Frequency of Nonunion in Ipsi Lateral Femur and Tibia Fracture Treatment

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ABSTRACT

Objective: The objective of our study is to determine the frequency of non union in ipsilateral femur and tibia fractures treatment.

Methods: This descriptive study included 30 patients having ipsilateral femur and tibia fractures in District Headquarter Hospital(DHQ)Teaching hospital Dera Ismail Khan(DI khan) from January 2016 to December 2018.Adult patients of either gender having ipsi lateral femur and tibia fractures fulfilling the inclusion criteria and treated surgically were included in this study. Postoperatively all the patients were seen at 2 weeks, and then every month till union is achieved.

Results: In our study male were 27(90%) and female 3(10%).The mean age of our patients were 43±4SD. Femur interlocking nailing was done in 23(76.6%) cases and platting in 7(23.3%) cases, while tibia platting was done in 25(83.3%) cases and interlocking in only 5(16.6%) patients. A total of 11(36.6%) patients had non union. In 7(23.3%) patients femur alone went to non union while in 4(13.3%) patients femur non union was accompanied with tibia. Femur fractures treated with plating had a non union percentage of 20%(6 patients) while 5(16.6%) patients with interlocking nail reported non union.Among patients of tibial non union, 2(6.6%) had interlocking nail and 2(6.6%) had plating. All femur plates were replaced with interlocking nails and exchange nailing was done in all six interlocking femur nonunion cases. In all four tibial nonunion only bone grafting was added at nonunion site after refreshing the area.

Conclusion: The frequency of non union in ipsilateral femur and tibia treatment is higher in femur than in tibia. Patients treated with femur platting had more chances of non union than with interlocking nail.

Key words: Floating knee, Interlocking nail, Ipsi-lateral fractures, Non union.

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INTRODUCTION

A poly trauma patient has more than one injury involving either single system or multiple systems.[1]Polytrauma patient should be examined thoroughly both locally and systemically in order to avoid any negligence. Such types of injuries are usually seen in young adults and the major cause is road traffic accident.[2,3] Ipsilateral femur and tibia fractures(floating Knee) are commonly associated with other injuries like meniscal and ligament tears, neuro-vascular injuries and large skin lacerations. Also these patients may have head,neck, chest or abdominal injuries which need urgent management on emergency bases. Therefore multidisciplinary team approach including surgeons and physians are necessary for accurate diagnosis and management. All the necessary manpower and logistics should be available under one roof and utilized for urgent and better outcome.[1] The basic principle in management of polytrauma patient is to reduce mortality and morbidity. Pathogenesis and management of polytrauma patients has been improved significantly in the last few decades. [4,5,6] In multiply injured extremity, the prime importance is limb salvage decision without the risk of patient's life. Simultaneous ipsilateral tibia and femur fractures results in floating knee injury, and multiple complications like delayed union,nonunion and rotational deformities can result.[7]In order to achieve best clinical outcomes, early

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surgical stabilization and mobilization should be the aim of treating a floating knee patient.[8]

Various treatment options are available for ipsilateral femur and tibia fractures like conservative management, external fixator, platting and nailing. Close reduction and casting in children mostly is all that is sufficient, but in some studies external fixator has yielded excellent outcomes.[9] In medically unfit and elderly patients traction and immobilization for few months is applied, but is associated with risks of bed sore,pneumonia and thrombo-embolism.[10] Platting and simple intramedullary-nailing of long bones was famous surgical procedure in the past and even is practiced in routine these days in some parts of the world but Interlocking nailing of long bones has revolutionized orthopedic surgery due to stable fixation and early range of movements. Whenever possible both femur and tibia fractures should be fixed with interlocking nails. But in certain circumstances various combinations like nail, plates, external fixator and even simple casting can be tried. Some of the authors apply external fixator initially in femur for open fractures and then replace it with interlocking nails after some times.[11]

Femur fractures treated with plates are associated with high failure rates.[12] Established nonunion of femoral interlocking nail is treated with large size exchange nailing or some sometimes augmented with 4.5 mm Plates or bone grafting.[13,14]

Because of the availability of single trauma expert, overall excessive flow of trauma patients on daily basis and inability of some of the patients to afford cost of interlocking nailing, we did femur and tibia plating in some patients with floating knee patients taking care of the fracture personality. We expected early mobilization and ultimate union. The objective of this study is to determine non union in ipsilateral femur and tibia treated surgically.

METHODS

This descriptive study was conducted in DHQ Teaching Hospital Dera Ismail Khan from January 2016 to December 2018. All adult patients with ipsilateral femur and tibia fractures(floating knee) diaphyseal fractures were included in this study. Medically unfit patients, open Type II and III fractures, intra articular extension, pathological factures, associated neurovascular injuries and patients presenting after one week were excluded from our study. Ethical approval of the study was taken before conducting the study. Informed consent was taken from all the patients. Patients were admitted in ward from emergency or outpatient department and history and examination was done. After routine investigations and proper preoperative workup, all patients were operated on next available operation list.

All fractures were fixed under general or spinal anesthesia and in one sitting by single surgeon, either with ante grade interlocking nails or plates. Fractures with comminution were treated with interlocking nails while simple transverse or oblique fractures were fixed with plates. Closed Interlocking nailing of femur and tibia were done under image intensifier and both proximal and distal locking screws applied. Maximum length and diameter of nails were inserted. Femoral platting was done through lateral approach and minimum often hole broad dynamic compression plate (4.5mm) applied. In tibia through anterior approach a minimum of eight hole narrow dynamic compression plates(4.5mm) applied on lateral surface of tibia. Patients were discharged usually on second or third postoperative day and early mobilization was advised accordingly. Stitches were removed at two weeks. Thereafter patients were followed up monthly for three months, and then at three months intervals till fracture union. Dynamization of interlocking nail of femur and tibia was routinely done at 3rd month if fracture callus was not seen radiographically. The fracture was labelled as non union at 9 months if it was painful on weight bearing and had no or minimal callus on xray and the patient had no clinical signs of infection with normal total leucocyte count(TLC), erythrocyte sedimentation rate(ESR) and C Reactive Proteins(CRP)

The data was analyzed with SPSS version 20. Quantitative variable were presented as Mean ±SD. Qualitative variable were presented as frequency and percentage. Data represented in table where necessary.

RESULTS

A total of 35 patients were enrolled in our study, but five patients were lost in the follow up and results of 30 patients were compiled. A summary of our study participant is shown in table I.

Table I: Demographic, intervention and outcome details of our study participants.

S.no	Age (years)	Sex	M.O.I	Tibia-site (1/3)	Tibia-treat:	Femur-site (1/3)	Femur-treat:	Compli-cation	revision	Union Tibia (month)	Union Femur (month)
1.	25	M	RTA	Prox:	Plat:	Dist:	ILN	Nil	Nil	5	6
2.	31	M	RTA	Mid:	Plat:	Mid:	ILN	Nil	Nil	6	8
3.	19	M	RTA	Prox:	Plat:	Mid:	ILN	Nil	Nil	3	4
4.	28	M	RTA	Dist:	Plat:	Prox:	ILN	FemNU	E.N(F)	7	14
5.	32	M	HOF	Prox:	Plat:	Mid:	ILN	NIL	NIL	5	9
6.	24	M	RTA	Prox:	Plat:	Dist:	ILN	NIL	NIL	3	6
7.	36	F	RTA	Mid:	Plat:	Prox:	ILN	NIL	NIL	10	12
8.	30	M	HOF	Mid:	Plat:	Mid:	Plat:	Fem NU	ILN(F)	5	13
9.	25	M	RTA	Prox:	ILN	Dist:	ILN	NIL	NIL	3	5
10.	33	M	RTA	Prox:	Plat:	Dist:	ILN	NIL	NIL	4	6
11.	36	M	RTA	Mid:	ILN	Prox:	ILN	FemNU Tib NU	E.N(F) B.G(T)	13	15
12.	29	M	HOF	Pox:	Plat:	Dist:	ILN	NIL	NIL	3	5
13.	18	M	RTA	Prox:	Plat:	Mid:	ILN	NIL	NIL	3	4
14.	55	M	HOF	Mid:	Plat:	Mid:	ILN	FemNU Tib(NU)	E.N(F) B.G(T)	14	18
15.	48	M	RTA	Dist:	Plat:	Mid:	Plat:	Fem IF	ILN(F)	8	15
16.	31	F	HOF	Prox:	ILN	Mid:	ILN	NIL	NIL	3	4
17.	35	M	RTA	Prox:	Plat:	Dist:	ILN	NIL	NIL	5	8
18.	39	M	RTA	Mid:	Plat:	Mid:	Plat:	FemNU	ILN(F)	10	14
19.	53	M	RTA	Mid:	Plat:	Prox:	ILN	FemNU	E.N(F)	6	13
20.	23	M	RTA	Prox:	Plat:	Dist:	ILN	NIL	NIL	4	6
21.	27	M	HOF	Prox:	Plat:	Mid:	Plat:	NIL	NIL	4	9
22.	52	M	RTA	Dist:	Plat:	Mid:	ILN	NIL	NIL	10	11
23.	30	M	RTA	Prox:	ILN	Dist:	ILN	NIL	NIL	6	8
24.	61	M	RTA	Mid:	Plat:	Prox:	ILN	FemNU	E.N(F)	11	17
25.	17	M	RTA	Prox:	Plat:	Mid:	ILN	NIL	NIL	3	4
26.	53	M	RTA	Mid:	Plat:	Mid:	Plat:	FemNU Tib(DU)	ILN(F) B.G(T)	13	18
27.	24	F	HOF	Prox:	Plat:	Dist:	ILN	NIL	NIL	4	6
28.	38	M	RTA	Mid:	Plat:	Mid:	Plat:	Fem(IF)	ILN(F)	10	14
29.	59	M	RTA	Mid:	ILN	Prox:	ILN	FemNU Tib(NU)	E.N(F) B.G(T)	13	17
30.	31	M	RTA	Mid:	Plat:	Mid:	Plat:	NIL	NIL	4	6

Male were 27(90%) and female 3(10%).The mean age of our patients were 43±4SD, Road traffic accidents was the cause of injury in 23(76%) cases and fall from height in 7(23.3%). Right & left sides were equally involved. All the patients were operated within a week of injury. Femur interlocking nailing was done in 23(76.6%) cases and platting in 7(23.3%) cases, while tibia platting was done in 25(83.3%) cases and interlocking in only 5(16.6%) patients. A total of 11(36.6%) patients had non union. In 7(23.3%) patients femur alone went to non union while in 4(13.3%) patients femur non union was accompanied with tibia. Femur fractures treated with plating had a non union percentage of 20%(6 patients) while 5(16.6%) patients with interlocking nail reported non union.Among patients of tibial non union 2(6.6%) had interlocking nail and 2(6.6%) had plating. All femur plates were replaced with interlocking nails and exchange nailing was done in all six interlocking femur

nonunion cases. In all four tibial nonunion only bone grafting was added at nonunion site after refreshing the area. Femur dynamization was done in 18(78.2%) while tibia in 2(40%).Superficial skin infection was noted in in 3(13%)femoral interlocking nail and 4(57.1%)femoral plating. A total of 2(8%) tibial plating and 1(20%) interlocking tiba had superficial skin infection. All the infected cases were managed conservatively and infection eradicated. No deep infection was documented.

DISCUSSION

Ipsilateral femur and tibia fractures are not uncommon injuries and usually results from high energy trauma, especially due to road side accidents.[15] Associated injuries in the limb and other parts of the body should be managed in time. In order to achieve best clinical outcomes both fractures should be fixed with stable fixation and early range of movements should be started. [16] Each fracture has its own geometry and the treatment is different accordingly, the basic principle is stable and anatomic fixation. With the passage of time, there is continuous improvement in the surgical skills and implant choice. Each procedure has its own merits and demerits, and success rate depends on many factors. In multiply injured patient early osteosynthesis is important for patient general health stabilization. [17]

Our study in many aspects correlates with other international studies, like patient's bio data, mechanism of injury and fractures location.[1,3,18] Young male patients were mostly affected in road traffic accident and diaphysis was the most common site. As far as the treatment and results are concerned, we have same results as that of Arsalan.[19]They operated 24 patients using various implants like nails, plates and external fixators in both femur and tibia, and got only 50 % good to excellent results. Open fractures had poor results in his study similar to ours as one of our patient which resulted in non-union in both femur and tibia had type I of femur and tibia. We dealt that patient with exchanged interlocking nailing in femur and only bone grafting at tibial non-union site.

Femur fractures treated with plates resulted in poor outcome while platting of tibia fractures gave excellent results in terms of union as supported by other studies. [20, 21,22,23]Chavda[24] treated 52 patients of floating knee with external fixator for open fractures and nailing, plating and screw fixation for closed fractures and reported a non union rate of 3.6%.He concluded that each patient of floating knee should have an individual plan of surgical treatment with special focus on fracture type and soft tissue envelop.

The sample size of our study was small and we could not assessed potential risk factors for non union like smoking, malnutrition and steroid use. We suggest comparative studies on this subject to help in formulating guidelines for managing ipsilateral femur and tibia fractures.

CONCLUSION

The frequency of non union in ipsilateral femur and tibia treatment is higher in femur than in tibia. Patients treated with femur platting had more chances of non union than with interlocking nail.

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Authorship and contribution Declaration

Muhammad Shafiq, Conception and design of the study, acquisition of data, interpreted the data, Drafted the manuscript, Revised the manuscript critically for important intellectual content, Final approval of the version for publication