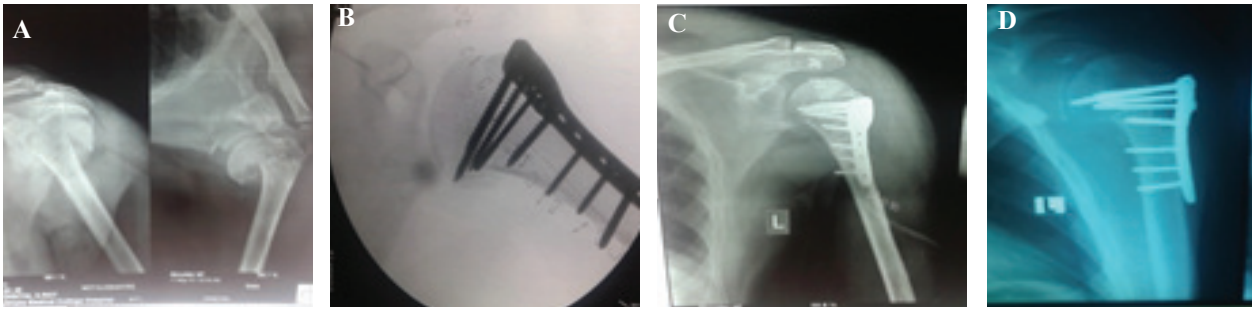


Figure - 2: *Neer's two part fracture. A. Pre operative.B. Per-operative. C.Post operative D Final followup radiograph.*

Table - 1

Complications.

Complications	No of patient
Inadequate reduction	01
Superficial infection	02
Varus collapse	01
Adhesive capsulitis	02

The age of the patients ranged from 28 to 60 years with an average of 48.5 years. The male to female ratio was 3:1 Road side accident was the most common mode of injury accounting for 65 % of the patients. 25 % patients had fall as the aetiology. 6 (40%) patients had Neer's two part fracture and 9 (60%) had Neer's three part fracture. Final follow up of the patients ranged from 12 to 33 months with an average follow up of 22.5 months.

All the fractures united and time to radiological union ranged from 12 to 20 weeks (Mean = 14 weeks). Over all there were 8 complications in 6 (40%) patients (**Table - 1**). Average CMS at final follow up was 84.06 (table **- 2**). The final functional outcome was excellent in 6 (40%) patients, good in 6 (40%) and moderate in 3 (20%) patients. No patient had poor functional outcome. The functional outcome was excellent in younger patients and it declined with increasing age

Table – III

Constant-Murley Score at final follow up.

Neer's FractureType	No. of patients	Mean CMS
Two part	6	86.4(78 to 98)
Three part	9	82.5(58 to 100)
Total	15	84.06(58 to 100)

DISCUSSION:

Displaced proximal humeral fractures is always a challenge to treatment especially when associated with osteoporotic bone and communication. To treat these type of fracture different techniques and implants have been used but advent of locking plates has revolutionised to treatment of these fractures[3]. Locking plates forming fixed angle stable construct, gives rigid and stable fixation. This is especially of great value in osteoporotic bones where screw loosening and subsequent implant failure is common with conventional plates[3,7]. Stable fixation also aids in early rehabilitation of the shoulder joint [3].However there have been very limited studies to evaluate surgical outcome for open reduction and internal fixation of proximal humerus fractures with PHLP. Most of these studies have reported good functional outcome[8].The mean CMS in our series at final follow up was 84.06 (range: 58 to 100) and that of Park J et al. who used PHILOS by minimally invasive technique was 82.7 (range: 66 to 92) . 12 (80%) patients in our study had excellent and good final functional outcome. No patient had poor outcome in our series. Park J et al had excellent and good functional outcome in 90.5% patients with no patient having poor result((÷2 = 0.003; p-value = 0.477)[9]. In series by Konrad G et al. (2010) 14 % patients had intra operative screw penetration of the humeral articular surface [10]. In our series we had no case of intra articular screw placement. This complication was avoided by looking for placement of screws under image intensifier in neutral, internal rotation and external rotation position of the shoulder as well as axillary view after completing fixation of the plate. 14 % patients in series by Miyazaki AN, et al (2012) had inadequate intra-operative fracture reduction[11]. We had only one case in our series that was fixed in slight varus. Inability to achieve anatomical reduction was due to medial comminution. We had one case of impingement and it was due to more cranial placement of the plate. To prevent mechanical impingement the proximal end of the plate should be placed 5 to 8 millimetre distal to tip of greater tubercle[11]. On the other hand Aksu N, et al. and park J et al. (2014) had no patient with subacromial impingement in their series[9,12]. There were two patients who developed superficial infection and were managed by dressings and extended course of antibiotics

CONCLUSION

Open reduction and internal fixation of Neer'stwo and three part fractures with proximal humeral locking plates (PHLP) achieves favorable fixation for proximal humeral fractures for early fracture union,early rehabilitation of shoulder and less complications especially when fracture is comminuted and osteoporotic.

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Original Article

Arthroscopic Partial Menisectomy Provides Better Option for Symptomatic Discoid Meniscus

Azizul Haque[1], Fakrul Amin Khan[2], Mohammad Shahin Akhter[3], Muhammad Asaduzzaman[4], Shah Muhammad Aman Ullah[5], Mohammad Arif Hossain[6]

ABSTRACT

The purpose of this study was to analyze the pre-operative physical findings ; per-operative arthroscopic patterns of discoid meniscus and post operative clinical results among the symptomatic discoid meniscus. Discoid meniscus is a congenital anomaly of the knee found in 3% of populations. It typically affects the lateral meniscus. Instade of the narrow crescent shape as seen in normal meniscus, a discoid meniscus is thickened, does not tapper towards the centre of the joint and is shaped likes a disc. Collagen orientation of this type of meniscus is haphazard and is very much prone to tear. So that in a symptomatic discoid meniscus arthroscopic partial menisectomy provides cushioning function & joint stability and also better outcome. This study was carried out at "Northern international Medical College and Hospital" Dhanmondi, Dhaka from July 2012 to june 2016. Symptomatic patients was taken for study. Diagnostic arthroscopy was done, meniscus was evaluated and classified. Arthroscopic partial meinsectomy was done. Post operative protocol was followed for all patients. Six months after operation patients was re-evaluated for symptoms. Out of 15 subject's excellent functional outcome was exhibited in 86.6% (13) & good functional outcome 13.3% (2) patients. Arthroscopic partial menisectomy is the effective treatment for symptomatic discoid meniscus.

Keywords: Partial Menisectomy, Discoid Meniscus, Better option

INTRODUCTION

The meniscus is a wedge-shaped cartilage sits in between the bones of the knee and acts as a cushion to protect the bones during movement. The meniscus also acts as a "shock absorber" between femur and tibia. It protects the thin articular cartilage which covers the ends of the bones and helps the knee easily bend and straighten [1,2,3].

There are two menisci in the knee: the medial meniscus and the lateral meniscus. The menisci are attached to the tibia bone by a strong tissue called the menisco femoral ligament [4]. This ligament also provides a blood supply to a small portion of the meniscus.

Healthy menisci are shaped like crescent moons (in fact, "meniscus" comes from the Greek word for crescent) [4]. A discoid meniscus is thicker than normal and often oval or disc-shaped. It is more prone to injury than a normally shaped meniscus.

Some people with discoid meniscus may pass through their entire lives and never experience any problems. Many people, however, will have knee problems related to the discoid meniscus. Symptoms often begin during childhood[5].

TYPES OF DISCOID MENISCUS

There are three types of discoid menisci:

- **Incomplete.** The meniscus is slightly thicker and wider than normal.
- **Complete.** The meniscus completely covers the tibia.
- **Hyper mobile Wrisberg.** This occurs when the menisco femoral ligament that attaches the meniscus to the tibia is absent. Without this ligament, even a fairly normally shaped meniscus can sometimes slip into the joint and cause pain, as well as locking and popping of the knee.

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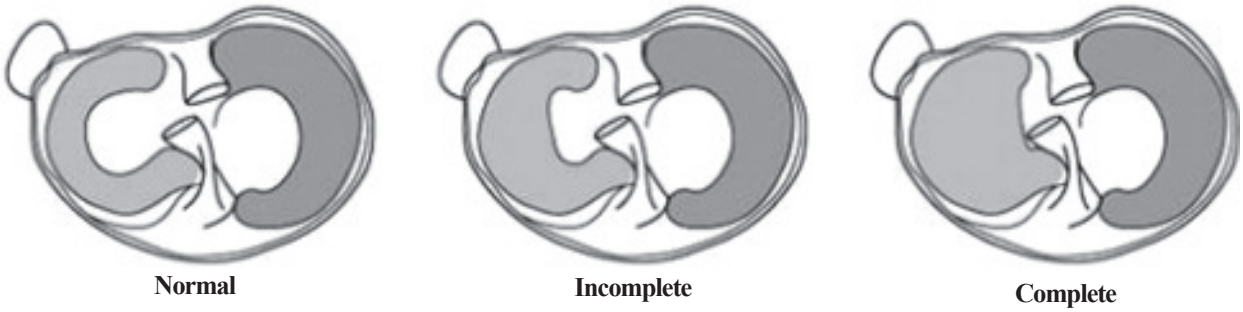


Fig.-1: *Cross-sectional views of normal, incomplete and complete discoid menisci.*

DISCOID MENISCUS INJURIES

A discoid meniscus is more prone to injury than a normal meniscus. The thick, abnormal shape of a discoid meniscus makes it more likely to get stuck in the knee or tear. If the menisco femoral ligament attachment to the tibia is also missing, the risk for injury is even greater.

Once injured, even a normal meniscus, it is difficult to heal. This is because the meniscus lacks a strong blood supply and the nutrients that are essential to healing cannot reach the injured tissues.

In many cases of discoid meniscus, patients experience symptoms without there being any injury to the meniscus.

Cause

The cause of discoid meniscus is not known. It is a congenital defect.

Injuries to the discoid meniscus often occur with twisting motions to the knee, such as during sports that require pivoting or fast changes in direction.

Symptoms

The most common symptoms of a discoid meniscus or torn discoid meniscus are:

- Pain
- Stiffness or swelling
- Catching, popping, locking of the knee
- Feeling that the knee is "giving way"
- Inability to fully extend (straighten) the knee[5,6]

Medical History and Physical Examination

After discussing medical history and any event occurred before symptoms started, doctors have to examine the knee of the patient.

Patient may or may not have tenderness where the bones meet. During the twist of patient's knee with the knee bent and straightened, in many cases of discoid meniscus, there is a popping or clunking sensation. This can sometimes even be heard. In extreme cases, part of the meniscus pop out of the knee joint and can be seen right under the skin[5].

Investigations

X-ray: Although X-rays do not show tears of soft tissues like the meniscus, they can show whether there are other problems in the knee. In addition, because the discoid meniscus is so thick, the space between the femur and tibia on the lateral part of the knee may appear widened in X-ray.

Magnetic Resonance Imaging (MRI): This is the best imaging test for discoid meniscus. MRI creates detailed images of the soft tissues of the knee joint [7].

This can show the abnormal shape of the discoid meniscus as well as tears within it. However, the rare Wrisberg type of discoid meniscus cannot be tested with MRI because the problem only occurs when the patient is moving but an MRI involves lying still for 30-45 minutes.

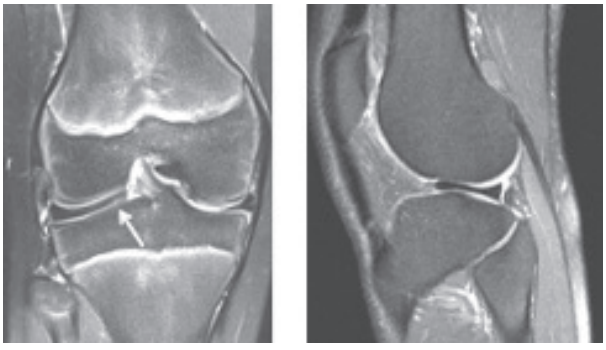
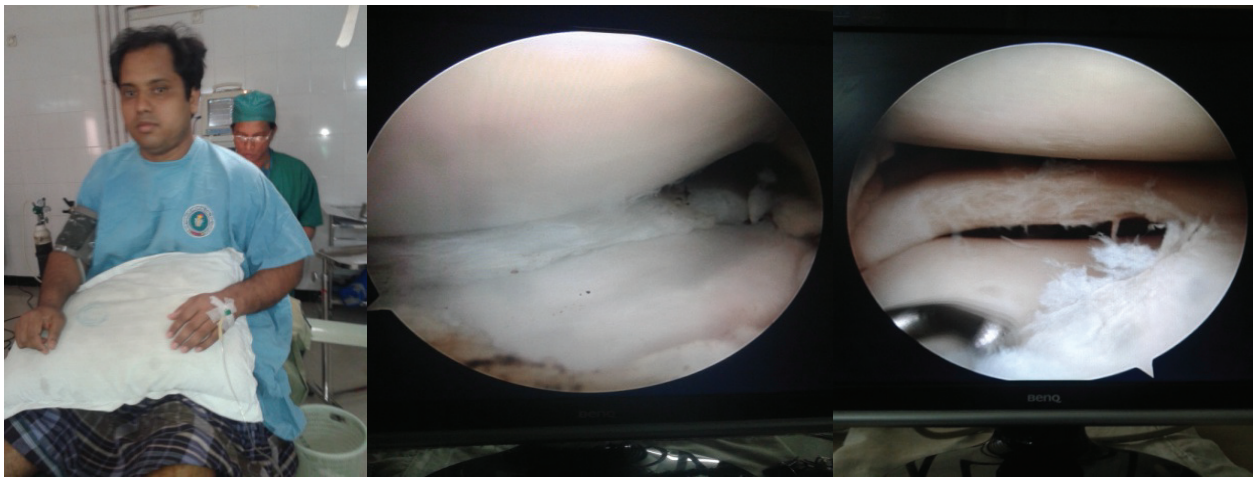
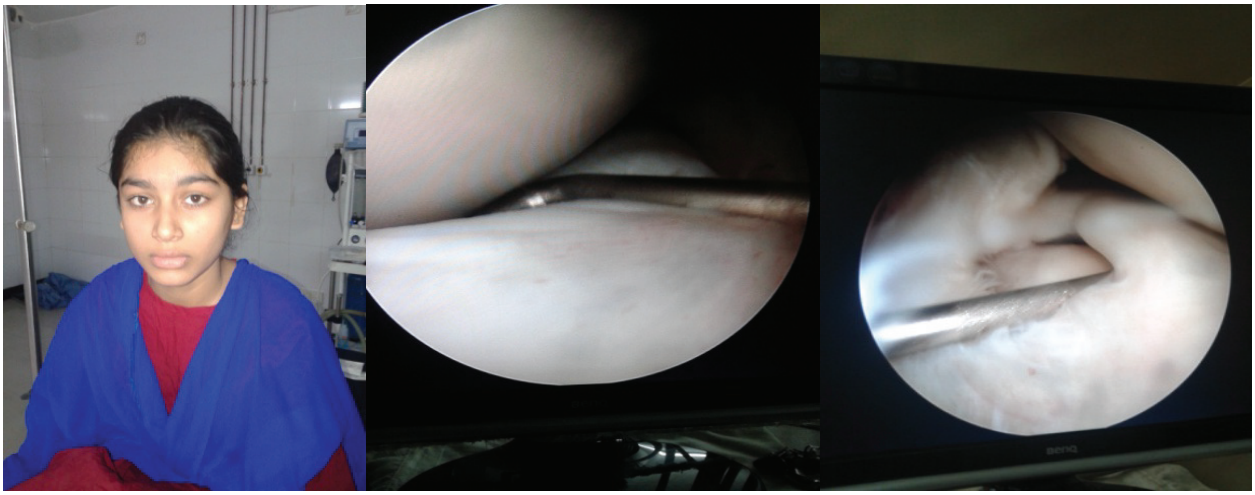


Fig.-1: *Knee joint in MRI(showing the discoid meniscus).*

Prevalence of the problem

Discoid meniscus is a congenital anomaly of the knee found in 3% of populations. It typically affects the lateral meniscus. Instead of the narrow crescent shape as seen in normal meniscus, a discoid meniscus is thickened, does





not tapper towards the centre of the joint and is shaped likes a disc. Collagen orientation of this type of meniscus is haphazard and is very much prone to tear.

Purpose

The purpose of this study was to analyze the preoperative physical findings; per-operative arthroscopic patterns of discoid meniscus and post operative clinical results among symptomatic discoid meniscus.

Methodology

This study was carried out at Northern international Medical College and Hospital, Dhanmondi, Dhaka from July, 2012 to July, 2016. 15 patients with symptomatic discoid meniscus were included for study. MRI and diagnostic arthroscopy was done, meniscus was evaluated and classified. Arthroscopic partial meinsectomy was done. Post operative protocol was followed for all patients. Six months after operation patients was re-evaluated for symptoms.

RESULTS

The age of the respondents was between 07 to 30 years. Among them 10(66%) were male and 05(33%) were female. 15(100%) respondents had pain and click sound.12(80%) respondents had been found with complete discoid meniscus and rest 03(20%) with incomplete discoid meniscus. Excellent functional outcome of arthroscopic partial menisectomy was exhibited in 86.6% (13) and good functional outcome in 13.3% (2) respondents.

CONCLUSION

Arthroscopic partial menisectomy is the effective treatment for symptomatic discoid meniscus.

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Original Article

Intramedullary Fixation of Traumatic Subtrochanteric Fractures of Femar with Proximal Femoral Nail (PFN) - Preliminary Results

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ABSTRACT

The objective of this study was to evaluate the clinical outcome of traumatic subtrochanteric fractures treated by open reduction and internal fixation by proximal femoral nail (PFN).This study was carried out in Dhaka medical college hospital from February 2015 to August 2016. We reviewed the results of 12 consecutive patients who had undergone ORIF with a PFN for traumatic subtrochanteric fractures in our hospital. Total no. of patient was 12. Out of 12, 8(66.66%) were male and 4(33.33%) were female. Left side was more commonly affected than right. Age range 23-75 yrs. Patients was selected according to clinical and radiological basis. All the patients underwent open reduction and internal fixation by proximal femoral nail. Each patient was followed up for at least 6 month at a 4week interval. During each follow up visit patients were evaluated both clinically and radiologically. All the 10(83.33%) traumatic subtrochanteric fractures healed uneventfully except 1(8.33%) case of delayed union and 1(8.33%) case of infective complication. Walking and squatting ability was completely restored in 11(91.66%) cases at follow-up examination 6 months postoperatively (including the patient with delayed union).

Keywords: Subtrochanteric Fractures, PFN, Preliminary Results

INTRODUCTION

Subtrochanteric fractures of the proximal femur have been defined as the fractures involving the area between the lesser trochanter and the isthmus of the femur. Although these fractures are the most difficult to manage in the femur, our improved understanding of the complex biology and biomechanics of this as well as the rapid development of orthopaedic implants has led to consensus on the treatment of subtrochanteric fractures.[1] However, the appropriate implant for the internal fixation of subtrochanteric fractures remains debatable; and a multitude of different intra- and extramedullary devices for their surgical fixation have been advocated.[2-6] The subtrochanteric region of the femur is subjected to many stresses resulting from bending movements and compressive forces generated by body weight and the hip muscles, thus leading the malunion and nonunion of the fractures and mechanical failure of the implants.[7,8] We now report the results of clinical and radiographic follow-up of a series of subtrochanteric fractures treated with proximal femoral nail (PFN).

MATERIALS AND METHODS

A series of 12 consecutive patients with subtrochanteric fractures underwent intramedullary fixation with PFN during the period of February 2016 to August 2016 in Dhaka medical college hospital. Among them, 8 (66.66%) patients were male and 4 (33.33%) were female. Their age range was 23 to 75, average 54. 10(83.33%) fractures were a result of high-energy trauma from road traffic accidents, while the remaining 2(16.66%) were due to fall from height. According to Seinsheimer's classification system, [9] there were 4(33.33%) type II, 3(25%) type III, 3(25%) type IV and 2(16.66%) type V fractures in this series of patients.

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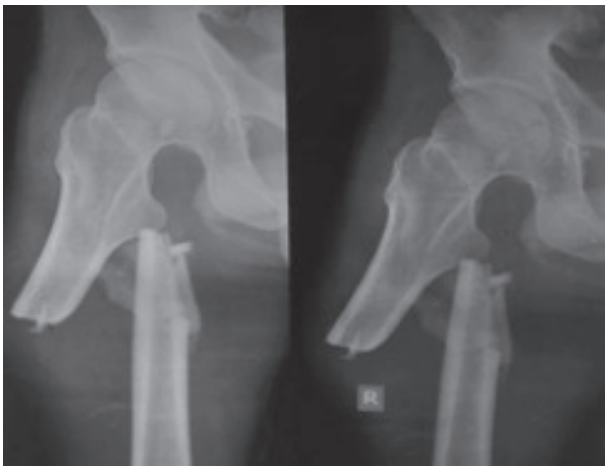


Fig 1: *Subtrochenteric fracture of rt. femar*

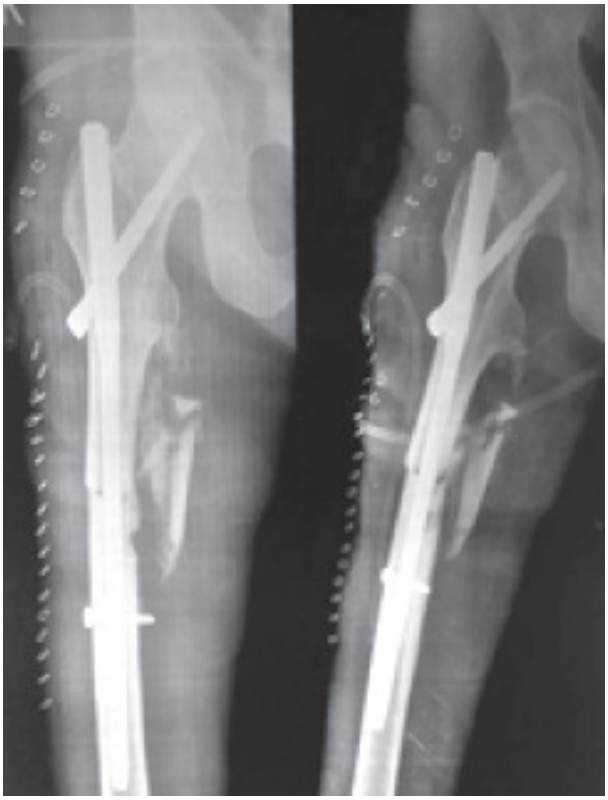


Fig 2: *ORIF by PFN*

RESULTS

A total no. of 12 cases of traumatic subtrochenteric fracture was included. We do not use fracture table for operation. All the patient was operated in lateral position. The average operative time was 50 minutes, range 45-90 minutes.

All the patients are followed up as outpatient basis after 2 week. At the first follow up visit, stitches were removed and gentle exercise of hip and knee within the pain limit was advised.

At a minimum follow-up time of 6 months, patients were invited to return for clinical and radiological evaluation in every 4 week. At each follow up visit, patients were assessed clinically and radiologically for fracture healing, ability to squat and weight bearing. At the end of 6 month, 10 (83.33%) out of 12 patients show satisfactory healing of the fracture both radiologically and clinically, can squat and weight bear satisfactorily, 1(8.33%) patient developed delayed union which ultimately unite at 10 month and 1(8.33%) patient develop infection at entry point of the nail which heals after proper dressing and appropriate antibiotic use.

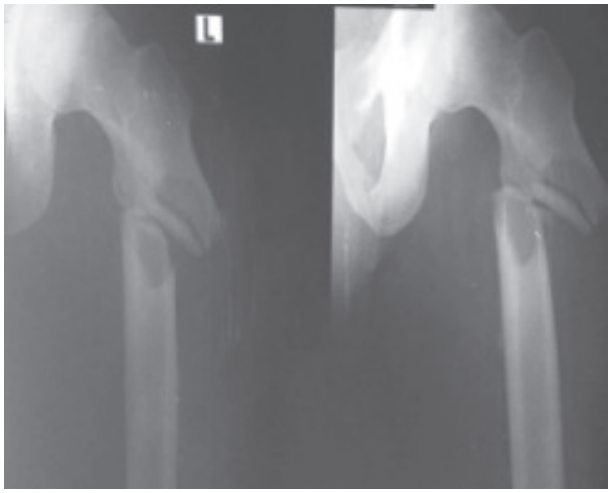


Fig 1:*Subtrochenteric fracture of lt. femar*

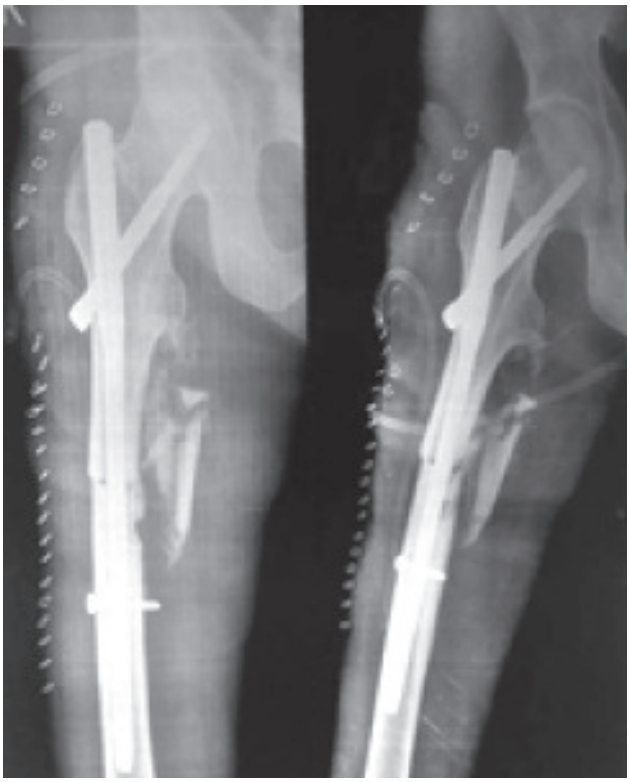


Fig 2: *ORIF by PFN*

DISCUSSION

Unlike osteoporotic trochanteric fractures, subtrochanteric fractures are usually the result of high-energy trauma and often subjected to significant displacement and great difficulty in close reduction through traction. The high incidence of delayed union, malunion and nonunion of fractures has left conservative treatment, as advocated by DeLee et al, [9] abolished in modern trauma care. Extramedullary fixation with plating has the potential disadvantages of extensive surgical exposure, severe soft tissue damage and blood loss, thus leading to problems of fracture union and implant failure. In addition, the eccentrically plating is prone to fatigue breakage due to their mechanical load-sharing effect.[2,4,6,10] Allowing a minimally open approach, intramedullary nailing is closely linked to "biological internal fixation", in addition to its mechanical benefits over plate fixation.[11] Initially, standard femoral nail was tried in subtrochanteric fractures but the proximal fragments were usually not long enough for stable fixation. The recent development of reconstruction nail, which changes the direction of the proximal interlocking bolts, has greatly expanded the indication of intramedullary fixation for subtrochanteric fractures.[11] The advantages of PFN for subtrochanteric fractures were well illustrated in our series of patients. In this study, 10(83.33%) cases of traumatic subtrochanteric fractures healed uneventfully except 1(8.33%) case of delayed union and 1(8.33%) case of infective complication. Walking and squatting ability was completely restored in 11(91.66%) case (including the patient with delayed union) at follow-up examination 6 months except patient with delayed union, postoperatively. No complications such as cutout or breakage of the implants, or peri-implant fractures were encountered.

CONCLUSIONS

PFN is a reliable implant for subtrochanteric fractures, leading to high rate of bone union and minimal soft tissue damage. Intramedullary fixation has biological and biomechanical advantages, but the operation is technically demanding.

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Original Article

Evaluation of the Outcome of Decompression and Transpedicular Screw Fixation in the Management of Traumatic Fracture of the Thoracolumbar Spine

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ABSTRACT

Transpedicular instrumentation systems have distinct advantages such as rigid segmental fixation, stabilization of the three column of the spine, least failure at bone metal interface, early post-operative mobilization with efficient nursing care and least complications in the management of traumatic fracture of the thoracolumbar spine injury. The aim of this study was to analyze the outcome of traumatic fracture of the thoracolumbar spine treated by decompression and transpedicular screw fixation. This prospective study was conducted for 2 years at Dhaka Medical College Hospital between July, 2014 to June, 2016. A total no. of 29 patients aged between 15-50 years of both sexes (Male-24, Female-05) were included in the study. Mean age was 30.7 years with SD±11 years. All the patients were clinically evaluated and radiologically investigated. Patients diagnosed as traumatic fracture of the thoracolumbar spine were operated by direct decompression and long segment spinal fixation in 24 cases and short segment spinal fixation in 5 cases. Post operative follow up records up to 6 months were reviewed. Pre-operative Mean Cobb angle was 26.9^0 with SD±7.1^0 and at final follow up was found 9.3^0 with SD±1.5^0. Pre-operative Mean Kyphotic deformation of vertebral body was 27.4^0 with SD±4.6^0 and at final follow up was 12.0^0 with SD±2.6^0. Pre-operative Mean Gardner segmental index was 31.5^0 with SD ±6.0^0 and at final follow up was 11.8^0 with SD±2.6^0. Pre-operative Mean vertebral compression height was 0.19 with SD±0.03 and at final follow up was 0.14 with SD±0.02. Pre-operative ASIA grade A was in 01 (03.45%), B in 06 (20.69%), C in 16 (55.17%), and D in 06 (20.69%) patients. At final follow up, ASIA grade A was in 01 (03.45%), B in 00 (00%), C in 01 (03.45%), D in 07 (24.14%) and E in 20 (68.96%) patients. According to the modified Macnab criteria, excellent outcome was found in 21 (72.41%) patients, good in 06 (20.69%) and fair in 02 (06.90%) patients. No patient showed poor outcome. In this study, there were UTI in 06 (20.69%) patients, superficial wound infection in 01 (03.45%) patient and bed sore in 01 (03.45%) patient. Surgical treatment by decompression and posterior instrumentation using pedicle screws and rods resulted in effectively decompresses the canal, achieves better anatomic restoration and reasonable correction of kyphotic deformity. Our results show that it is an effective option for early pain relief, early ambulation and early recovery of the patients with traumatic fracture of the thoracolumbar spine.

Key words: Decompression, transpedicular screw fixation, thoracolumbar spine injury.

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INTRODUCTION

Spinal column injuries represent approximately 3%-6% of all trauma cases[12] and about 30% of polytraumatized patients have a spinal injury[6]. More than 50% of thoracic and lumbar injuries occur between T11 and L1vertebrae. Overall, 20 to 40% of these fractures are associated with neurological deficits[13].

Epidemiological studies show that thoracolumbar spine fractures are one of the most common fractures in the young healthy population and are more frequent in men (2/3) than in women (1/3). Peak between the ages of 20 and 40 years. Many epidemiologic studies have shown that fractures of the thoracic and the lumbosacral spine are much more common than fractures of the cervical spine. A systematic review by Sekhon and Fehlings found that 55% of all spinal injuries (including all types of spinal injuries) involve the cervical spine, 15% the thoracic spine, 15% the lumbar spine, and 15% the lumbosacral spine[6].

The thoracolumbar vertebrae are the most rigid and strong of all the vertebrae and to disrupt the column at this level requires great force[5]. However, the thoracolumbar junction is the most common area of injury to the axial skeleton. This region is vulnerable because it is the anatomical and mechanical transition zone between the relatively rigid thoracic and more flexible lumbar spine[3]. And the forces along the long stiff kyphotic thoracic spine switch abruptly into the mobile lordotic lumbar spine at the thoracolumbar junction[15].

Fractures can be followed by neurological damage, which is a direct consequence of the spinal cord damage. A delay in diagnosis may be associated with progressive neurological deficit. Vertebral fracture in this area are usually extremely unstable with marked kyphotic deformity[22].

Spine fractures, especially fractures accompanied with the spinal cord injury, pose a difficult surgical, social and economic problem. Until about thirty years ago, spine fractures were treated only with nonsurgical methods; surgical stabilization was not performed. This kind of treatment implied a long term immobilization in the cast, and the complications were manifold[14].

The management of traumatic fractures of the thoracic and lumbar spine remains controversial. Fractures can be treated with surgical or nonsurgical methods. Surgical treatment is a modern way of treating spinal column fractures[24]. The best results can be obtained by surgical treatment. It is safe and effective. Decompression and transpedicular screw fixation is one of the best methods of surgical treatment[14].

Non-operative treatment is typically not recommended for patients with significant instability or neurologic compression. Operative management of thoracolumbar injuries is usually considered for fractures that are unstable or have the potential for further neurologic deficit. Rupture of the posterior ligamentous complex (PLC) has been associated with increased spinal instability which may indicate the need for surgical intervention, as these structures have poor healing ability[4].

Stabilization has evolved greatly during the years. Initially, fixation devices including Harrington rods, hooks and sub laminar wires were used. However, these were associated with issues such as loss of number of motion segments, lack of correction in the sagittal plane, and increase in neurological deficit after a few years. The introduction of transpedicular instrumentation systems were considered highly beneficial because of its distinct advantages such as rigid segmental fixation, stabilization of the three columns, least failure at bone metal interface, early post-operative mobilization with efficient nursing care and least complications. Additionally, pedicle screw fixation does not require the presence of intact lamina, facet joints or spinous processes. The pedicle withstands all of the transmitted stresses of rotation, side bending, and extension of the spine. Neurologic injury is an important indicator of the severity of the spinal injury. The presence of a neurologic deficit is a strong indicator for surgical intervention[17].

Surgical decompression of the spinal canal is presently accepted worldwide as the method of treatment for traumatic fractures of the thoracolumbar spine with neurological deficit and/or evidence of severe spinal instability in the belief that neurological recovery may be produced or enhanced[25].

Goals of treatment were to obtain a painless, balanced, stable spine with optimum neurological function and maximum spine mobility.

MATERIALS AND METHODS

This prospective study was conducted in the Department of Orthopaedic Surgery, Dhaka Medical College and Hospital Dhaka, Bangladesh between July, 2014 to June, 2016. Patients with traumatic fracture of the thoracolumbar spine who underwent surgery as per inclusion and exclusion criteria in the above mentioned institution were the study population.

Patients with following characteristics were eligible for the study- 1. Age- any age above 13 years and below 75 years, 2. Sex - both sexes, 3. Patients with traumatic fracture of the thoracolumbar spine, 4. No discrimi-nation of socioeconomic and occupational status.

Patients with following characteristics were excluded from the study- 1.Age: below <13 years and >75 years were excluded, 2. Active infection of the thoracolumbar spine or any other region of the body, 3. Any comorbid condition that would significantly increases the risk of morbidity and mortality, 4. Bone tumour of spine.

A detailed history of the selected patients were taken with mode of injury, time of injury, other history, thorough general, local and neurological examination was done for proper assessment. Plain x-ray both anterior posterior & lateral view and MRI of thoracolumbar region for all cases and CT scan was done in 05 cases.

A questionnaire were prepared to collect data considering key variables like information on demographic data, presenting complaints, clinical findings, causes, levels of spine injury, site involved, neurological status on admission, associated medical condition, investigations, per-operative findings, type of surgical procedure, and outcome of the procedure regarding neurological recovery, according to ASIA impairment scale, duration of hospital stay, and mortality. Collected data were compiled and presented in the form of tables and charts based on key variables and functional assessment scoring.

The analysis of different variables was done according to standard statistical analysis. The results were analyzed by using statistical package for social science (SPSS) version 20.0. For valid statistical analysis, outcome categories were regrouped. Excellent and good categories were considered as satisfactory; fair and poor categories were considered as unsatisfactory.

SURGICAL PROCEDURE

Patients with traumatic fracture of the thoracolumbar spine were managed surgically by direct decompression and long segment spinal fixation in 24 cases and short spinal fixation in 5 cases. All patients underwent open reduction and internal fixation by posterior approach as posterior approach is faster and technically simple to carry out and is suitable for emergency conditions.

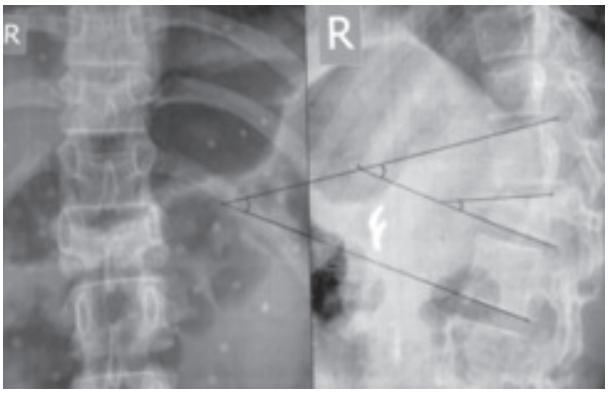


Fig.-1: *Preoperative X-ray findings*

The level of vertebra involved was identified preoperatively by a skin marking under radiological guidance to aid the peroperative vertebral level identification as well as planning of the extent of incision.

All the patients underwent surgery under general anesthesia and in prone position on a specially designed padded operating table for the purpose of abdomen hang free, to reduce intravenous pressure and peroperative blood loss as a result of collapse of the epidural venous plexus. A midline incision was made and extended both proximally and distally according to the requirement. To expose the lamina, the facets and transverse process, a standard subperiosteal dissection was carried out using self-retaining retractors to maintain tension on soft tissues during exposure and any bleeding was secured by proper haemostasis using bipolar diathermy. The injured level of vertebra identified and confirmed by using C-arm or portable X-ray. The lamina of the injured vertebra was removed and decompression of the neural elements was approached by removing the portion of unilateral or bilateral pedicle of the vertebra to provide access for debridement of the burst fracture fragments (360p decompression) where it caused the compression. The fragments were impacted by a specially designed L-

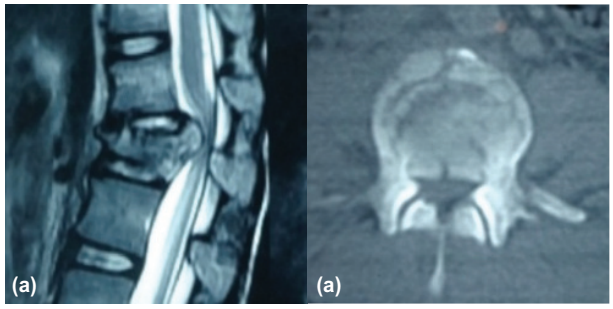


Fig.-2: *MRI (a), and CT scan(b) findings (showing retropulsed fragment).*

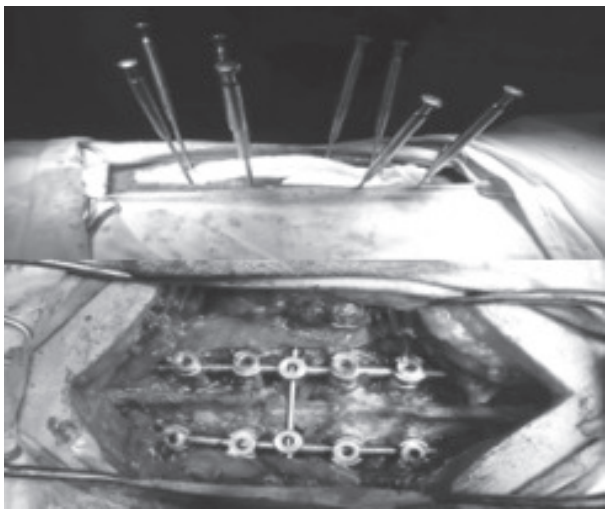


Fig.-3: Pedicular marker insertion (a) and instrumentation (b).

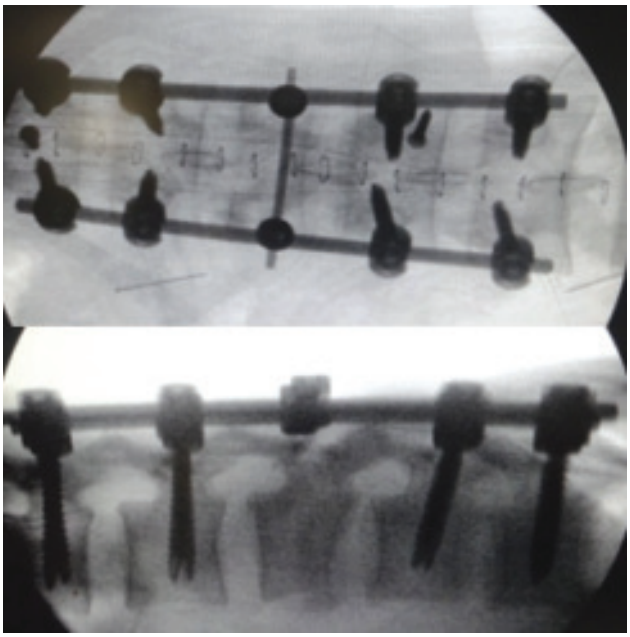


Fig.-4: *Per operative C-arm film in operation theatre both anterior posterior (a) and lateral view (b).*

impactor or removed adequately by using specially designed curettes. When dural tears were encountered, the neural elements were gently returned to the dural sac, and the dural defect was repaired directly using non-absorbable 4/0 silk with round body needle. Then we prepared the pedicles one or two level above and below the involved vertebra. A pedicle awl was then placed into the pedicle & make a hole advanced slowly down the pedicle, the medial inclination and an appropriate degree of cephalad – cauded inclination. Then pedicular screws of adequate length and diameter were inserted. The screw placement was rechecked by C-arm. Then the titanium rod has been measured, cut and fixed rigidly with screws on one side to allow distraction or compression in required situations. Then decompression was checked and confirmed. Interconnecting bars were fixed in the middle of rods. The bony fragments cut from the spinous process during the surgery were prepared and placed postero-laterally for postero-lateral fusion. The wound was closed in layers with a drain kept in situ.

POST-OPERATIVE FOLLOW-UP:

Immediately after surgery, routine lateral and anteroposterior radiographs were obtained to assess the extent of decompression and placement of graft and instrumentation. All patients were followed up till hospital stay. Patients were discharged with advised from the hospital on an average 9.9±4.5 days after operation. After discharge from hospital, each patient was called for follow up at 01 month, 03 months and 06 months after surgery.

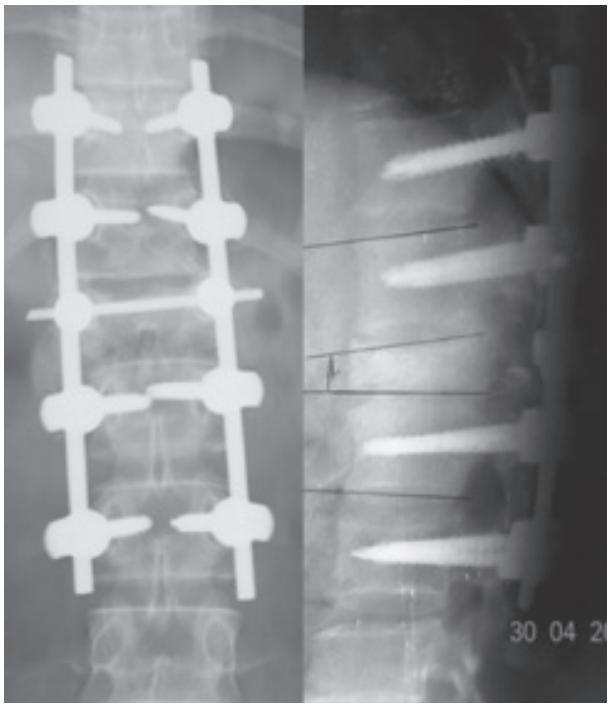


Fig.-5: *Post operative F/U x-ray both A/P (a) and L/V (b) 6 months after surgery.*

At each follow up; clinical examination of wound, neurological assessment and plain radiographic studies were obtained in standing position to determine the Cobb angle, Kphotic angle, Gardner index, the progression of fracture healing, and development of progression of deformity after surgery and instrumentation failure.

Upon pre-operative, post-operative, and follow-up clinical assessments, the patients neurologic function graded by using the ASIA grading system, the severity of back pain assessed by using Denis et al.'s Pain scale and modified Macnab criteria for the outcome of surgery.

OBSERVATIONS & RESULTS

We obtained the records of a 29 patients with traumatic fracture of the thoracolumbar spine, treated by direct decompression and long segment spinal fixation in 24 (82.76%) cases and short segment spinal fixation in 05 (17.24%) cases between July, 2014 to June.

From the socio-demographic characteristics, we observed that out of 29 patients 24 (82.76%) of the study patients were men and 05 (17.24%) were women with the ratio of 4.8 : 01 (M : F).

Age ranges of the patients were found between 15 to 50 years. Most of the patients 12 (41.38%) were in 15-25 years age group followed by 07 (24.14%) in 36-45 years and 06 (20.69%) in 26-35 years age group. Mean age was found 30.7 years with SD±11.0 years (table-I).

Table-I

Distribution of the study patients by age (n=29)

Age (in years)	No. of patients	Percentage(%)
15-25	12	41.38
26-35	06	20.69
36-45	07	24.14
46-55	04	13.79
56-65	00	0.0
66-75	00	0.0
Mean ± SD	30.7 ±11.0	
Range(min, max)	15	50

An analysis of the different job categories showed that the most impacted group in the samples were 06 (20.69%) labourers and 06 (20.60%) business man, followed by service holder 05 (17.24%), driver 03 (10.34%) housewives 03 (10.34%), students 03 (10.34%), farmers 01 (03.45%) and others 02 (06.91%).

Table-II

Distribution of the study patients by mode of injury (n=29)

Mode of injury	Number of patients	Percentage %
Fall from height	17	58.62
-Fall from building	12	41.38
-Fall from tree	04	13.79
-Fall from electric pole	01	03.45
Motor vehicle accident (MVA)	10	34.48
Fall of heavy object over back	02	06.90

In terms of the traumas that caused the injuries, fall from height were the most common 17 (58.62%) patients, followed by motor vehicle accidents 10 (34.48%) patients. Among the falls, fall from roof of buildings 12 (41.38%), fall from trees 04 (13.79%) and fall from electric pole 01 (03.45%). Finally, there were two (06.90%) patients with injuries from fall of heavy objects over back (table-II).

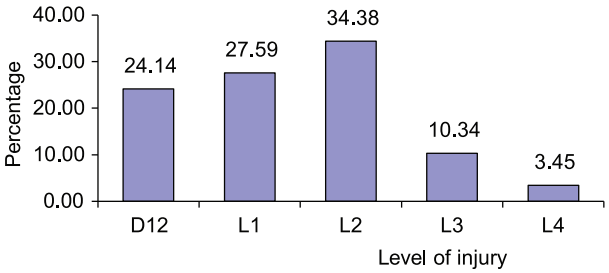


Fig.-1: *Bar diagram of level of injury of the study patients (n=29)*

As for the distribution of the injuries by vertebral level, there were 07 thoracic (24.14%), 22 (75.86%) lumbar injuries. The most common level of injury involved was L2 10 (34.48%) patients, followed by L1 08 (27.59%), D12 07 (24.14%), L3 03 (10.34%), and L4 01 (03.45%) patient (figure-1).

Table-III

Distribution of the study patients by type of fracture (n=29)

Type of fracture	Number of patients	Percentage (%)
Compression	04	13.79
Burst	19	65.52
Chance type	05	17.52
Fracture dislocation	01	03.45

According to Denis classification, Burst fracture was the commonest in 19 (65.52%) patients, followed by Chance fracture in 05 (17.52%), then Compression fracture in 04 (13.79%) patients. And fracture dislocation was seen in 01 (03.45%) patient (table-III).

In terms of neurological involvement; on admission all 29 patients had neurological deficit. 28 (96.55%) patients were with incomplete injury and complete injury was found in 01 (03.45%) patient.

Table-IV

Pre & post operative status of the study patients according to ASIA grading (n=29).

ASIA grade (Preoperative)		Post operative ASIA grade (After 6 months follow up)				
	Total	A	B	C	D	E
A	01	1	-	-	-	-
B	06	-	-	1	5	-
C	16	-	-	-	2	14
D	06	-	-	-	-	06
E	00	-	-	-	-	-
	Total	1	0	1	7	20

Pre-operative ASIA grade A was in 01 (03.45%), B in 06 (20.69%), C in 16 (55.17%), and D in 06 (20.69%) patients. At final follow up, ASIA grade A was in 01 (03.45%), B in 00 (00%), C in 01 (03.45%), D in 07 (24.14%) and E in 20 (68.96%) patients. 1 grade improvement was found in 9 patients, 2 grade improvement in 19 patients and no patient showed 3 grade improvement. One patient showed no neurological improvement and none of the patient was neurologically deteriorated during this study (table-IV).

According to Denis et al.'s pain scale; preoperatively all the patients were in grade 5. Postoperatively most of the patients were in grade-1 19 (65.52%), then grade-2 08 (27.59%), grade-3 02 (06.89%) patients. No patient was found in grade 4 and 5. According to Denis et al.'s work scale; preoperatively all the patients were in grade 5. Postoperatively most of the patients were in grade-1 20 (68.96%), followed by Grade-3 04 (13.79%) patients then Grade-2 03 (10.34%) and Grade-4 02 (06.91%) patients. No patient was found in Grade-5.

Pre-operative Mean Cobb angle was 26.9^0 with SD±7.1^0 and at final follow up was found 9.3^0 with SD±1.5^0. Pre-operative Mean Kyphotic deformation of vertebral body was 27.4^0 with SD±4.6^0 and at final follow up was 12.0^0 with SD±2.6^0. Pre-operative Mean Gardner segmental index was 31.5^0 with SD ±6.0^0 and at final follow up was 11.8^0 with SD±2.6^0. Pre-operative Mean vertebral compression height was 0.19 with SD±0.03 and at final follow up was 0.14 with SD±0.02 (table-V).

Mean time interval between injury and surgery was 16.8 days with SD ±11.0 days. And mean total post operative hospital stay was 9.9 days with SD ±4.5 days.

Regarding the modified Macnab criteria; excellent outcome was found in 21 (72.41%) patients, good in 06 (20.69%) and fair in 02 (06.90%) patients. No patient showed poor outcome (figure-2).

Table-V

Preoperative, immediate post operative and final follow up (after 6 months) measurement of various deformity of affected vertebral segment of the study patients (n=29).

Variable	Pre-Op.	Immediate post-op	Final follow up after 6m	P-value
Cobb angle	26.9±7.1	5.2±1.1	9.3±1.5	<0.05[s]
Kyphotic deformation of vertebral body	27.4±4.6	6.8±1.2	12.0±2.6	<0.05[s]
Gardner seg-mental index	31.5±6.0	7.8±1.3	11.8±2.6	<0.05[s]
Measurement of compression deformity-	0.19±0.03	0.12±0.02	0.14±0.02	<0.05[s]

s= significant, Level of significance= 0.05 (5%)

P-value reached from F-test (ANOVA)

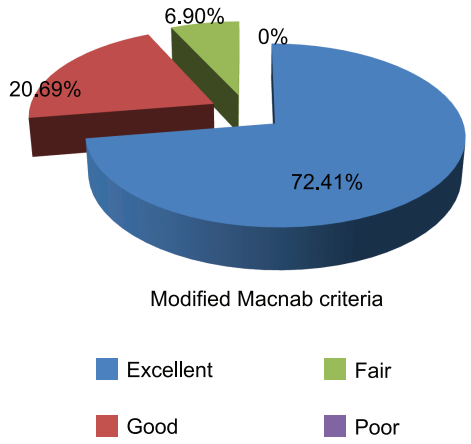


Fig.-2: *Pie chart of modified Macnab criteria*

Out of total 29 patients, 21 patients (72.41%) resumed their daily activities and 06 patients (20.69%) were in modified work and 02 (07.90%) patients were not able to, due to some form of disability.

Regarding post operative complications; in this study, there were UTI in 06 (20.69%) patients, superficial wound infection in 01 (03.45%) patient and bed sore in 01 (03.45%) patient. They were successfully managed by conservative treatment. No patient was found with implant failure.

Biostatistical analysis of the results :

Table-VI

Distribution of the results according to functional outcome (n=29)

Result	Number of Patient	Percentage (%)
Satisfactory	27	93.10
Unsatisfactory	02	06.90
Total	29	100.0

In this series, satisfactory results (Excellent and Good) were found in 27 (93.10%) patients and unsatisfactory results (Fair and Poor) were found in 02 (06.90%) patients (table-VI).

DISCUSSION

Traumatic spinal injuries are certainly a risk that we face every day. Unfortunately, injuries accompanied by spinal cord damage are one of the most debilitating pathologies that a patient and a doctor can face.

After conservative treat-ments, there are many reports on worsening spinal ste-nosis, increasing the pressure on the vertebral body and deteriorating the neurological functions. However, others who suggest surgical treatment, pointed that patients could expect to become mobile early, perform rehabilita-tive remedies, overcome anatomic fractures, restore sway-back and improve, in most cases, the nervous functions by using decompression and fixation[23].

Surgical intervention in thoracolumbar unstable fractures is advocated for decompression of neural elements, prevention of possible late neurological injuries in unstable fractures and early mobilization to avoid the complications of prolonged bed rest[18]. Khan, et al. (2008) stated that purpose of treating thoracolumbar fracture is to achieve early neurological decompression & stabilization for early rehabilitation. The pedicle offers a strong point of attachment of the posterior elements to the vertebral body. Pedicle screw fixation revolutionized spine surgery[9] and it is considered biomechanically superior to other stabilization constructs or parapedicular screws and are exceptionally rigid. It has rapidly become one of the most popular strategies for achieving solid fusion. So instrumentation with pedicle screws is a commonly used procedure for correcting deformity and stabilizing the spine until bony fusion occurs[10].

Traumatic spinal injury is common in our country in young, predominantly male patients in good health; which is reflected in this study as the mean age of patients was 30.7 years (range 15-50 years). Majority 12 (41.38%) of the patients belongs to 15-25 years age group. Alam, et al. (2011) showed that they studied on 22 patients and mean age was 32.13 years (range 17-66 year) which is similar to this study[2].

Regarding the sex distribution, male was found 24 (82.76%) and Female was 05 (17.24%) with the ratio of 4.8 : 01 (M : F). Ovalle, Rios and Balbuena (2013) showed that 43 (71.7%) of the patients were men and 17 (28.3%) were women. The patients' ages ranged from 16 to 84 years, with a median age of 35 years. The age group with the largest number of patients was the 31-45 years old group[16].

In this study, occupation of the subjects demonstrates that Labourers 06 (20.69%) and Businessmen comprised the main bulk 06 (20.69%), followed by Service holder 05 (17.24%), Students 03 (10.34%), Housewife 03 (10.34%), Driver 03 (10.34%), farmer 01 (03.45%) & Others 02 (06.91%).

In this series, in terms of the traumas that caused the injuries, fall from height were the most common 17 (58.62%) patients, followed by motor vehicle accidents 10 (34.48%) patients. Among the falls, fall from roof of building 12 (41.38%) patients, fall from tree 04 (13.79%) and fall from electric pole 01 (03.45%) patient. Finally, there were two (06.90%) patients with injuries from fall of heavy objects over back. Sarkari, et al. (2011) showed that fall from height/ staircase was the most common mode of injury in 9 patients followed by road traffic accidents in 4 and in one case the injury occurred by a car jack slipping and falling of vehicle over the back while patient was repairing it from below. out of total 14 patients[20].

As for the distribution of the injuries by vertebral level, there were 07 thoracic (24.14%), 22 (75.86%) lumbar injuries. The most common level of injury involved was L2 10 (34.48%) patients, followed by L1 08 (27.59%), D12 07 (24.14%), L3 03 (10.34%), and L4 01 (03.45%) patient. Akon, et al. (2012) showed that 08 cases (34.78%) had fracture L1, 06 cases (26.09%) had fracture D12, 04 cases (17.40%) fracture L2, 02 cases (8.69%) fracture D11and L3 each and 01 (4.35%) fracture D4 only[1].

According to Denis classification, Burst fracture was the commonest in 19 (65.52%) patients, followed by Chance fracture in 05 (17.52%), then Compression fracture in 04 (13.79%) patients. And fracture dislocation was seen in 01 (03.45%) patient. Khare and Sharma (2013) showed that out of twenty-five, 16 patients had a simple wedge compression fracture, 5 patients had burst fracture and 4 patients had fracture dislocation type of fracture. All fracture dislocation fractures were flexion rotation type[8].

In this study, Pre-operative ASIA grade A was in 01 (03.45%), B in 06 (20.69%), C in 16 (55.17%), and D in 06 (20.69%) patients. At final follow up, ASIA grade A was in 01 (03.45%), B in 00 (00%), C in 01 (03.45%), D in 07 (24.14%) and E in 20 (68.96%) patients. 1 grade improvement was found in 9 patients, 2 grade improvement in 19 patients and no patient showed 3 grade improvement. One patient showed no neurological improvement and none of the patient was neurologically deteriorated during this study.

Islam, et al. (2014) showed that two grade of improvement in 23 (57.5%) patients and one grade of improvement in 17 (42.5%) patients. So, the result is similar to my study[7].

In current series initial incomplete neurological deficit was found in 28 (96.55%) patients & complete neurological deficit was found in 01 (03.45%) patient.

In terms of Denis et al.'s pain scale; preoperatively all the patients were in grade 5. Postoperatively most of the patients were in grade-1 19 (65.52%), then grade-2 08 (27.59%), grade-3 02 (06.89%) patients. No patient was found in grade 4 and 5. According to Denis et al.'s work scale; preoperatively all the patients were in grade 5. Postoperatively most of the patients were in grade-1 20 (68.96%), followed by Grade-3 04 (13.79%) patients then Grade-2 03 (10.34%) and Grade-4 02 (06.91%) patients. No patient was found in Grade-5. Shin, et al. (2007) showed that distribution of patients classified by Denis et al.'s Work scale; Grade-1 were 10 (52.6%) patients, grade-2 14 (20.5%), grade-3 2 (10.5%), grade-411 (5.3%), grade-5 12 (10.5%),Total 19 (100.0%). Distribution of patients classified by Denis et al.'s Pain scale; Grade-1 11 (57.9%) Patients, grade-2 7 (36.8%), grade-311 (5.3%), grade-410 (0.0%), grade-5 10 (0.0%), total 19 (100.0%)[21].

In this series, Pre-operative Mean Cobb angle was 26.9^0 with SD±7.1^0 and at final follow up was found 9.3^0 with SD±1.5^0. Pre-operative Mean Kyphotic deformation of vertebral body was 27.4^0 with SD±4.6^0 and at final follow up was 12.0^0 with SD±2.6^0. Pre-operative Mean Gardner segmental index was 31.5^0 with SD ±6.0^0 and at final follow up was 11.8^0 with SD±2.6^0. Pre-operative Mean vertebral compression height was 0.19 with SD±0.03 and at final follow up was 0.14 with SD±0.02. Sapkas, et al. (2010) showed that pre operative cobb angle was 17.5 and at final follow up was 6 degree, pre operative kyphotic deformation of vertebral body was 13 and at final follow up was 4.5 degree, pre operative Beck index was 0.60 and at final follow up was 0.92, which is near about of my study[19].

Regarding the modified Macnab criteria; excellent outcome was found in 21 (72.41%) patients, good in 06 (20.69%) and fair in 02 (06.90%) patients. No patient showed poor outcome.

In this series, satisfactory results (Excellent and Good) were found in 27 (93.10%) patients and unsatisfactory results (Fair and Poor) were found in 02 (06.90%) patients. Islam, et al., (2014) showed that good to excellent result 36 (90%), fair in 3 (7.5%) and poor in 1 (2.5%) patients[7]. Sarkari, et al. (2011) showed that good to excellent outcome was 84.6% and he also mentioned that Schewender showed good to excellent result was 91.1% which is similar to my study[20].

Regarding post operative complications; in this study, there were UTI in 06 (20.69%) patients, superficial wound infection in 01 (03.45%) patient and bed sore in 01 (03.45%) patient. They were successfully managed by conservative treatment. No patient was found with implant failure. Lee, et al. (2013) showed that 2 (7.4%) patients with superficial wound infections responded to antibiotics and antiseptic dressing and 1 (3.7%) patient with decubitus ulcer required plastic surgery of total 27 patients[11].

CONCLUSIONS

Surgical treatment by decompression and posterior instrumentation using pedicle screws and rods resulted in effectively decompresses the canal, achieves better anatomic restoration and reasonable correction of kyphotic deformity. It significantly reduces recumbency-associated complications. Our results show that it is an effective option for early pain relief, early ambulation and early recovery of the patients with traumatic fracture of the thoracolumbar spine.

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Original Article

Anterior Decompression, Fusion and Plating in Traumatic Cervical Spine Facet Dislocation

Syed Shahidul Islam[1], Purnendu Biswas[2], MR Karim[2], Md. Aminul Haque Pathan[2], Kazi Shamim Uzzaman[3], Meraj[4], Rahman[5], Mamun[6], Rayhan Hamid[7], Susmita Islam[8]

To evaluate the role of anterior cervical decompression, fusion with bone graft and titanium plate fixation in traumatic facet dislocation in respect of neurological outcome, postoperative stability and early rehabilitation. This study was conducted in NITOR, Dhaka, Bangladesh from January 2010 to July 2016. 64 patients with facet dislocation were included in this study. All cases were evaluated for their clinical and radiological outcome. During initial phase, level and degree of neurological injury was assessed using ASIA impairment scale. Cervical traction was applied to all patients. Operative and postoperative records with x-rays and MRI were maintained. Patients with facet dislocation to C3-C7 underwent decompression, fusion with bone graft and titanium plate fixation through anterior approach. The follow-up ranged from 6 to 24 months with clinical and radiological assessment. Out of 64 patients 55 were male, 9 were female, (Ratio = 6.1:1). Age range was 14-55 years. Complete SCI were 7 and incomplete were 57. Common mode of injury was fall from height. Post operative follow up showed good clinical and radiological outcome, bony fusion which favours early rehabilitation. In our study one grade improvement 31.25%, two grade improvements was 46.87%, wheel-chair-bound was 18.75%. No immediate complication was found except temporary dysphagia. All patients developed pain at the donor site. Anterior decompression, fusion with bone graft and titanium plate fixation is an effective method with good neurological and radiological outcome.

Key Words: Cervical Spine Facet dislocation, Anterior Decompression, Fusion and Plating.

INTRODUCTION

Anterior approach to cervical decompression was first described by Cloward[2] and Robinson and Smith(9) in the 1950s. Both described an anterior approach via a longitudinal incision along anterior border of starnoclidomastoid muscle to allow soft tissue dissection. Following discectomy and removal of any compressive structures, fusion was then achieved using an autogenous graft.

The most important developments in anterior cervical surgery are related to the introduction of anterior cervical instrumentation with technologies that have evolved steadily over the last 40-50 years. In 1960, Bailey and Badgley expanded the usage of ACDF to treat neoplasm and instability (3). The anterior cervical plates were developed by Declos and Tapies in 1970, and they were the first to be used in an unstable cervical lesion induced by a trauma (21). The plates and screws system was subsequently improved by the studies of Caspar who developed a system of trapizoidal anterior stabilization that improved the fusion after the trauma(6).

The apposition of a plate, in theory, determines an immediate stabilization, prevents the extrusion of the graft and reduce the necessity of an additional cervical external stabilization to the surgical procedure. Furthermore, an anterior stabilization with plates helps to reconstitute the

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sagittal alignment of the cervical spine and prevents the collapse of the graft and its expulsion. The purpose of this study is to analyze the results in terms of neurological outcome, fusion rates, symptomatic adjacent-segment disease, complications following surgery.

MATERIALS AND METHOD

All the patients underwent X-Ray and MRI scan. Patients having dislocation under went tong traction. All patients underwent ACDF using autogenous cancellus bone graft taken from anterior superior iliac spine and titanium plate fixation . In 48 cases, the operation was performed after of cervical traction . The follow up period ranged from 6 to 24 months with clinical and radiological evaluation between January 2010 and June 2016, a total of 64 patients with a mean age of 14 to 55 years with trauma to the middle and lower cervical spine (C3-C7) were treated surgically. The operative levels were C3-C4 in 4 patients, C4-C5 in a 17 patients, C5-C6 in 40 patients, C6-C7 in 3 patients.

The preoperative and post operative degree of neurological deficit was evaluated according to the ASIA scale.

Procedure:

Patient was given general anesthesia in supine position with tong traction in situ. A sand bag is placed under the neck and both upper limb were fixed with gentle traction as shoulders are kept a bit distance from operative field. With all aseptic precaution a left sided transverse incision was made about 4cm long started from midline of neck along the skin crease. Platizma was cut at the same incision line and separated from muscles by blunt disection. The muscle under the skin was then split in the plane between the sternoclidomastoid and the strap muscles. Next a plane between the trachea with oesophagus and carotid sheath was entered. A thin prevertibral fascia was reached and dissected then two parallel longuscoli muscle were identified. The disc space was confirmed by image intensifier. Next the disc was removed and and reduction was done by gentle manipulation, distanced between two vertibeae was measured . A tricortical bony block was taken from anterior superior iliac spine according to need and placed previously prepared operative field and fixed with titanium plate and screw. Wound was closed keeping a drain and tong traction was removed.

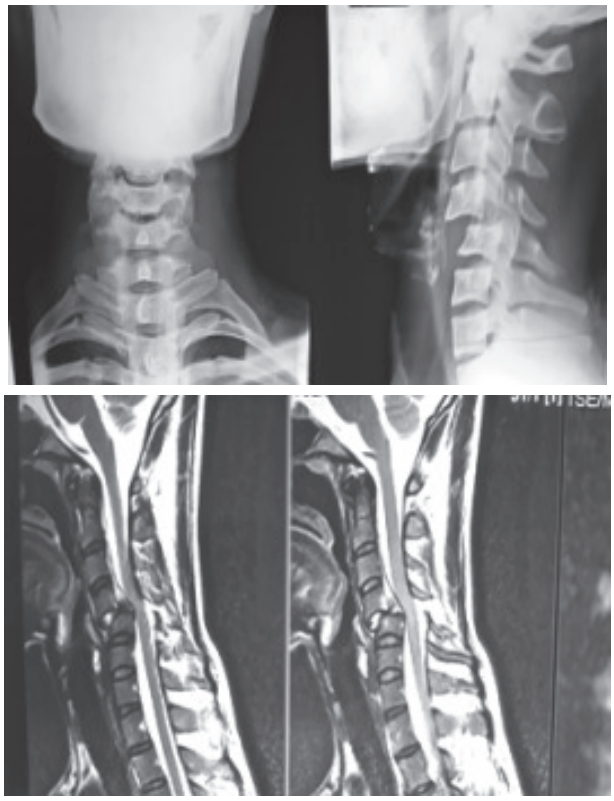
RESULTS

Out of 64 patients 55 were mal, 9 were female, (Ratio = 6.1:1). Age range was 14-55 years. Complete SCI were 7 and incomplete were 57. Common mode of injury was fall from height in 33 patients a RTA in 24 patients, heavy weight lifting on head in 5 patients, weight fall on the body in 2 patients. Post operative follow up showed good clinical and radiological outcome, bony fusion which favors early rehabilitation. In our study one grade improvement was 20 patients (31.25%), two grade improvements was 30 patients (46.87%), wheel-chair-bound was 12 patients (18.75%). No immediate complication was found except temporary dysphagia. All patients developed pain at the donor site.

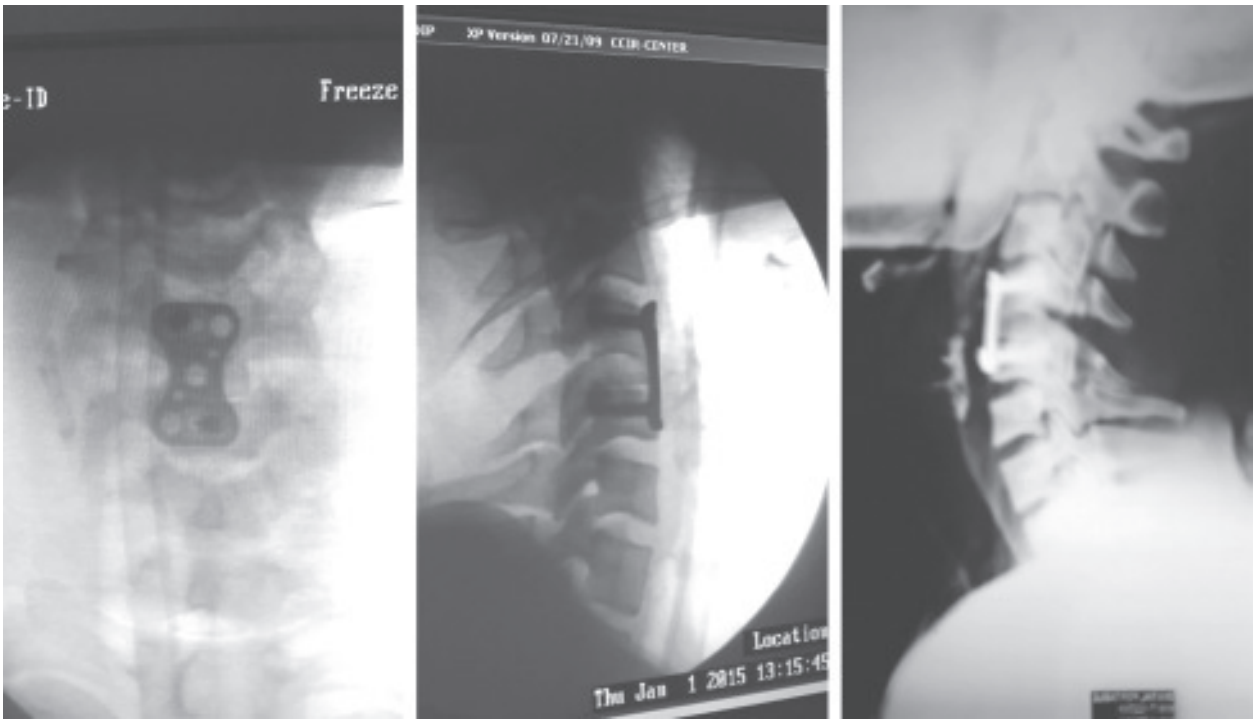
Table 1

The ASIA scale for spinal cord injury that classifies the extent of the neurological/functional deficit into 5 grades.

ASIA Scale	Preoperative	Latest Follow-up				
		A	B	C	D	E
A	7	7	-	-	-	-
B	13	-	-	4	9	-
C	28	-	-	1	6	21
D	12	-	-	-	2	10
E	4	-	-	-	-	4



Pre-operative Scans



Pre-operative Scans **Post operative Scans**

DISCUSSION

Cervical spine injury is the most frequent problem in young adults with a male predominance . The goals of surgical treatment are to restore the neurological function, prevention of further deterioration neurological function and restoration of spinal stability with bony fusion. RTA accidents are the most frequent cause of spinal cord lesion (20), but in our study fall from height is the most common cause of cervical spine 33 patients (51.56%) injury and in our study RTA accidents were the second common cause of trauma in 24 patients (37.5%).

The rationale of the use of screw plate system is that pts who treated with this implants may require shorter hospitalization and may return to normal socio-economic activities earlier than those undergoing cervical fusion procedures without plating.

The appropriate selection of position and length of the screw is important. In our procedure we use cortical screws. There is no spinal cord injury was reported in our study. Although there is chance of damage of spinal cord with the use of bi-cortical screw (7-19).

We had good restoration of spinal alignment and adequate stabilization during the follow up period . The risk related to screw-plate fixation of cervical spine includes all those associated with anterior discectomy, injury to brance of vagus nerve, dysphasia, redicular or mylopathic injury, CSF leakage, anterior or posterior migration of grafted bone, breakage of screws and plate, post operative hematoma, treacheoesophagial lesion, vascular injury and infection. Recurrent laryngeal nerve injury is the most common neurological complication after ACDF, and the incidence varies between 0.2 and 11% (5-15). In ACDF, Flynn reported an incidence of 0.05% of post operative spinal cord injury(11). But in our study there was no such complications.

Autologus bone graft has been used in cervical anterior procedures for more than 50 years. The placement of bone graft has every chance of potential trauma to spinal cord . The depth of the bone graft should be less than that of the vertebral body.

A frequently reported complication of autologus bone grafting from the iliac crest is post operative pain at the donor site reported in about 22%. Other complication include wound infection, hematoma, pelvic fracture and nerve palsy at donor site. In our study there was no such compliction.

The incidence of nerve root palsy has been estimated to be 0.17% (11).The ventral decompressive procedure has reported rates of radiculopathy from 2 to 15% caused from sympathetic adjucent-segment disease(22). Hilibrand et al. followed, in a conservative series for twenty years, 374 who had a total of 409 anterior cervical arthodesis for

the treatment of cervical spondylosis and report a constant incidence of a symptomatic adjacent -segment disease of 2.9% per year(16). Ishihara in series of 112 patient followed by more than 2 years ,report of incidence of symptomatic adjacent-segment disease from 7% to 15%(17). In the present study, 5 of 10 pts followed for 24 months had a permanent radiculopathy caused by traumatic lesion of the nerve root.

Vascular injury can occur during ventral approaches to the cervical spine .The carotid artery may be injured during exposer and be occluded during excessive retraction ; vertebral artery injury can occur if the dissection is taken too far laterally(14-15) . The reported incidence of this range from 0.3 to 0.5% of cases (12,14,15).

Coe and Vaccaro in their review of literature, reported that the prevalence of screw and plate loosening was between 0 and 15.4%, the prevalence of screw fracture was between 13.3%, the prevalence of plate fracture was between 0 and 6.7%, the prevalence of plate and graft displacement was between 0 and 21.4% and prevalence of implant malposition was between 0 and 12.5%(10). Fortunately infection after cervical spine fusion is uncommon, with a prevalence ranging from 0 to 4.5% (28).

Many clinical studies have reported high fusion rates anterior cervical plates (4,26,27). In several trials the fusion rate is reported from 90-100% for single level implant and from 70-95% for multilevel procedure 13-24 . Cheng et al. reported a fusion rate of 100% in a series of 17 patients (8). Ripa et al. and Aebi et al. reported a fusion rate near 100% in their series (1-23). In contrast, Johnson, in a group of 87 patient, describe a fusion rate near 93% and incomplete fusion in 27% patient s (18).

The fusion in our study was of 87.50%, in 8 patients follow up period was too short to establish an adequate fusion rate. In our study we had no complication, in contrast to other studies in which is reported a rates of complications from 2-3% to 17%. Only one patient experienced a transitory dysphasia.

CONCLUSION

Anterior decompression, reduction, fusion and plate fixation in cervical facet dislocation is an effective method with good clinical, neurological and radiological outcome

The result of our study, in line with literature, shows that the ACDF with the use of bone graft and titanium plate, is safer and without complication with respect the use of autogenous bone graft, and has some favorable clinical outcome and fusion rates.

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Original Article

Short Segment versus Long Segment Fixation in the Management of Thoracolumbar Fractures

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ABSTRACT

Among the various modalities used for the surgical management of unstable thoracolumbar fractures both the Short Segment and Long Segment instrumentation are effective options. Controversy still exits which one is better. Objectives**: To compare the effect of Short Segment and Long Segment fixation in the management of thoracolumbar fractures. This was a prospective interventional study carried out in the Department of Orthopedics, BSMMU from January 2011 to December 2012. A total of 20 thoracolumbar fractures patients divided into two groups. Group I (short segment) included 10 patients and group II (long segment) included 10 patients. Diagnosis confirmed by taking history, physical examination and relevant investigations. Stabilization of unstable thoracolumbar fractures was done with Short Segment and Long Segment fixation. Clinical and radiological outcome variables were fixed. Statistical analysis was done by SPSS -12.0. Most of the patients were within the age of 20-40 years (mean±SD: 30.6±8.4 vs 33.4±8.4), male were predominant in both groups (70%/30% vs 80%/20%). Higher injury prevalence at the level of L1-L2, compression fracture (70% vs 70%) type is the most common type of fracture. Frankel grading (pre-operative) grade C-was common in both groups [6(60.0%) vs 6(60.0%)] and post operative grade D was common in both groups [5(50.0%) vs 5(50.0%)]. There was no significant difference in cobb angle (preoperative) between short segment and long segment [mean±SD: 13.56±3 vs 13.4±4.3, p=0.967], similarly, there was no significant difference in cobb angle (post operative) between short segment and long segment [mean±SD: 4.4±3.1 vs 5.4±2.8, p=0.458]. Kyphotic deformation of vertebral body (pre operative) was 5.1±3.2 and 4.8±2.3 in group I and group II respectively. Kyphotic deformation of vertebral body (post operative) was 1.9±1.3 in group I and 2.2±2.1 in group II. (P>0.05). The results of the study demonstrate that surgical outcome of Thoracolumbar fracture using Short Segment and Long Segment fixation has similar outcomes.**

Key words: Thoracolumbar Fractures Short Segment, Versus Long Segment Fixation, Similar Outcome

INTRODUCTION

Thoracolumbar junction is particularly prone to injury because of the transition between the relatively fixed thoracic spine and relatively mobile lumbar spine[1]. Fracture and dislocations of the spine are serious injuries that most commonly occur in young people. Nearly 43% of patients with spinal cord injuries sustain multiple injuries[2]. The incidence of multi-segmental spinal fractures is 3%-5%, and the factures may be either adjacent or nonadjacent. The incidence of this condition tends to increase day by day[3].

The treatment of unstable fractures and fracture dislocations of thoracolumbar spine remains controversial[4]. The goal of the treatment of unstable thoracolumbar injuries is optimizing neural decompression while providing stable internal fixation over the least number of spinal segments. Either anterior or posterior or both approaches can be used

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to achieve fusion. However, posterior approach is less extensive. Pedicle screw devices allow immediate stable fixation as the screws traverse all the three columns. The pedicle screws are passed one level above and one level below the fractured vertebra via posterior approach in short-segmental (SS) fixation and two level above and two level below in case of long-segmental (LS) fixation.

Although SS pedicle instrumentation has been considered as a superior method,[5] several studies showed that it had a high rate of failure[6] and other showed that it had good outcome. [7]

The goal of this study was to compare SS pedicle instrumentation with long segment (LS) instrumentation for the treatment of thoracolumbar fractures.

METHOD:

This prospective interventional study was carried out in the Department of Orthopaedic Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh, over a period of two years from January 2011 to December 2012. A total of 20 thoracolumbar fracture patients were selected as study population. The patients with thoracolumbar fracture due to existing systemic illness like TB or spinal tumor, multi level fracture and stable fracture were excluded from this study. They were simply randomized into two groups according to hospitalization. Group I patients were treated by short-segment (SS) posterior fixation & fusion and Group II patients were treated by long-segment (LS) posterior instrumentation and fusion.

Complete clinical and radiologic examinations were done on admission. Computed tomography (CT) scans was taken preoperatively to classify the fracture type. Clinical and radiographic follow-up was done at 06 weeks, 3, 6, and 12 months. Data were collected concerning age, sex, localization, type and severity of injury, presence of neurological deficits, pain and work status, complications and radiologic parameters (Cobb angle, kyphotic deformation of the vertebral body and posterolateral fusion). The clinical and radiographic outcomes of treatment with the short segment posterior fixation (SSPF) was compared with those of treatment with the long segment posterior fixation (LSPF) using parametric and nonparametric analyses as appropriate for the data.

RESULTS

Table I

Demographic profile of the study patients (n=20)

Demographic profile of the patients	Group I (n=10) n(%)	Group II (n=10) n(%)	*p*-value
Age (years)			
20	1 (10.0)	0 (0.0)	
21-30	4 (40.0)	4 (40.0)	
30-40	4 (40.0)	5 (50.0)	
>40	1 (10.0)	1 (10.0)	
Mean ± SD	30.6±8.4	33.4±8.4	0.465[ns]
Sex			
Male	7 (70.0)	8 (80.0)	0.500[ns]
Female	3 (30.0)	2 (20.0)	

P value reached from Unpaired t-test and chi-square test
ns=not significant

In this study, mean age was found 30.6±8.4 years in group I and 33.4±8.4 years in group II. The difference was not statistically significant (P>0.05) between two groups.

Male were predominant in both groups (7/3 vs 8/2). The difference was not statistically significant (P>0.05) between two groups.

Table II

Information regarding injury (n=20)

	Group I (n=10) n(%)	Group II (n=10) n(%)	*p*-value
Mode of injury			
RTA	2 (20.0)	3 (30.0)	0.718[ns]
Fall from a height	6 (60.0)	5 (50.0)	
Fall of heavy object	2 (20.0)	2 (20.0)	
Level of injury			
D_{11}	2 (20.0)	1 (10.0)	0.753[ns]
D_{12}	3 (30.0)	2 (20.0)	
L_1	3 (30.0)	3 (30.0)	
L_2	2 (20.0)	4 (40.0)	
Type of fracture			
Compression	7 (70.0)	7 (70.0)	0.548[ns]
Burst	2 (20.0)	3 (30.0)	
Fracture Dislocation	1 (10.0)	0 (00.0)	

P value reached from Chi-square t-test.
ns=not significant

RTA was found 2(20.0%) in group I and 3(30.0%) in group II. Fall from height was 6 (60.0%) and 5(50.0%) in group I and group II respectively. Fall of heavy object was 2(20.0%) in group I and 2(20.0%) in group II. The difference was not statistically significant (P>0.05). Regarding the level of injury, D_{11} injury was found 2(20.0%) in group I and 1(10.0%) in group II. D_{12} injury was found 3(30.0%) and 2(20.0%) in group I and group II respectively. L_1 injury was found 3(30.0%) in group I and 3(30.0%) in group II. L_2 injury was found 2(20.0%) in group I and 4(40.0%) in group II. The difference was not statistically significant (P>0.05) between two groups. Regarding the type of fracture, compression fracture was found 7(70.0%) in group I and 7(70.0%) in group II. Burst fracture was found 2(20.0%) and 3(30.0%) in group I and group II respectively. Dislocation fracture was found 1(10.0%) in group I but not found in group II. The difference was not statistically significant (P>0.05) between two groups.

Table III

Distribution of the study patients according to pre-operative frankel grading (n=20)

Pre-operative frankel grading	Group I (n=10) n(%)	Group II (n=10) n(%)	*p*-value
A	1 (10.0)	0 (00.0)	0.564 ns
B	3 (30.0)	4 (40.0)	
C	6 (60.0)	6 (60.0)	

P value reached from Chi-square t-test.
ns=not significant

Regarding the pre-operative frankel grading, C-operative frankel was common in both groups, which was 6(60.0%) in group I and 6(60.0%) in group II. The difference was not statistically significant (P>0.05).

Table IV

Distribution of the study patients according to Post operative frankel grading (n=20)

Post operative frankel grading	Group I (n=10) n(%)	Group II (n=10) n(%)	*p*-value
B	1 (10.0)	0 (00.0)	0.572 ns
C	0 (00.0)	1 (10.0)	
D	5 (50.0)	5 (50.0)	
E	4 (40.0)	4 (40.0)	

P value reached from Chi-square t-test.

Regarding the post-operative frankel grading, D operative frankel was common in both groups, which was 5(50.0%) in group I and 5(50.0%) in group II. The difference was not statistically significant (P>0.05).

Table V

Distribution of study patients according to pain score during last follow up (n=20)

Pain score by VAS	Group I (n=10) n(%)	Group II (n=10) n(%)	*p*-value
Present	1 (10.0)	1 (00.0)	0.763 ns
Absent	9 (90.0)	9 (90.0)	

P value reached from Chi-square t-test.

Regarding the pain score of the study patients. Pain was found 1(10.0%) in group I and 1(10.0%) in group II. The difference was not statistically significant (P>0.05).

Table VI

Distribution of the study patients according to pre and post operative follow-up (n=20)

Pain score by VAS	Group I (n=10) n(%)	Group II (n=10) n(%)	*p*-value
Work status at last follow UP (By ODI)	23.8±12.4	22.2±10.9	0.762 ns
Cobb angle (pre-operative)	13.5±6.3	13.4±4.3	0.962
Cobb angle (Post-operative)	4.4±3.1	5.4±2.8	0.458
Kyphotic deformation of V. body (pre-operative)	5.1±3.2	4.8±2.3	0.812
Kyphotic deformation of V. body (Post-operative)	1.9±1.3	2.2±2.1	0.705

P value reached from Chi-square t-test.

Mean work status at last follow up (By ODI) was found 23.8±12.4 in group I and 22.2±10.9 in group II. Mean Cobb angle (pre operative) was found 13.5±6.3 and 13.4±4.3 in group I and group II respectively. Mean Cobb angle (Post operative) 4.4±3.1 in group I and 5.4±2.8 in group II. Kyphotic deformation of vertebral body (pre operative) was 5.1±3.2 and 4.8±2.3 in group1 and group II respectively. Kyphotic deformation of vertebral body (post

operative) was 1.9±1.3 in group I and 2.2±2.1 in group II. The mean difference was not statistically significant (P>0.05) between two groups.

Table XII

Distribution of the study patients according to modified macnab criteria.

Modified macnab criteria	Group I (n=10) n(%)	Group II (n=10) n(%)	*p*-value
Excellent	4 (40.0)	4 (40.0)	0.800 ns
Good	4 (40.0)	5 (50.0)	
Fair	2 (20.0)	1 (10.0)	

P value reached from Chi-square t-test.

Regarding the modified macnab criteria of the study patients, Excellent was found 4(40.0%) in group I and 4(40.0%) in group II. Good was 4(40.0%) in group I and 5(50.0%) in group II. Fair was 2(20.0%) in group I and 1(10.0%) in group II. Poor was not found in both groups. The difference was not statistically significant (p>0.05) between two groups.

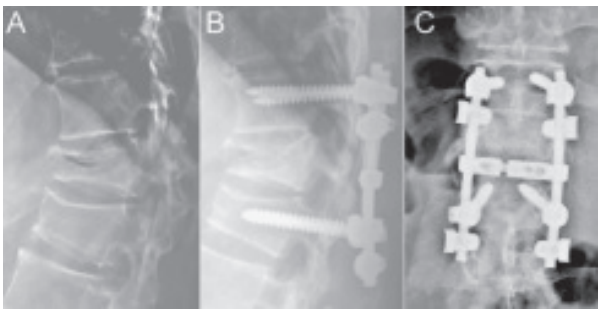


Fig.1: *short segment fixation*

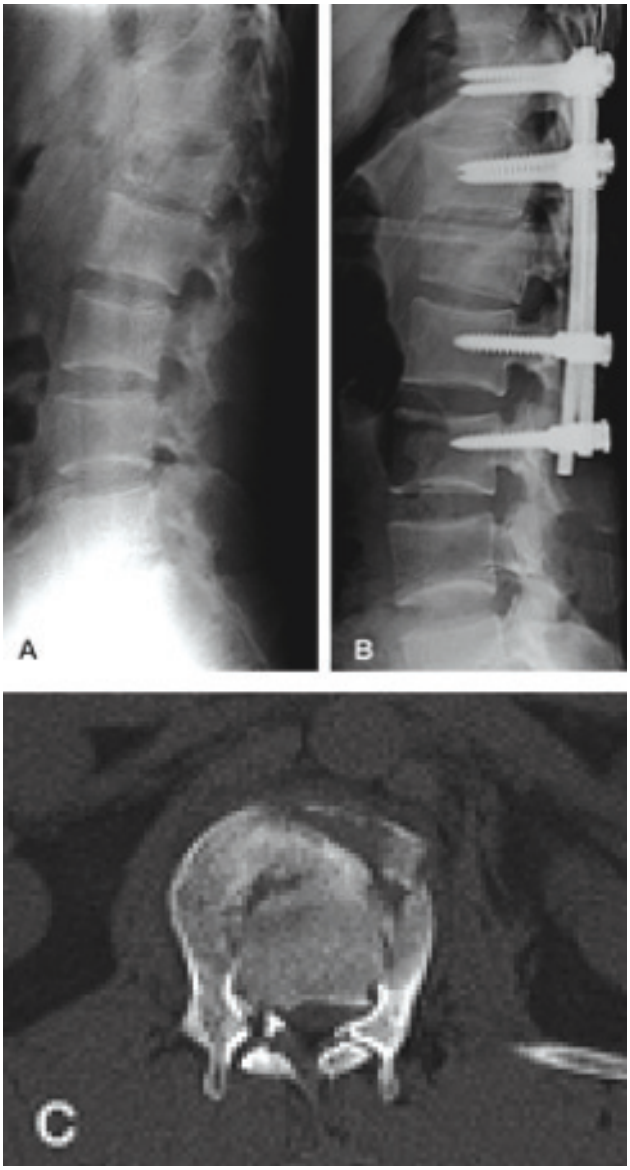


Fig.2: *Long segment fixation*

DISCUSSION

The aim of this study is to compare the SS fixation to LS fixation as far as both clinical and radiological outcome.

This study showed that the majority of injured patients were within the age of 20-40 years (mean±SD: 30.6±8.4 vs 33.4±8.4). Similar age was observed in the study of Moon et al.[8] and Kim et al[9]. Male patient is predominant (70%/30% vs 80%/20%) because they were the predominantly working group of population in our country. Hur et al.[10] and Kim et al.[9] also found similar findings. In this study injury prevalence was high at the level of thoracolumbar junction (L1-L2), it may also reflect a greater degree of instability at these level. Similar finding also observed in the study of Hur et al.[10] and Kim et al.[9] According to the study population of both the SS and LS group shows that compression fracture (70% vs 70%) type is the most common type of fracture with negligible associated injury present. Fall from height was the prevalent cause of injury in this study which is consistent with study of Moon et al[8] and Lee et al[11].

Regarding the clinical variables frankel grading, (pre-operative) grade C-was common in both groups, which was 6(60.0%) in group I and 6(60.0%) in group II pre operatively (p value>0.05), frankel grading D was common in both groups post operatively, [5(50.0%) vs 5(50.0%)] (p value>0.05). Pain score or disability status, there was no significant variation between these groups.

Regarding radiological outcome both SS and LS fixation, There was no significant difference cobb angle (preoperative) [13.56±3 vs 13.4±4.3, p=0.967], similarly, no significant difference was found between groups [4.4±3.1 vs 5.4±2.8, p = 0.458]. Kyphotic deformation of vertebral body (pre operative) was 5.1±3.2 and 4.8±2.3 in group I and group II respectively. Kyphotic deformation of vertebral body (post operative) was 1.9±1.3 in group I and 2.2±2.1 in group II. Kyphotic angle was reduced in both cases which is consistent with the findings of Kim et al[9] and Moon et al[8].

In this study, patients in both groups achieved satisfactory clinical outcomes according to the modified Mcnab criteria. Similar finding also observed in the study of Hur et al[10].

CONCLUSION

As seen from the result of this study, traumatic thoracolumbar spine injuries can be treated with spinal fixation through posterior approach. Both the SS and LS fixation is an effective method of treatment. Both methods enhance neurological recovery, reduce pain and improve disability status with early rehabilitation without significant radiological deference in case of short term follow up.

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Original Article

Clinical Outcome of Surgical Treatment of Old Defect Or Rupture In Tendo Achilles by Reconstruction with Bosworth Technique

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ABSTRACTS

Tendo Achilles, often termed Heel Cord, the strongest tendon of the body is to be the third one next to supraspinatus, biceps of most frequently ruptured tendon occurring among active men and women, between 30 years and 50 years of age, 2-6cm from the tendon insertion, the critical hypovascular area - "Water Shed Zone" according to Lagergreen and Lindholm. The most common mechanisms of rupture result from sudden forced planter flexion of the foot under load, unexpected dorsi flexion of the foot, violent dorsiflexion of a plantar flexed foot, direct trauma and less frequently attrition of the tendon as a result of long standing peritendinitis, overuse, side effects of medication. Populations at risk are recreational athlete (weekend warrior), previous rupture/injury, previous tendon injection, sudden changes in training and participation in new activities. Among the causes like degenerative rupture are not infrequent; the precise hypothesis are : a) Age dependent changes in the collagen cross linking leading to increased stiffness and loss of viscoelasticity b) Repetitive microtrauma making refractory for reparatory process and degenerate to attrition, c) Another theory postulates failure of inhibiting mechanism as a result of fatigue with resultant eccentric overload. Clinical diagnosis is clear cut, revealed from gait, palpable gap, positive Simmond test, failure to heel raise, positive 'O'Brien needle test though MRI is extremely sensitive to delineate extent of injury but costly. Delayed repair or reconstruction of old defects presents an entirely different entity because of gap and contracture so that if even a small amount of tendinous tissue completely and firmly bridged the gap, re-formation of normal tendon would occur from the interposed remnants; that is why reconstruction is preferable to repair. Out of many operations as proposed for ruptured TA older than 3 months but as a rule to select optimal option or modality patient physiological age, activity level and amount of functional impairment were subject to consider. This operative method had been employed in seven patients. All were had old complete, full thickness rupture older than three months with intact overlying skin. Patients ages were between twenty seven years and fifty years out of which 4 were male and 3 were female. This study was carried out in Rajshahi Medical College Hospital and District hospital, Joypurhat during the period of May 2008 to July 2009. Cases were selected using strict inclusion criteria excluding the fresh, acute, open, partial or incomplete rupture as well as the population over fifty to sixty years of age. Mean follow up was 13.7 months during which no operative complications were experienced and all seven had normal calf musculature with compared to that of opposite side. Reconstitution as to size and out line had been good with no loss of length, tensile strength, tip-toe stance, puss off, ROM at ankle and gait were satisfactory. All had uniformly good results.

Keywords: Tendo Achilles, Old defect, Rupture, Reconstruction

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INTRODUCTION

Spontaneous rupture of Achilles tendon is now increasing in recent years due to increases number of older people and increases in recreational sporting activities by the middle age and frequent use of tendon injections (corticosteroid). The treatment of rupture TA remains controversial despite extensive literature though there are 2 therapeutic regimes; one conservative and another surgical viz. repair alone, repair with augmentation procedure or reconstruction.

But complete, full thickness, old rupture, older than three months is a different and difficult entity where there is appreciable gap due to rapid contracture of calf muscle. Repair (end to end approximation) gaining length by different procedure will render challenge in regard of healing of ischemic ends, lengthening procedure and consequent weakness, loss of power, weak push off, alteration in gait, and overall reduced tensile strength. Re-rupture is not infrequent due to fibrous healing though sloughing off of skin or dead tendons are the dreadful attendant complications.

So the purpose of this study is to validate as well as to accept, to adopt the technique as immensely effective intervention due to its virtues.

BACKGROUND

The Achilles tendon is named after Achilles, the ancient Greek hero of the Trojan War. Achilles tendon rupture commonly occur to otherwise healthy individuals between ages 30 and 50 years who had no previous injury or problem.

Most Achilles tendon tears occur in left leg approximately 2-6 cm-the "Watershed zone", critical hypovascular area above the calcaneal insertion of the tendon. That the left Achilles tendon is torn more frequently may be related to hand deadness; right handed individuals push off more frequently with left foot.

The most common mechanisms of injury include sudden forced planter flexion of the foot, unexpected dorsiflexion of the foot and violent dorsiflexion of planter flexed foot due to sudden eccentric load. Other mechanisms include direct trauma, less frequently attrition of the tendon as a result of long standing peritendonitis or peritendinosis; other populations at risk are advanced age, recreational athlete, previous tendon injection, infiltration of corticosteroid and participation in a new activity.

FUNCTIONAL ANATOMY

Tendo Achilles, often termed Heel cord, the largest and the strongest tendon in the human body connects heel to the muscles of the lower leg and is formed from tendinous contribution of gastronomes and soleus muscles. The tendon converse approximately 15 cm proximal to the insertion at the posterior calcaneus.

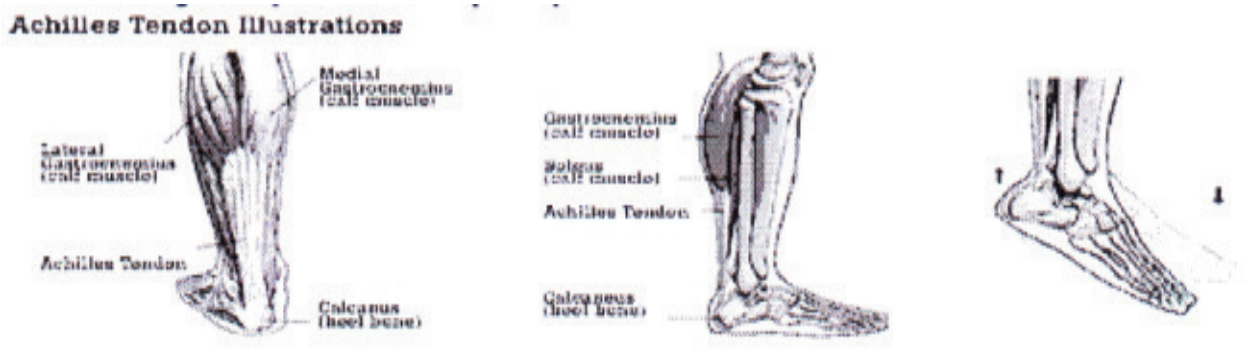
When view in cross section, right Achilles tendon appears to spiral counter clockwise 30°-150° towards its insertion; the left Achilles tendon spirals clockwise analogously. This spiraling allows for elongation and elastic recoil within the tendon facilitating storage and release of energy during locomotion. Contracting calf muscles pull the Achilles tendon which pushes the foot downward. This contraction enables, standing on toes, walking, running and jumping.

The blood supply for the Achilles tendon is derived from posterior Tibial artery and its contributions as well as the mesosternal vessels which cross the paratenon. The water shed zone is an area 2-6 cm proximal to the calcaneus in which blood supply is less abundant and even become sparser with age. It is in this region that most degeneration and therefore rupture of Achilles tendon occur. Younger tendons have better blood supply, higher tensile strength, less stiffness leading to rupture less frequently.

MATERIALS AND METHODS

This cross sectional study to evaluate the out come of treatment of old defect or rupture, older than 3 month or more by the said technique carried out at Rajshahi Medical college Hospital, Rajshahi and Modern District Hospital, Joypurhat during the period of May'2008 to July'2009.

The total number of patients were 7, all were from 27-50 years old, 5 were male and 2 were female. Patient were selected by purposive sampling method as per inclusion and exclusion criteria.



INCLUSION AND EXCLUSION CRITERIA:

SI. No	Inclusion criteria	Exclusion criteria
1	Older defect (3 month and/or more) preferably degenerative.	Fresh, acute, open rupture
2	Complete, full thickness rupture	Partial, incomplete rupture
3	Over lying skin is intact, healthy	Laceration, wound/ulcer, breach continuity of skin
4	Patient's age. 27-50 years (high activity level)	Older, above 50-60 years of age.

All were operated by Bosworth technique in which lazy 'S' was the skin incision. Posterior longitudinal midline incision through the subcutaneous tissue exposing the TA and its upward extension of tendinous raphe was made. Exposing the rupture ends excision of scar and shredded tissue between the ends, mostly from the proximal one was carried out. Ihestrip of tendon 1.5 cm wide and 17.5 cm to 22.5 cm long from the central third incorporating the apponuretic raphe attached 2 cm away from proximal

stump. Turn the strip distally, pass it transversely through the proximal stump and anchor it there.

Pass the tendon strip distally and than transversely through the distal end; pass it again through the said end from anterior to posterior. Holding the knee at 90° and the ankle in plantar flexion, draw the facial strip tight and anchor it with delayed absorbing (vicryl) suture. Bring the strip proximal ly and pass it transversely through the proximal end. carry it distally and suture it on itself.

Close the wound and apply long leg cast holding knee in 60° flexion and ankle in planter flexion.

Diagram: Steps of Technique

AFTER CARE:

Following surgery long leg plaster slab encasement, ankle in gravity equinus for 2 weeks. Stitches removed. Wound checked. Reapplication. long leg full plaster 2 weeks. 4 wks later, short leg full plaster lifting ankle to neutral/Plantigrade for 4 weeks. After 8 weeks, Sarmiento walking plaster (PTB) for further 4 weeks. Alternatively rigid lockable AFO orthosis for 4-8 weeks. After 12-16 weeks, worn heel raised shoe, Full weight Bearing with calf stretching-building exercises. At that period, active, active assisted, ROM and gradual resistance exercises progress to full activity. Full weight bearing was permitted in these patients approximately 3 months after operation.

OBSERVATION AND RESULTS:

Results were evaluated on following criteria.

1. Post operative wound complications.
2. Post operative pain on walking.
3. Strength (in terms of planter flexion) of tendoachilles.
4. Independent tiptoe stance.
5. Range of motion at ankle.
6. Gait.

Results were graded by the following criteria:

1. Restriction of movement of dorsiflexion

25% -	Very Good
50%-	Good
100%-	Bad

2. Limp

Absent -	Very Good
Mild to moderate-	Good

3. Push off while walking comparison with the pre operative status as experienced by the patient

Significant improvement	:	very Good
Some improvement	:	Good
No improvement	:	Bad

RESULTS

Very Good	:	6 cases
Good	:	1 case
Bad/Poor	:	Nil

Complications

Wound dehiscence Skin sloughing off, Superficial wound infection. Keloid formation.

Table 1
distribution of patient by age (n= 7)

Age (in year)	Frequency	Percent
27-35 35-45 45-50	4 2 1	57.15 28.58 14.29
Total	7	100.0

Mean ±SD = 38.79 ±5. 18

Table II
Distribution of patient by sex (n=7)

Sex	Frequency	Percent
Male Female	5 2	71.43 28.58
Total	^T"	100.0

Table-III
Distribution of patient by side of injury (n=7)

Side	Frequency	Percent
Left	5	71.43
Right	2	28.58
Total	7	100.0

Table IV
Distribution of the patient by complications

Complication	Frequency	Percentage
Wound dehiscence	0	0
Skin sloughing off	0	0
Superficial wound infection	1	14.29
Keloid formation	0	0
Total	1	14.29

Table -V
Distribution of the patient by final outcome (n=7)

Final outcome	Frequency	percentage
Very Good	6	85.72
Good	1	14.29
Bad/Poor	0	0
Total	7	100.0

DISCUSSION

Our initial experience of tendoachilles was to repair the tendon by end to end suturing of the shraded cut ends. However we found many dreadful complication like sloughing off of skin over the tendon, sloughing of the dead tendon ends and re-rupture etc. The basis of this operative technique which have used since 1934 is the anatomical fact that the raphe of the tendon Achilles extends upward on the posterior surface of calf, three fifth of the way from the heel to the knee.

In this series, out of 7 patient 4 (57.15%) were within 27-35 years of old followed by 2 (28.58%) were 35-45 years old and 1 (14.29%) was 45-50 years aged. Mean age was 38.79 ±5.18 years age. This group represent middle aged with high activities level and functional impairments were significant.

In our series, male and female ratio was 3:1.5. Out of 7 patients (n=7) 5 (71.43%) were male and 2 (28.58%) were female.

In the study 5 (71.43%) cases were left sided and 2 (28.53%) were right sided though all were right handedness.

All of the patient attended hospital in late i.e. 3 months and /or after. Initially they have been treated by local general practitioner, quack attended with long lusting complains presenting relative weakness during walking, stiffness in ankles and weak push off.

In our series, 6 cases (85.72%) were free from any complication, 1 (14.29%) develop superficial wound infection which healed by dressing.

In our study, range of follow up period was 6-17 months. Out of 7 patients (n=7) 4 (57.15%) were followed up for 8 months, 2 (28.58%) were followed up for 12 months and 1 (14.29%) cases followed up to one and half year.

The results were graded by:

1. Post operative wound complications.
2. Post operative pain during walking.
3. Limp
4. Push off while walking.
5. ROM at ankle.
6. Gait.

The cases presented are few but their follow up appears adequate. No operative complications have been experienced. No physical therapy aside from warm baths and message done by the patients themselves in their homes have been employed. Reconstitution of the calf muscles both as to size and out line had been good.

CONCLUSION

Ruptured tendon ends are physiologically compromised tissue; does not heal in time.

So, in treating old defect or rupture, the Gold standards are: Primary debridement. Lazy 'S' incision which prevents sloughing off of the skin. A small amount of new tendinous tissue completely and firmly bridged the gap, reformation of normal tissue (tendon) as to size and out line without weakening would result from interposed remnants, reflects '*essence of the technique*'.

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Original Article

A Comparative Study between Early & Late Open Reduction & Internal Fixation by Cross K-wires for the Treatment of Supracondylar Fracture of Humerus in Children (Below 12 Years)

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ABSTRACT:

Supracondylar fractures of the humerus in children are common injuries in Bangladesh & complete displacement of the fragments occur in many cases. With proper indication surgical procedures are superior in maintaining stability, avoid complications, early recovery & early rehabilitation. Early Open Reduction & Internal Fixation (ORIF) & cross K-wire fixation is a better method of treatment. To find out a better way of treatment of displaced Supracondylar fractures of humerus in children, to assess functional outcome, to find out the complications associated with fracture. This prospective study was carried out during the period of July 2006 to June 2008 at National Institute of Traumatology & Orthopaedic Rehabilitation (NITOR). Total 36 cases were included in the study but 6 patients were missing due to inadequate follow up. Remaining 30, 15 were treated by early ORIF (within 2 days) & rest 15 were treated by late ORIF (within 2 weeks) with a follow-up period of 6 months to 1 year. Result was graded according to the criteria used by Flynn et al[6] .The overall result was analyzed by categorizing satisfactory 14 cases (93.3%) in early ORIF by K-wire & 11 cases (73.2%) in late ORIF by K-wire fixation. Early ORIF by K-wire is better treatment modality than late ORIF by K-wire fixation for the treatment of Supracondylar fracture of humerus in children (Below 12 years).

Keywords: Supracondylar fracture of humerus, Early ORIF by K-wire, Late ORIF by K-wire, Children below 12 years.

INTRODUCTION:

Supracondylar fractures of the humerus in children are common injuries in Bangladesh [20]. Complete displacement of the fragments occurs in many cases.

These fractures are extra capsular in nature & occur following a fall on out stretched hand. They are of two types- Extension (97.7%) & Flexion (2.3%).

Among the numerous attempts to classify Supracondylar fractures Gartland proposed the most widely accepted grading of this fracture- Type I: Undisplaced, Type II: Displaced with intact posterior cortex, Type III: Displaced with no cortical contact.

Aetiology varies in different studies. According to Wilkins(1996) total 7212 cases of Supracondylar fractures pooled data from different studies- shows average age incidence 6.7 years, left side was 60.8%, boys were more affected 62.89%.[25]

Problems of Supracondylar fractures are mainly due to unsuccessful attempts at closed reduction, which frequently results in Cubitus varus deformity, valgus deformity, VIC, loss of motion, Myositis ossificans & tardy ulnar nerve palsy.

Main problem regarding management of displaced Supracondylar fractures are obtaining & maintaining

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reduction, as they commonly present in the emergency department with varying degrees of soft tissue swelling. These swollen limbs with displaced fracture present a formidable challenge.

Management of displaced unstable Supracondylar fractures remains under dilemma; There are 4 basic types of treatment:[7]

1. Skin traction (Dunlop traction)
2. Overhead skeletal traction
3. Close reduction & casting with or without pinning
4. Open reduction & internal fixation

Surgical methods of treatment have not been regarded favorably in the past mainly due to infection, stiffness, Myositis ossificans & varus deformity. But now it is proved to be the safe & superior method for unreduced or displaced unstable Supracondylar fracture of humerus, when closed reduction is unsatisfactory. Deformity is less & range of motion is more in open reduction & internal fixation for Supracondylar fracture of humerus.

Maltreated Supracondylar fracture results in loss of elbow function, late deformity like Cubitus varus or valgus & Myositis ossificans.

Randomly treated Supracondylar fracture by closed reduction with posterior cast immobilization bears potential risk of re-displacement. Considerable swelling that may compromise circulation & lead to VIC.

Closed reduction & maintenance of the reduction with pin without C-arm is not safe in huge swollen elbow which may injure vascular system, nervous tissue especially ulnar nerve. But C-arm is not always available in emergency operation theatre.

Therefore, early or late open reduction & internal fixation of displaced Supracondylar fracture is better option by triceps splitting posterior incision. This method solves the problem regarding failed reduction, huge swelling of the elbow, open fracture with vascular injury, preventing of gun-stock deformity, to get increase range of motion & avoid radiation hazards. Our attempt is to show that early open reduction & internal fixation of unreduced Supracondylar fracture of humerus by crossed k-wires is a good method of treatment.

MATERIALS & METHODS:

This is a prospective study that was carried out during the period of July 2006 to June 2008 at National Institute of Traumatology & Orthopaedic Rehabilitation (NITOR) to compare the results of the displaced Supracondylar fracture in children management by early open reduction K-wire fixation & late open reduction K-wire fixation

Total 36 cases were included in the study but six patients were missing due to inadequate follow up. Remaining 30, 15 were treated by early ORIF (within 2 days) & rest 15 were treated by late ORIF (within 2 weeks) with follow up period of 6 months to 1 year. Patients were selected on the basis of history, physical examination, radiological findings. Patients were recruited on the basis of inclusion & exclusion criteria.

CRITERIA FOR SELECTION OF CASES:

I. Children below 12 years
II. Both sexes
III. Displaced Supracondylar fracture of humerus
IV. Only closed fracture with medial or lateral displacement
V. Extension type fracture
VI. Both fresh & failed cases (1 or 2 attempts of closed reduction)
VII. Those presented within 2 weeks after injury.
VIII. Injuries of any cause (Fall from height, RTA, Fall from bed etc)
IX. Any associated injuries are also included

Criteria for exclusion of cases:

I. Patient above 12 years
II. Open fractures
III. Un-displaced fracture (I & II)
IV. Flexion type fracture
V. Late presentation after 2 weeks

In this study the results were classified according to criteria used by Flynn et al. (1974) as follows (Table I):

Result	Cosmetic factor: Loss of carrying angle (in degree)	Functional factor: Loss of motion (in degree)
Excellent	0-5	0-5
Good	6-10	6-10
Fair	11-15	11-15
Poor	>15	>15

Flynn et al.(1974) categorized the result into satisfactory & unsatisfactory groups. The satisfactory group included excellent, good & fair results. The unsatisfactory group included poor outcome[7].

RESULTS:

This prospective study of surgical treatment of Supra-condylar fracture was carried out in 36

cases but 6 patients were lost due to inadequate follow-up. With an average of 6 months to 1

year follow-up period the following findings were compiled to find out the common cause,

age, sex, incidence & to propose a protocol for treating such cases.

Table-II

Age distribution of the patients (early & late group)

Age in years	No. of Patients	Percentage
2-4	7	23.4
5-8	14	46.6
9-12	9	30.0
Total	30	100.0

Table-III

Sex distribution of the patients (early & late group)

Sex	No. of patient	Percentage
Male	18	60
Female	12	40
Total	30	100

Table-IV

Various causes of injury (early & late group)

Causes of injury	No. of patient	Percentage
Fall from tree/height	12	40.0
Fall from bed	07	23.3
Fall during playing	03	10.0
RTA (Fall from rickshaw)	08	26.6
Total	30	100.0

Table-V

Sides of involvement (Early & late group)

Side	No. of patients	Percentage
Left	21	70
Right	09	30
Total	30	100

Table-VI

The displacement (Early & late group)

Displacement	No. of patients	Percentage
Postero-medial	24	80
Postero-lateral	6	20
Total	30	100

Table-VII

Complications at presentation (n=30)

No. of patients	Injury	Type of fracture	Percentage
0	Volkmann's Ischemia	III	0
1	Ulnar nerve palsy	III	3.3

Table-VIII

Interval between injury & operation

Time Interval	No. of patients	Percentage
Within 48 hours	15	50
2 days to 14 days	15	50
	30	100

Table-IX

Loss of motion & carrying angle in early open reduction & internal fixation by K-wires (N=15)

No. of patients	Loss of motion in degree	Loss of carrying angle in degree	Grading	Percentage
n= 3	0-3	1-5	Excellent	20.0
n=8	6-10	6-10	Good	53.3
n=3	11-15	11-15	Fair	20.0
n=1	21	18	Poor	6.7

Table-X

Loss of motion & carrying angle in late open reduction & internal fixation by K-wires (N=15)

No. of patients	Loss of motion in degree	Loss of carrying angle in degree	Grading	Percentage
n= 1	4	5	Excellent	6.7
n=6	3-10	6-10	Good	40.0
n=4	11-15	11-15	Fair	26.6
n=4	6-30	18-26	Poor	26.6

Table-XI

The comparative proportion of satisfactory & unsatisfactory results (N=15)

Result	Early ORIF by K-wire		Late ORIF by K-wire	
	No. of Pts	Percentage	No. of Pts	Percentage
Satisfactory	14	93.3	11	73.4
Unsatisfactory	1	6.7	4	26.6
Total	15	100.0	15	100.0

Table-XII

Complication in early open reduction & internal fixation by K-wires (N=15)

Complication	No. of Pts	Percentage
Volkmann's ischemia	0	0
Blister formation	2	13.3
Mal-union	1	6.7
Neurological damage	0	0

Table-XIII

Complications in late open reduction & internal fixation by K-wires (N=15)

Complication	No. of Pts	Percentage
Pin tract infection	1	6.7
Ulnar nerve palsy	1	6.7
Failure of fixation	2	13.3
Volkmann's ischaemia	0	0

Table-XIV

Relative Percentile

Result	Early ORIF by K-wire		Late ORIF by K-wire	
	No. of Pts (n=15)	Percentage	No. of Pts (n=15)	Percentage
Excellent & Good	11	73.4	7	46.6
Fair	3	20.0	4	26.6
Poor	1	6.7	4	26.6

Table-XV

Relative Percentage of satisfactory result

	Early ORIF by K-wire (n=15)	Late ORIF by K-wire (n=15)
Satisfactory	93.3% (n=14)	73.2% (n=11)
Unsatisfactory	6.7% (n=1)	26.8% (n=4)

The overall result was analyzed by categorizing satisfactory 14 cases (93.3%), unsatisfactory 1 case (6.7%) in Early ORIF by K-wire (n=15) & satisfactory 11 cases (73.2%) with unsatisfactory 4 cases (26.8%) in Late ORIF by K-wire (n=15).

DISCUSSION

The purpose of surgical treatment of Supra condylar fracture is to maintain stability, avoid complications, early recovery & early rehabilitation.

Supra Condylar fractures of the humerus in children are common injuries[20]. In this study, the fracture was found more common in boys (60%) than in girls (40%). In all studies of Supra Condylar fracture, there was a higher frequency in male patients 63% (Wilkins1996) & 66.7% (Sarwar 2003).

Supra Condylar fracture of the humerus occurs commonly in the first decade, peaks at 5 to 8 years of age & decrease in incidence until age 15 years[2,10]. In this study mean age of the patients were 7.2 years.

Most common cause of injury in this study was due to fall from height (40%). According to Sarwar (2003) it was 46.7%. Left side was more frequently involved in 70% of patient. While the right side fracture was 30%. According to Wilkins (1996) left side was more frequently involved (76.7%).

Flynn et al.(1974) cited an incidence of 18% vascular & 8% neural complications in his 72 displaced Supracondylar fracture study. In this study there was no vascular complication. Only one patient had ulnar nerve palsy & was associated with type III postero-medial type fracture. At 6 weeks of follow-up the nerve function improved.

In this study, 15 patients were treated by early open reduction & cross K-wire fixation, through the epicondyles across the fracture to the proximal fragment. The limb immobilization in a back slab-keeping forearm pronated & elbow at 90° flexion. Pins were removed at 3-4 weeks. All fractures united at 4 to 6 weeks. Out of 15 patients 3 (20%) achieved excellent result, 8 (53.33%) had good result, 3(20%) fair & 1(6.6%) had poor result. The overall satisfactory result (including the excellent, good & fair) was 93.3% & unsatisfactory was only 6.7%.

Another 15 patients were treated by late open reduction & internal fixation by K-wire. At follow up, out of 15 patients 1 (6.7%) achieved excellent result, 6 (40%) had good result, 4 (26.64%) fair & 4(26.64%) had poor result. The overall satisfactory result (including the excellent, good & fair) was 73.2% & unsatisfactory was only 26.8%.

Volkmann's ischaemia is a dread complication of Supra Condylar fracture of the humerus. The vulnerable position of the neurovascular structure in relation to fracture made this complication more common. In Flynn study (1974) it was 18%, Pirone reported one patient in his study. In this study there was no case of Volkmann's ischaemia.

In this study 1 patient out of 30 (3.33%) has been reported with transient ulnar neuropathy. This was due to medical pin fixation probably traction injury during pinning has caused neuropraxia. The nerve completely returned to normal. Myositis ossificans although reported in some series none in this study. This may occur due to repeated manipulation of arm. In this study, 1 patient suffered from pin tract infection. The infection was superficial & overcome by antibiotic therapy with culture & sensitivity but some degree of scar tissue remained, which could not interfere the final outcome. Accurate pin insertion requires actual mastering of the procedure. There was no broken pin or no growth disturbance.

ORIF by transcondylar K-wire, result was excellent but others previously disliked this method mainly due to infection, stiffness, Myositis ossificans & loss of motion due to soft tissue contracture. But now it is proved to be safe & superior method for displaced unstable Supracondylar fracture of humerus due to fewer complications. A modified technique of close pinning under 'C-Arm' image intensifier & demanded almost all patients had excellent & good result. But use of image intensifier adds a hazard of radiation to both the patients as well as OT staff. On the other hand, pin introduction without C-Arm intensifier is not safe in huge swollen elbow which may injure vessels & nerves especially ulnar nerve.

In this technique, the midline posterior incision & triceps splitting technique that visualized directly the fracture site & solve the problems regarding failed reduction, huge swelling, to deal with neurovascular damage & avoid any radiation hazards.

Swelling was a major problem in some cases, especially after one or two attempt of closed reduction or late presentation with inadequate initial management. In this study, it was managed by elevating the limb 2-3 days, then open reduction & K-wire fixation done. Swelling is a barrier for close reduction & blind pinning.

The most common late complication of Supracondylar fracture is Cubitus varus deformity. That deformity appear to result from, faulty reduction with medial angulation of the distal fragments, it is the result of postero-medial tilt of the distal fragment. In this study all fractures united, no non-union developed. Good remodeling potential present in children, this also can help to attain satisfactory function. Long-term observation outlines that the flexion & extensive of the elbow can be improved up to one year by gradual remodeling of the fracture. The carrying angle did not change appreciably after 3 months of fracture. As children have remodeling capacity is required to achieve the best possible functional results.

In the most management of displaced Supracondylar fracture, the key to the success depends on the accuracy

of reduction. As all patients with poor final result had a Gartland type III with initial treatment. Immobilization procedure can be selected upon the type of the injury & surgeon's choice. A swollen elbow compromises the vascularity & is difficult to stabilize. So to ensure vascularity the elbow is kept at 90° or between 70°-90°.

Some authors believe percutaneous K-wire fixation can solve the problem. But in this study, as the fractures are fixed by open reduction & K-wire fixation, the elbow can be splinted at 90° or lesser degree of fixation without any chance of vascular compromise or re-displacement. It requires general anaesthesia & aseptic precaution followed by antibiotic therapy. Therefore, this procedure can be practiced at every trauma centers of our country even in district hospital where such operative facilities are available.

Perfect reduction is our goal. The open reduction & K-wire fixation has no effect upon the functional & cosmetic result. This technique requires no C-Arm intensifier, which is also available in many hospitals in Bangladesh at this moment. But radiation hazards require higher attention. So considering socio-economic conditions & facilities available is in favour of open reduction & K-wire fixation in case of early displaced supracondylar fracture.

CONCLUSION

Supracondylar fracture of humerus is the most common fracture of the elbow in children & complete displacement is common. There are several methods of treatment of this fracture close reduction & plaster immobilization is the most commonly employed method of treatment in NITOR. To treat a case of supracondylar fracture, assessment of the severity of elbow swelling & degree of displacement is essential. Close reduction & plaster splinting should be reserved for those cases with type I & II fracture. In case of displaced fractures with one or two failed closed reduction, early open reduction & cross K-wire fixation is better method of treatment.

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Original Article

Locking Compression Plate Versus Dynamic Compression Plate for the Treatment of Old Humeral Shaft Fracture Augmented With Autogenous Cancellous Bone Graft

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ABSTRACT

There are certain indications where surgical treatment is needed in the form of plating and bone grafting or intramedullary nailing (open or closed, simple or interlocking) or external fixators for humeral shaft fracture. This study was undertaken to compare the functional outcomes of open reduction and internal fixation done by narrow dynamic compression plate (DCP) and locking compression plate (LCP) augmented with autogenous cancellous bone graft. A prospective interventional study was carried out for the old humeral shaft fracture at the department of orthopaedic surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka from January 2009 to December 2010. A total of thirty (30) patients from different age and gender constituted the study population who were divided randomly into two groups for open reduction and internal fixation either by anterolateral or posterior approach. Group-I, comprising of 14 patients treated by dynamic compression plate (DCP) and group-II, comprising of 16 patients treated by locking compression plate (LCP) with autogenous cancellous bone graft in both groups. Patients were followed-up postoperatively at three weeks interval and final functional outcomes were assessed after 6 months of surgery by modified Constant and Murley score. In intervention group-I, out of 14 cases, 13 (92.58%) had good union with a mean time of 15.38 ± 3.31 weeks against all 16 (100%) cases of intervention group-II with a mean time of 14.63 ± 2.60 weeks. Preoperatively 3 patients comprising both groups had radial nerve palsy that completely recovered after surgery. There was no major complication in both groups except one patient developed non union with implant failure and another patient developed transient radial nerve palsy from group-I. In final outcome assessment, satisfactory (Excellent and Good) results were achieved in 11 (78.58%) cases from group-I against 14 (87.50%) from group-II but there was no significant statistical difference (p= 0.425) between two methods of intervention. This study reinforces that LCP can be considered as slightly better surgical option for the management of old diaphyseal fractures of the humerus as it offers a short union time and lower incidence of serious complications like infection. However, there appears to be no statistical difference between two procedures in terms of the rate of union and functional outcome.

Keywords: Humeral shaft fracture, Dynamic compression plate (DCP), Locking compression plate (LCP), Comparison of functional outcome.

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INTRODUCTION

Fracture of the humeral shaft is commonly encountered by the orthopaedic surgeons accounting for approximately 30% of all humeral fractures.[1] Most uncomplicated humeral shaft fractures can be managed conservatively[2] with an expected union rate of more than 90%. In certain circumstances, the fracture fails to unite in expected period of time (4-6 months) when it is called delayed union or non- union.[3] Operative treatment is usually indicated for non-union, poly trauma patients, bilateral humeral shaft fracture, floating elbow, fractures with neurovascular complications, segmented fractures, radial nerve palsy after manipulation, pathological fracture, failure to obtain or maintain acceptable alignment after close reduction, associated injury or patient conditions precluding close management, failure to conservative treatment. [4,5,6,7] Surgical methods of treatment include open reduction and internal fixation by plate and screws (LCP, DCP), open or close reduction and internal fixation by intramedullary nail, semi flexible pins and external fixator. [8] The aim of treatment is to provide a good functional limb as early as possible and return to work.

The optimal method of humeral shaft fracture fixation remains in debate. A consensus is yet to develop regarding operative treatment of diaphyseal fracture of the humerus. Intramedullary nailing is considered most appropriate for internal fixation of long bones as the implant lies nearer to the axis of the bone and requires less extensive exposure and less stripping of soft tissues than plating. However intramedullary nailing of diaphyseal fractures of the humerus has disadvantage of possible decreased mobility at the shoulder because of mainly rotator cuff injury or elbow joint depending on its site of introduction[6]. Moreover, all intramedullary nail fixations demand sophisticated instruments, modern equipments and technical expertise. Among various modalities of surgical treatment for diaphyseal fractures of the humerus, dynamic compression plate fixation remains the gold standard.[7] But recent introduction of locking compression plate has revolutionized the management of juxta articular fractures and osteoporotic bone.[8,9] Locking plate technology with a fixed-angle relationship between the screws and plate has been developed as a potential solution to the difficulties encountered using conventional plating to treat fractures in osteoporotic bone. Many studies have shown the superiority of LCP over traditional implants on osteoporotic fracture.[10] With locking compression plating system, the locking screws are locked with plate that stabilizes the screws and gives better rigid fixation. Further, the friction between the plate and bone is less in locking compression plates that provide less disturbance of periosteal blood supply.[7,8] Researchers suggest plates with locked screws may provide improved fracture stability and healing[9]. Locking compression plates also provide stable fixation of poor quality bone in patients with delayed union or non-union of the humerus.[11] Both experimental and clinical studies with early locking compression plates have shown a lower rate of infection than the standard dynamic compression plate[12]. However, there are some drawbacks of locking compression plates including difficulty in removing the implant than standard compression plates. Also cold wielding may occur in which the locking screw heads become affixed to the plate holes which is difficult to remove[13.] Though both surgical methods are in practice but unfortunately there is lack of sufficient information regarding outcomes between locking compression plate and dynamic compression plate for the treatment of old humeral shaft fractures in our context. This interventional study was aimed to compare the functional outcomes of two well practiced surgical methods for the old humerus fractures in the context of only a few studies are available in this part of world.

METHODOLOGY

Study place and patients:

The study was carried out at the department of Orthopedic surgery of Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka during January 2009 to December 2010. A total of 30 consecutive patients with old humeral shaft fractures were diagnosed by history, clinical examination and relevant investigation and randomized into two surgical intervention groups using a sealed envelope. Fixation by dynamic compression plate (DCP) was done for group-I, comprising of 14 patients (n=14) and locking compression plate (LCP) was used for group-II, comprising of 16 patients (n=16). In both procedures, autogenous cancellous bone graft was used for augmentation.

SELECTION OF PATIENTS:

After taking informed written consent from each patient purposive sampling technique was adapted for selection of patients using following inclusion and exclusion criteria:

Inclusion:

1. 8 to 28 weeks old humeral shaft fracture.
2. 20 to 60 years of age from both sexes.
3. Site: diaphyseal fractures of humeral shaft between 3 cm distal to surgical neck and 5 cm proximal to the olecranon fossa.
4. Fracture of humeral shaft with or without radial nerve palsy.
5. Failure of conservative treatment.

Exclusion:

1. Open fractures.
2. Pathological fractures.
3. Infected non-union and persistence of wound.
4. Unstable medical illness.
5. Non-cooperative patients.

Surgical procedures:

The surgery was carried out under general anesthesia. All patients were administered 1 gram 3rd generation Cephalosporin 30 min preoperatively as prophylactic measure and continued for 72 hours. With all aseptic precautions, open reduction and internal fixation was performed with a narrow DCP or with a LCP using commercially available plates by standard anterolateral Henry approach with lateral plating. In case of distal third humeral fracture posterior approach with posterior plating was done. Autogenous cancellous bone grafting was done in all patients. Postoperatively suction drain was removed after 48 hours. Sutures were removed on 12 to 14 postoperative day and check X-rays were taken. After removal of sutures, patients were allowed arm sling and advised to perform shoulder, elbow and finger movements.

Follow up:

At the beginning patients were followed up at three weeks interval then at monthly interval till fracture union was achieved. Both clinical (for evidence of pain at the fracture site,

evidence of union, radial nerve palsy, infection and functional outcome) and radiological assessments were done at each visit. Final functional outcomes were assessed at 6 month's visit using modified Constant and Murley score (Table 1)[14] which included original Constant and Murley score (Excellent: 80-100, Good: 60-79, Fair: 40-59 and Poor: 0-39) along with radiological scoring (union within 12 weeks- Excellent; 12-16 weeks- Good; 16-20 weeks- Fair; >20 weeks- Poor).

Table I

Constant and Murley score

Item	Findings	Points
Pain (15)	None	15
	Mild	10
	Moderate	05
	Severe	00
Activities of daily	Full Work	04
living (20)	Full recreation / sports	04
	Unaffected sleep	02
	Hand position	
	Up to waist	02
	Up to xiphiod	04
	Up to top head	08
	Above head	10
Range of motion (40)	Abduction	10
	Forward elevation	10
	Internal rotation	10
	External rotation	10
Shoulder power (25)		
Pounds to resist		
Total = 100		

Statistics:

Proportion, measure of tendency and dispersion of the variables like age, sex, involved limb, dominant limb, duration of injury, type of fracture, rate of infection, pain at the fracture site, time to achieve union, functional outcome of shoulder and elbow and complications of surgery were tested by appropriate paremetric and non parametric statistical technique (e.g. T-test, Chi-square test) depending upon the natures of variables in both the groups. Data were analyzed using SPSS computer software programme.

Results

Out of 30 patients, 14 (group-I) underwent internal fixation by DCP and 16 (group-II) by LCP. Table 2 depicts distribution of patients by age in two groups. The mean

age of the patients was 38.79 ± 10.89 years and 41.38 ± 12.50 years respectively for the DCP and LCP fixation with no statistical significance in mean age between two groups (p= 0.549).

Table-II

Age distribution of patients (n=30)

Age in year	Group-I (n=14)	Group-II (n=16)	t value	p value
20-29	3	4	0.61	0.549
30-39	5	3		
40-49	3	2		
50-59	3	3		

Mean ± SD 38.79± 10.8941.38 ± 12.50 Group-I = DCP and Group-II = LCP

Regarding gender distribution, there were 10 males (71.43%) and 4 females (28.57%) in group-I (DCP) while in group-II (LCP), there were 10 males (62.50%) and 6 females (37.50%) with no statistical significance (p=0.605) in gender distribution of groups. Most of the patients sustained injuries in road traffic accidents (78.57% in group-I vs. 87.50% in group-II) with no statistical significance (p= 0.154) between two groups. Location of injury comprised of proximal third, middle third and distal third of humerus with vast majority involved the middle third in both groups (78.57% in group-I vs. 87.50% in group-II) without any statistical significance (p=0.327) between the groups. Mean duration of injury (weeks) for group-I and group-II was 12.29 ± 2.70 and 16.19 ± 6.46 respectively (p=0.0045). Incidence of radial nerve injury associated with humeral shaft fracture was 02 (14.29%) in group-I, while it was 01 (7.14%) in group-II respectively. In group-I, fracture union was achieved in 13(92.58%) cases within 12 to 24 weeks (mean 15.38± 3.31) and it was 16(100%) in group-II within 10 to 20 weeks (mean 14.63± 2.60) and there was no statistical significance (p=0.02) between two groups. Duration of fracture union in weeks was 15.38± 3.31 and 14.63± 2.60 for group-I and group-II respectively and there was no statistical difference (p=0.494) between two groups. Regarding post operative complications, infection, non union with implant failure and radial nerve palsy were noted in 01(7.14%) case each in group-I only and there was none in group-II (Table III).

Table IV depicts the functional outcomes assessed after 6 months according to modified Constant and Murley scoring system[14]. In group-I, Excellent, Good, Fair and Poor outcomes were noted in 03(21.43%), 08(57.14%), 02(14.29%) and 01(7.14%) cases respectively. While, in group-II, Excellent, Good and Fair results were noted in 07(43.75%), 07(43.75%) and 02(12.50%) cases respectively. Satisfactory functional outcome included both Excellent and Good grades and it was 11 (78.58%) in group-I and 14(87.50%) in group-II respectively and there was no significant statistical difference between two intervention groups (p= 0.425).

Table-III

Patient's characteristics (n=30)

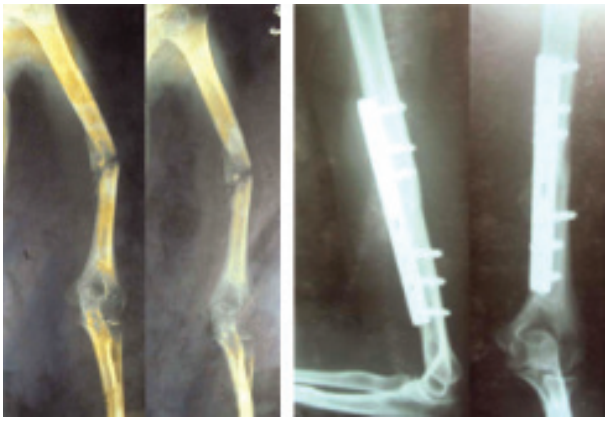
Characteristics	Group-I	Group-II	P value
Gender			
Male	10 (71.43%)	10 (62.50%)	0.605
Female	04 (28.57%)	06 (37.50%)	
Mode of injury			
RTA	78.57%	87.50%	p= 0.154
Others	21.43%	12.50%	
Location of injury	00		p=0.327
Proximal third	11(78.57%)	01(6.25%)	
Middle third	03(21.43%)	14(87.50%)	
Distal third		01(6.25%)	
Mean duration of injury (weeks)	12.29 ± 2.70	16.19 ± 6.46	p=0.0045
Incidence of radial nerve injury	02 (14.29%)	01 (7.14%)	
Rate of fracture union	13(92.58%)	16(100%)	p=0.02
Duration of fracture union(weeks)	15.38± 3.31	14.63± 2.60	p=0.494
Post operative complications			
Infection	01 (7.14%)	00	
Non union with implant failure	01 (7.14%)	00	
Radial nerve palsy	01 (7.14%)	00	

Table-IV

Comparison of functional outcome between two groups after 6 months by modified Constant and Murley score (n=30)

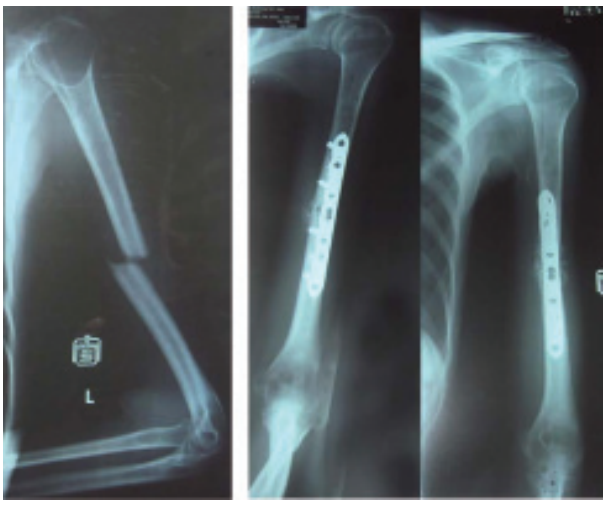
Functional outcome	Group-I (n= 14)		Group-II (n= 16)		Total(n=30)	
	No. of patients	Percentage	No. of patients	Percentage	No. of patients	Percentage
Excellent	3	21.43	7	43.75	10	33.33
Good	8	57.14	7	43.75	15	50.00
Fair	2	14.29	2	12.50	4	13.34
Poor	1	07.14	0	0	1	03.33
p value	p= 0.425					

Figure 1 and 2 depict the radiological findings of fractures humerus before and after surgical interventions in two groups.



Pre-operative Post-operative

Fig.-1: *Humeral shaft fracture stabilized with LCP*



Pre-operative Post-operative

Fig. 2: *Humeral shaft fracture stabilized with LCP*

DISCUSSION

Successful surgical managements for old humeral shaft fractures require stable internal fixation and early joint motion. Osteoconduction and osteoinduction are needed for sufficient bone healing. Bone healing is not anticipated without the addition of a potent biologic stimulus. Osteoconductive bone graft substitute is indicated as an extender of an osteoinductive substance in the management of nonunion. Several osteoconductive bone graft substitutes are available for clinical use, including coralline hydroxyapatite, collagen-based matrices, calcium phosphate, calcium sulfate, and tricalcium phosphate. These products vary considerably in their chemical composition, structural strength, and resorption/ remodeling rates.[15] Different authors used different criteria to label union. Healing or union has been variously defined by the presence of bridging callus on x-ray, the absence of pain on deformation at fracture site, the ability of the patient to load full weight without external support. In our study we considered the fracture as united when there was no pain clinically and without any subjective symptoms and the patient had full function. In the present study, rate of union of humeral shaft fracture treated by DCP was 92.58% and non union was 7.42% due to implant loosening. These results corroborate well with a number of studies done in similar settings. [16,17,18,19] Union rate treated by LCP (group-II) in this study was 100% and similar results were documented by Shankar et al.[19] and Saha[20] in humeral shaft fracture treated by locking compression plate.

Regarding mean union time for intervention group-I (DCP), it was 15.38± 3.31 weeks (range 12 to 24 weeks) noted in our study and similar results were found by Healy white et al.[16] and Shankar et al.[19] in their series too. While, mean union time for locking compression plate (LCP) group was slightly less (14.63±2.60 weeks) than DCP which was also in accordance with a few investigators.[19,20,21]

In this study, we adapted modified Constant and Murley[14] scoring for the assessment of functional outcomes. In group-I (DCP), Excellent, Good, Fair and Poor functional outcomes were distributed as 21.43% 57.14%, 14.29% and 7.14% respectively, while in group-II (LCP), Excellent, Good and Fair functional outcomes were found to be 43.75%, 43.75% and 12.50% cases respectively. Final outcome was analyzed on the basis of functional outcome, time taken for union, infection and radial nerve palsy. In DCP group satisfactory (Excellent and Good) results were found in 78.58% cases against 87.50% in LCP group. Our results for the post surgical functional outcomes assessment are comparable with a few authors.[20,22,23] Though apparently slight better performance was noted in LCP group but there is no significant statistical difference ($p>0.05$) between two groups. In a meta-analysis of prospective studies which included 155 patients carried out by Bhandari et al could not formulate any conclusive preference on surgical procedures for humeral shaft fracture.[24]

CONCLUSION

Old humeral shaft fracture can be treated either by dynamic compression plate and screws or with locking compression plate and screws with autogenous cancellous bone grafting. Though there has not been found any significant statistical difference in the functional outcomes yet LCP may be a better option in relation to fracture healing, lower infection rate and less chance of implant failure especially in osteoporotic bones.

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Original Article

Tubercular Dactylitis in A 5 Years Girl: A Case Report on Uncommon Presentation of Skeletal Tuberculosis

Quadrat-A-Eahsan Ullah[1], M.H.M. Alamgir[2], Mohammad Abdul Quader[3], Nurul Alam Badsha[4], Samarjit Barua[5]

ABSTRACT

Tuberculosis of musculoskeletal system is most commonly manifested as tuberculosis of spinal cord (tubercular spondylitis) followed by joint diseases affecting hip, knee, wrist and elbow in the descending order. Tubercular involvement of small bones of hands and feet is known as Tubercular Dactylitis. It is a rare form of extra pulmonary tuberculosis, causing spindle shaped expansion of short tubular bones due to granuloma formation thereby named as *Spina Ventosa.*

A 5 years old Bangladeshi girl presented with a history of painless progressive swelling on the middle phalanx of the left index finger for 3 months. Physical and radiographic examination was consistent with tubercular dactylitis. Curettage & allogenic bone grafting was performed. Histo-pathological examination confirmed the diagnosis of tubercular dactylitis. Anti-TB drugs were prescribed for 12 months. Excellent clinical and functional results were obtained with no recurrence after 2 years of follow-up.

Tubercular Dactylitis is a rare presentation of skeletal tuberculosis and decision making for management poses difficulties. Our experience with curettage & allogenic bone grafting with anti-tubercular therapy for 12 months was quite satisfactory with excellent clinical result, and we recommend this as one of the satisfactory modalities of treatment of Tubercular Dactylitis in children.

Keywords: Tubercular Dactylitis, Spina Ventosa, Extra pulmonary tuberculosis, Children, Curettage & allogenic bone graft.

INTRODUCTION

Tuberculosis is an infection caused by ***Mycobacterium tuberculosis*** manifested by formation of tubercles and caseous necrosis in tissues[1]. Pulmonary tuberculosis is its most common form. Osteo-articular tuberculosis constitutes 1-4.3% of all tuberculosis cases[1,2] and 10-15% of all cases of extra pulmonary tuberculosis[3]. Tubercular infection of the metacarpal, metatarsal and phalanges is known as tubercular dactylitis[4].

Rankin in 1886 first identified Tuberculous dactylitis by histological Technique. ***Feilchenfeld*** in 1896 described Tuberculous dactylitis radiologically in children[5].

Nearly 85% of the patients of Tuberculous dactylitis are below 6 years of age after the formation of the epiphyseal centers. The bones of hands are more commonly involved than those of the feet. Proximal phalanx of the index and middle fingers are the commonest sites of involvement. Up to nearly 7% of children with pulmonary tuberculosis may develop this condition[7]. Spread to the skeletal system is believed to occur via blood and lymphatics.[8]

The diagnosis of this condition is made on the basis of radiological, histological and bacteriological studies. Tuberculosis dactylitis may be confused with conditions like osteomylitis, gout, sarcoidosis and tumors[6,7].

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Treatment with anti-tubercular therapy and rest to the affected part with early mobilization of the joint is a good option. Curratage & allogenic bone graft with concomitant anti-tubercular therapy is also a modality of treatment. Excisional arthoplasty or corrective osteotomy is indicated if the joint is ankylosed in the awkward position. Amputation of the finger or the corresponding ray may be considered if a finger is grossly deformed, scarred and interfering with normal function[2,3,4].

We, hereby, report a case of Tubercular dactylitis in a 5 years old girl, treated successfully with curratage & allogenic bone grafting and anti-TB drugs therapy, to increase the awareness of this rare entity in the orthopedic community.

CASE REPORT

A slum dwelling 5 years old Bangladeshi girl presented with painless progressive swelling of the middle phalanx of left index finger for 3 months and restriction in the index finger movement for 1 month. There was no history of trauma, pain, similar swelling elsewhere in the body with no other local & constitutional symptoms of tuberculosis. There was no history of contact with pulmonary tuberculosis. Family history for congenital or acquired swelling is absent.

A fusiform swelling was on the middle- phalanx of left index finger, more prominent on the dorsal surface, 3.5x2 cm in size, non-tender, no local rise of temperature, firm, with smooth surface & well defined margin. (Fig: 1). Reducibility, compressibility, pulsatility, crackling sensation, ulceration, discharging sinus, scar mark, pigmentation , empty sign & pressure effects were absent. Overlying skin was free. Swelling was immobile & fixed with underlying structure with no neurovascular compromise. DIP joint was mildly flexed with slight restricted movement of PIP & DIP joints of left index finger with no wasting of the hand and forearm of the involved side. No other bony swelling was found in the body. Muscle power of all limbs was MRC - 5/5.

Laboratory investigation was not significant except a raise in ESR (48 mm in 1st hr). X ray of left hand revealed small cystic lesion within medullary space of middle phalanx of index finger with expansion of medullary cavity and thinning of overlying cortex with no periosteal reaction but mild soft tissue swelling. (Fig: 2) .Chest X-ray was normal.

The bony cystic lesion in the middle phalanx of left index finger was approached through a 1.5 cm lateral incision. A well circumscribed cavity with thin cortex, eroded at places was found. Straw colored fluid with cheesy materials was found within the cavity. After curetting of material and proper washing, allogenic bone graft was placed within the cavity.

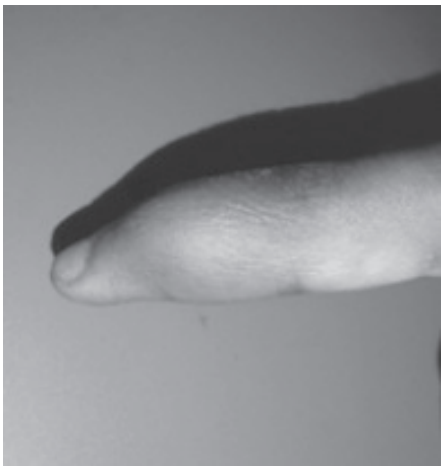


Fig.-1: *Fusiform swelling in the middle phalanx of the left index finger. (Pre-operative). [White arrowed].*

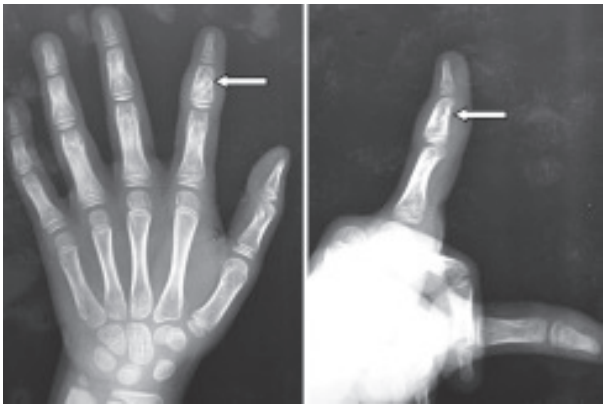


Fig--2: *X-ray Left hand focusing Index Finger (A/P & Lateral view) showing Small cystic lesion within medullary space of middle phalanx of finger with expansion of medullary cavity and thinning of overlying cortex. [White arrowed].*

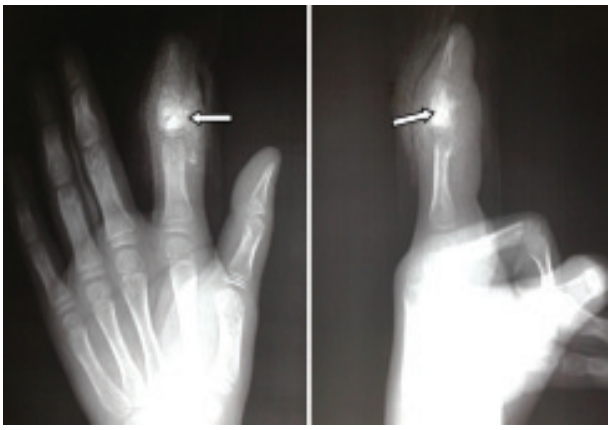


Fig.-3: X-ray of Left Hand focusing Index Finger (A/P & Lateral view) showing allogenic bone graft in the middle phalanx with tissue swelling [White arrowed] in 1st Post-

Histopathology of specimen showed necrotic bone, cartilage and inflammed granulation tissue containing multiple epithelioid granulomas compatible with tubercular osteomylitis. (Fig:4)

Anti-TB drugs were prescribed for 12 months according to current National guideline of Osteo-articular Tuberculosis treatment in Bangladesh. Excellent clinical and functional results were obtained with no recurrence after 2 years of follow-up. (Fig: 5)

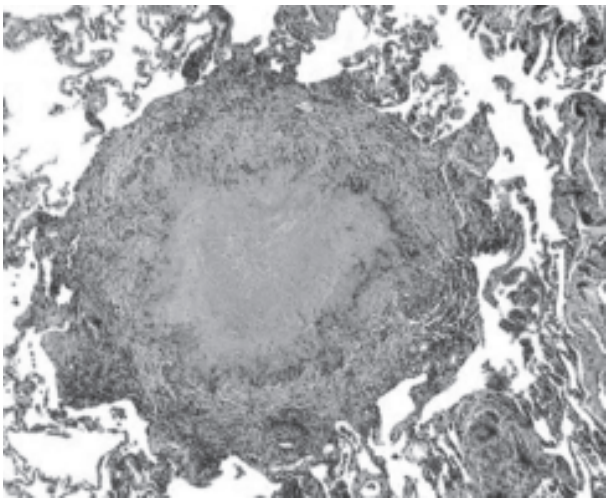


Fig.-4: *Histopathological specimen showing Tubercular granuloma with Epithelioid cells, Langerhans type of giant cells with central Caseation necrosis. [Magnification: 40X]*



Fig.-5: *Follow up X-ray after 2 years showing complete*

DISCUSSION

Osteoarticuar tuberculosis comprises 1-4.3% of all tuberculosis cases and 10-15% of all extra pulmonary tuberculosis cases. 85% of children with Tuberculous dactylitis are younger than six years of age and the incidence among children who had prior history of tuberculosis was reported to be 0.65%-6.9%.[7] Metacarpals and Phalanges are more commonly affected than the bones of the feet and among the bones of the hand index and middle finger are more commonly affected [1]. The diagnosis is usually delayed because of lack of specific sign and symptoms. Radiographic manifestations shows a spectrum of changes varying from soft tissue swelling (90%), osteopenia (72%), joint space narrowing (66%), cysts(66%), erosions (64%), bony sclerosis (20%), periostitis (15%) to calcifications (5%)[7].

Radioisotope scanning usually shows uptake of Technetium 99 diphosphonate, and T2-weighted images in MRI may show bone marrow expansion. During childhood, a large nutrient artery enters almost in the middle of these short tubular bones of the hand and feet. Therefore the first inoculum of infection is lodged in the centre of the marrow cavity of these tubular bones and the interior of the short tubular bone is converted into a tuberculosis granuloma. This leads to a spindle shaped expansion of the bone **(*Spina Ventosa*)** and therefore nutrient artery of the involved bone is occluded leading to the destruction of internal lamellae of the bone and subsequent formation of sequestra[3]. Tubercular dactylitis need to be differentiated from dactylitis in pyogenic osteomylitis, sickle cell disease, congenital syphilis, fungal infections, histiocytosis X and bone tumors (enchondromata and fibrous defect). Sickle cell dactylitis is similar to that of tubercular dactylitis and is characteristically bilateral and irregularly sclerotic new bone formation. In syphilis, the bone is periosteal reaction is very marked. Clinically, pyogenic osteomylitis is acutely painful, swollen, and hot, with high grade fever. Tuberculous osteomylitis is most often mildly painful, fever is minimal, and the whole condition has a benign course and radiographically periosteal reaction is absent or sparse[8]. Management of Tubercular dactylitis includes antitubercular therapy and rest to the affected part with early mobilization of the joint. With antitubercular therapy most of the lesions heal. Surgical intervention is indicated when the response is unfavorable or recurrence of the infection. If the joint is ankylosed in the awkward position excisional arthoplasty or corrective osteotomy is indicated. If a finger has ankylosed of more than one joint, or is grossly deformed, scarred and interfering with normal functioning -

amputation of the finger or the corresponding ray may be considered[2,3,4].

In our case, excellent clinical and functional results were obtained with curettage & allogenic bone grafting & anti-TB drugs for 12 months. No recurrence is observed after 2 years of follow-up.

CONCLUSION

Tubercular Dactylitis should be considered as one of the differential diagnosis for children presenting with longstanding finger swelling with or without pain. High index of suspicion is crucial, especially in areas like Bangladesh where tuberculosis is endemic.

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