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Management of Tibial Plateau Fractures by Locking Compression Plate in Adults

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Abstract
Background: *Tibial plateau fracture (TBF) is a very crucial issue for surgical management. Usually, it results from axial loading in combination with valgus stress forces, present a variety of soft tissue and bony injuries that can produce permanent disabilities. Locking compression plate (LCP) is a contemporary implant that allows for both the conventional screw placement and locking screw placement. Although there are various methods for fixation of such fractures with satisfactory results, there is no general consensus as to which method is the best regarding functional outcomes.*
Aim of the study: *The aim of this study was to assess the functional outcome of surgical management of tibial plateau fractures in adult patients by locking compression.*
Methods*: This was a prospective observational study which was conducted in the Orthopedics surgery department of Sher-e-Bangla Medical College (SBMC) Hospital, Barisal, Bangladesh and the Rahat Anwar Hospital, Rayal City Hospital, Arif Memorial Hospital, Barisal, Bangladesh during the period from January 2017 to June, 2021. In total 27 adult patients of several age groups with tibial plateau fractures attended to the mentioned hospital and treated by locking compression during the first six months of the study were selected as the study population. Gustilo Anderson Grade I fractures of tibial plateau presenting in patients requiring open or closed reduction were finalized for this study. All data were processed, analyzed and disseminated by MS Office and SPSS program as per need.*
Results: *In this current study, for most of the cases the treatment duration was less than 10 days (Among 59.26% cases). Then up to 3 weeks and up to 6 weeks were in needed for 29.63% and 11.11% patients respectively. As complications, knee stiffness and malunion were found in 7.14% cases separately. Besides these, varus deformity, extensor lag and re-depression were found in 3.57% separately. In this study the average duration of hospitalization of the participants was 7.5 days. In total 16 patients were operated within 2 to 3 days of injury and showed excellent to good results. Seven patients presented at 5 to 7 days of injury. Among them, those patients, who had swelling Final results as per Rasmussen's criteria were found 'Excellent' in 16 (59.26%), 'Good' in 8 (29.63%), 'Fair' in 2 (7.41%) and 'Poor' in 1 (3.70%) patient.*
Conclusion: *In this study, we found satisfactory outcomes among most of the patients. Considering low blood loss, lower rate of complications and prompt healing ensured by locking compression method, it can be treated as the method of choice for the management of tibial plateau fractures in adults.*
Keywords: *Management, Tibial plateau fractures, Outcome, Axial, Schatzker classification*

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I. Introduction

Tibial plateau fracture (TBF) is a very crucial issue for surgical management. Usually, it results from axial loading in combination with valgus stress forces, present a variety of soft tissue and bony injuries that can produce permanent disabilities. Locking compression plate (LCP) is a contemporary implant that allows for both the conventional screw placement and locking screw placement. Tibial plateau fractures are very common intra-

articular fractures that result from indirect coronal or direct axial compressive forces. Among such fractures, most injuries affect lateral tibial condyle and isolated medial condyle fractures occur in 10-23% whereas the involvement of bicondylar lesions is found in 10 to 30% of the reported series [1]. Tibial plateau fractures may be accompanied by meniscal and ligamentous injuries to the knee too. [2] Tibial plateau fractures constitute of 1% of all fractures and 8% fractures in the elderly. [3] In case of improper restoration of the plateau surface and the axis of the leg, these fractures could lead to develop the premature osteoarthritis, injury in ligaments and lifelong pain and disability. [4] Each increasing numeric category specifies increased level of energy imparted to bone thereby increasing severity of the fracture. [5] The management of tibial plateau fracture in their patient is very difficult in terms of accuracy in fixation. Ali, et al. reported a 31% fixation failure for tibial plateau fracture in their elderly population [6]. Stevens et al. noted, among only 57% of patients found good functional outcome after surgical management of tibial plateau fractures in age of <40 years [7]. Open reduction as well as internal fixation has a significant complication rate [8]. The use of locking compression plate in treating of tibial plateau fractures is being increased day by day. Generally, plateau fractures are low energy and involve uni-condylar pathology with simple articular impaction. [9] The most obvious benefit to using periarticular locking plates includes the scopes of maintaining reduction of a bicondylar fracture using a solitary laterally based plate, thus decreasing the likelihood of late varus malalignment while limiting the overall surgical exposure. [10] The major objective of this study was to assess the functional outcome of surgical management of tibial plateau fractures in adult patients by locking compression.

II. Methodology

This was a prospective observational study which was conducted conducted in the Orthopedics surgery department of Sher-e-Bangla Medical College (SBMC) Hospital, Barisal, Bangladesh and the Rahat Anwar Hospital, Rayal City Hospital, Arif Memorial Hospital, Barisal, Bangladesh during the period from January 2017 to June, 2021. In total 27 adult patients of several age groups with tibial plateau fractures attended to the mentioned hospital and treated by locking compression during the first six months of the study were selected as the study population. Gustilo Anderson Grade I fractures of tibial plateau presenting in patients requiring open or closed reduction were finalized for this study. According to the exclusion criteria, fractures having Gustilo Anderson severity of more than Grade I, pathological fractures and fractures having associated condition like compartment syndrome, ligamentous injury, ipsilateral meniscal, cases of floating knee or other polytrauma were excluded. After recording identification data, lateral roentgenograms and antero-posterior were used to classify the facture as per Schatzker classification. Surgical procedures were done under suitable antibiotic coverage and fluoroscopic control and as soon as local soft tissue conditions were favorable and operation was performed. Fracture site reduction was completed under fluoroscopic guidance with the use of percutaneous clamps, distracters judiciously and repeat fluoroscopic assessment was ensured to assess the anatomical reduction. Open reduction was performed as per need. Buttress plates were used since the proximal end of tibia contains large amount of cancellous bone and has the tendency of axial deviation or bending under the effects of compression or shearing forces. Locking compression plates were used in cases of high energy bicondylar fractures, severe comminution and in osteoporotic bones. If the fixation was deemed stable, then intermittent knee mobilization was started once pain subsided. Weight bearing was deferred until evidence of union was seen on X ray. Partial weight bearing was started at around 10 to 14 weeks depending upon the fracture configuration. The results of this study were evaluated using the functional grading of Rasmussen et al. [10]. All data were processed, analyzed and disseminated by MS Office and SPSS program as per need.

III. Result

In this current study, among total 27 participants, 15 were male which was 56% and 12 were female which was 44%. So, the male participants were dominating in number and the male-female ratio was 1.25:1. The mean (±SD) age of the participants was 39.75 ± 8.25 years. In analyzing the mechanism of injuries among the participants we observed, the highest 41% injuries occurred by road traffic accidents (RTA). Then in 33% cases the mode of injury was low energy, in 19% cases it was fall from height and in 7% cases it was sports. As per Schatzker classification, pure cleavage, cleavage with depression, bicondylar fracture, medial condyle fracture and metaphysiodiaphyseal dissociation were with 40.74%, 22.22%, 18.52%, 11.11% and 7.41% patients respectively. In this current study, for most of the cases the treatment duration was less than 10 days which was among 59.26%. Then up to 3 weeks and up to 6 weeks were in needed for 29.63% and 11.11% patients respectively. As complications, knee stiffness and malunion were found in 7.14% cases separately. Besides these, varus deformity, extensor lag and re-depression were found in 3.57% separately. In this study the average duration of hospitalization of the participants was 7.5 days. In total 16 patients were operated within 2 to 3 days of injury and showed excellent to good results. Seven patients presented at 5 to 7 days of injury. Among them, those patients, who had swelling around the proximal leg were kept on skeletal traction and were operated as soon as local tissue condition was optimized for surgery. Average time gap between operation and

partial weight bearing was around 8.5 weeks. The mean period of radiological union was 12.50 weeks. Most of the patients were allowed complete weight bearing at 11 to 15 weeks. Average time gap for complete weight bearing was 12.50 weeks. Most of the patients had 120º or more knee flexion. Average range of motion was 110.6º. In our study, we found satisfactory outcome in 24 patients which was 89% and not satisfactory in 3 patients which was 11% among all the participants. Final results as per Rasmussen's criteria were found 'Excellent' in 16 (59.26%), 'Good' in 8 (29.63%), 'Fair' in 2 (7.41%) and 'Poor' in 1 (3.70%) patient.

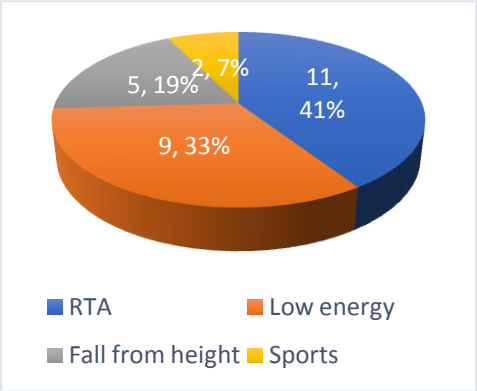

Figure 1: Distribution of mode of injuries (N=27)

Table 1: Type of fractures among participants (N=27)

Type of fractures	**n**	**%**
Pure cleavage	11	40.74
Cleavage & depression	6	22.22
Bicondylar fracture	5	18.52
Medial condyle fracture	3	11.11
MD	2	7.41

MD: Metaphysiodiaphyseal dissociation

Table 2: Period of immobilization of participants (N=27)

Period/time	**n**	**%**
Less than 10 days	16	59.26
Up to 3 weeks	8	29.63
Up to 6 weeks	3	11.11
Total	27	100

Table 3: Complications among participants (N=27)

Complications	**n**	**%**
Knee stiffness	2	7.14
Malunion	2	7.14
Varus deformity	1	7.14
Extensor lag	1	3.57
Re-depression	1	3.57

Table 4: Final outcome regarding Rasmussen grading (N=27)

Outcomes	**n**	**%**
Excellent	16	59.26
Good	8	29.63
Fair	2	7.41

Poor	1	3.70
Total	27	100

IV. Discussion

Tibial plateau fractures which are one of the commonest intra-articular fractures, are major traumatic injury occur due to road traffic accidents, fall from height, violence etc. It is sometimes associated with other bony or soft tissue injuries. Hence the treatment of the upper tibial fractures with intra articular extension has become a challenge for orthopedic surgeons. Keeping this aim at high, we presented the clinical study of surgical treatment of 27 tibial plateau fractures in this study. In our study, we observed the majority of fractures occur between 20 and 50 years of age with maximum incidence involving productive age group of 30 to 40 years. The mean age in this (±SD) study was 39.75 ± 8.25 years. In a similar study done by Rasmussen et al. the average age of patients was 55 years [10]. In our study the majority of patients were male (56%). This can be accredited to the Indian subcontinent set ups where the female population largely remains indoors and is less prone to automobile accidents. In our study the commonest mode of injury was RTA (41%). This did not correlate well with previous study by Chiax et al who in their series reported that 71% of the injuries occurred due to RTA [11]. In this series we studied 27 cases of simple tibial plateau fractures treated only by surgical method. Different authors use different criteria for surgical management of these fractures. Seppo E Honkoenen in his series of 130 tibial plateau fractures, conducted surgery taking into consideration condylar widening of >5 mm and lateral condyle step off >3 mm [12]. The indication for surgery in these types of injuries has evolved steadily with time. Burri, et al. in his study in 1979 advised internal fixation at 1 mm of depression, Hohl et al. and Segal et al. advocated fixation at 5 mm of depression and Honkonen et al. took 3 mm of depression in consideration in his study in 1993 [13, 14]. In this study the indication for surgery were the same standard indications as for those tibial plateau fractures, 3 mm depression was considered as an indication for surgery. In this study, we found satisfactory outcome in 24 patients which was 89% and not satisfactory in 3 patients which were 11% among all the participants. The period of immobilization was individualized depending upon the rigidity of fixation. The benefits of early knee movement include reduced knee stiffness and improved cartilage regeneration. However, these benefits are to be cautiously weighted against their negative impact such as loss of fracture reduction, failure of internal fixation and compromised soft tissue healing. J Schatzker and Robert Mcbroom [7] stated that the prognosis is given by the degree of displacement, type of fracture, method of treatment and quality of post-operative care. In spite some complications we were able to achieve 59.26% excellent, 29.63% good results. Ebraheim et al. in his series of 117 tibial plateau fractures had excellent results in 68% of cases, good in 13%, fair in 11% and poor in 8% of the patients [15]. Final results as per Rasmussen's criteria were found 'Excellent' in 16 (59.26%), 'Good' in 8 (29.63%), 'Fair' in 2 (7.41%) and 'Poor' in 1 (3.70%) patient. The aim of this study was to assess the functional outcome of surgical management of tibial plateau fractures in adult patients by locking compression. The findings of this study may be helpful in the treatment arena of tibial plateau fractures

Limitation of the study:

This was a single centered study with a small sized sample. So, findings of this study may not reflect the exact scenario of the whole country.

V. Conclusion

In this study, we found satisfactory outcomes among most of the patients. Considering low blood loss, lower rate of complications and prompt healing ensured by locking compression method, it can be treated as the method of choice for the management of tibial plateau fractures in adults..

VI. Recommendation

For getting more specific information regarding this issue we would like to recommend for conducting more studies in several places with larger sized samples

References

[1]. J.L.Marsh, Tibial Plateau Fractures, chapter 53 in Rockwood and Green's fractures in adults, Bucholz RW and Heckman JD, 7th Edition. Vol 2: Philadelphia, Lippincott Williams and Wilkins 2010; 1780-1831.

[2]. Markhardt BK, Gross JM, Monu JU. Schatzker classification of tibial plateau fractures: Use of CT and MR imaging improves assessment. Radiographics 2009; 29:585-97.

[3]. Swamy, K. V., Ajay, A., Venkateswararao, T., Reddy, K. R. K., & Thirupathi, S. (2017). Surgical management of tibial plateau fractures by various modalities. INTERNATIONAL JOURNAL OF SCIENTIFIC STUDY, 5(2), 206-209.

[4]. Wang SQ, Gao YS, Wang JQ, Zhang CQ, Mei J, Rao ZT. Surgical approach for high-energy posterior tibial plateau fractures. Indian J Orthop 2011; 45:125-31.

[5]. Mills WJ, Nork SE. Open reduction and internal fixation of high-energy tibial plateau fractures. Orthop Clin North Am 2002; 33:177-98, ix.
[6]. Ali, A. M., El-Shafie, M., & Willett, K. M. (2002). Failure of fixation of tibial plateau fractures. Journal of orthopaedic trauma, 16(5), 323-329.
[7]. Stevens, D. G., Beharry, R., McKee, M. D., Waddell, J. P., & Schemitsch, E. H. (2001). The long-term functional outcome of operatively treated tibial plateau fractures. Journal of orthopaedic trauma, 15(5), 312-320.
[8]. Schatzker, J., Mcbroom, R., & Bruce, D. (1979). The tibial plateau fracture: the Toronto experience. Clinical Orthopaedics and Related Research®, (138), 94-104.
[9]. Watson JT. High energy fractures of the tibial plateau. Orthop Clin North Am 1994; 25:728 –752.
[10]. Rasmussen P. Tibial condylar fractures, impairment of knee joint stability as an indicator for surgical treatment. J Bone Joint Surg 1973;55A:1331–1350.
[11]. De Mourgues, G., & Chaix, D. (1969). Treatment of tibial plateau fracture. Revue de chirurgie orthopedique et reparatrice de l'appareil moteur, 55(6), 575-576.
[12]. Honkonen, S. E. (1994). Indications for surgical treatment of tibial condyle fractures. Clinical orthopaedics and related research, (302), 199-205.
[13]. Burri, C., Bartzke, G., Coldewey, J., & Muggler, E. (1979). Fractures of the tibial plateau. Clinical Orthopaedics and Related Research (1976- 2007), 138, 84-93.
[14]. Bowes, D. N., & Hohl, M. A. S. O. N. (1982). Tibial condylar fractures. Evaluation of treatment and outcome. Clinical orthopaedics and related research, (171), 104-108.
[15]. Ebraheim, N. A., Sabry, F. F., & Haman, S. P. (2004). Open reduction and internal fixation of 117 tibial plateau fractures.

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