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A comparison of the results of dual vs single plating in Schatzker type 5 and 6 proximal tibia fractures

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Abstract
Background: Tibial plateau fracture (TPF) refers to a variety of fracture forms characterised by varying degrees of articular depression and displacement. To treat these complex fractures, a variety of fixators, including a newly developed plate with locking screws, were used. We planned to monitor the surgical results of (1) unilateral for TPF, there are three options: (1) a locking plate, (2) conventional dual plates, or (3) hybrid dual plates.
Materials and Methods: 50 adult participants had closed proximal tibial fractures (Schatzker'5 & 6) managed by open reduction and internal fixation with anterolateral and posteromedial techniques. The Department of Orthopaedics, Govt Medical College and Associated Group of Hospitals, Kota, carried this hospital-based prospective study
Results Our study's youngest patient was 18 years old, while the oldest patient was 68 years old. The bulk of the patients were between the ages of 20 - 50. The patients in the research were on average 39.24 years old. In our current study, the majority of patients experienced trauma due to a road traffic accident, 8% owing to a fall from height, and the remaining 2% had a history of assault. 90 percent of patients were released within 14 days. After 14 days following surgery, 10% of patients were released. In our study, the average length of stay in the hospital was 11.2 days eight patients out of 50 experienced early post-operative problems, with five instances having superficial infection and three cases having wound dehiscence.
Conclusions: There was no statistically significant difference in unionisation rates between the two groups in this study. Based on our clinical follow-up, we learned that soft tissue problems must be recognised, and that using a locking plate can considerably reduce the discomfort of hardware impingement. TPF surgery with a single lateral approach and locking plate takes less time and leaves you in the Hospital for less time.

Keywords: bicondylar tibial plateau, tibial plateau fracture (TPF) fracture, locking plate fixation, dual plate, single plate

Introduction
Tibial plateau fractures (TPFs), which account for around 1.2 percent of all fractures, feature a complex intraarticular fracture pattern [1]. Most surgeons find it difficult to repair high-energy displaced bicondylar fractures of the tibia plateau surgically. According to the report, Types V and VI of the Schatzker classification are complicated. Fractures are frequently accompanied with soft tissue damage and have a high risk of the possibility of wound complications, the difficulty in reducing the size of the incision, and Additional fixing is required for stability. Nonetheless, the best technique of fixation is yet unknown, however treatment options include screws, an external fixator, and a hybrid external fixator [2, 3] Anatomic reduction of intraarticular fracture fragments while preserving stability is the goal of tibial plateau fracture treatment [4-8] There are a variety of ways for both internal and external repair. These fractures are treated with. [5-11] Bilateral open reduction with internal fixation This method has received the approval of the Association for Osteosynthesis/Association for the Study of Internal Fixation. [6] On the other hand, bilateral plating may need extensive dissection. As a result of the injured soft tissue, wound complications or poor osteosynthesis may develop [4, 6, 8, 11]. To prevent further soft tissue injury, a less intrusive surgical technique is advised [4, 6] According to certain authors, unilateral locked plating can be used to stabilise bicondylar tibial plateau fractures while minimising medial soft tissue damage. Dissection of tissues [4, 6, 12-16] although its efficacy is unclear, this decreases the risks of bilateral plate fixation. It will keep reducing articular cartilage. [6, 12-16] on both sides to plate fixation Open reduction with internal fixation with the dual plating has indeed been proven to become a biomechanically effective way to securing both fracture elements & articular surface following reduction in extremely unstable bicondylar fractures. But at the other side, double plating necessitates significant soft tissue dissection, that raises the risk of wound complications. Using a unilateral periarticular locking device in the treatment of bicondylar TPFs has been demonstrated in several trials to diminish sentimental tissue damage and operative site infection. They discovered that both stabilisation methods are equally successful [17] the aim of study is to compare outcome of dual plate versus single plating in schatzker type 5 and 6 fracture of proximal tibia.

Materials and Method
The Department of Orthopaedics, Govt Medical College and Associated Group of Hospitals, Kota, carried this hospital-based prospective study from September 2018 to December 2020. This research findings mainly based on the analysis of 50 adult

participants who had closed proximal tibial fractures (Schatzker'5 & 6) and managed by open reduction and internal fixation with anterolateral and posteromedial techniques. All of the cases were thoroughly investigated in terms of the patients' age, gender, and employment, as well as the manner of damage, medical co-morbidities, other related bone injuries, and the time gap between injury and hospital admission. Swelling, oedema, ecchymosis, blisters, usually deformity of the limb, signs of compartment syndrome such as intense, persistent, searing pain that cannot be localised to a specific site, decreased or missing pulses were all evaluated thoroughly. A related bone injury in the same leg was discovered. Associated injuries such as head, chest, visceral, and other bone injuries were discovered. Antibiotics were administered until the blisters healed, trypsin chymotrypsin until the skin condition improved and wrinkles emerged, and all patients were scheduled for elective surgery as soon as feasible. Prior to surgery, a preanesthetic assessment was performed.

Inclusion criteria

>the age of eighteen there are both guys and females engaged. Closed fractures with a displacement of more than 2 mm in the articular surface Schatzker type V and VI tibial plateau fractures. Only one side of the proximal tibia fractured. Grade one compound fracture. Closed reduction failed due to a fracture that was less than three weeks old and had an unstable alignment.

Exclusion criteria

Patients with non-union proximal tibial fractures that are pathological, malunited, and non-union. Patients who are medically unfit are at a high risk of experiencing complications during anaesthesia. fractures with open wounds Types 2 and 3 G ustilo-Anderson fractures with vascular damage, Patients who have had a lower limb fracture in the same or opposite limb. Pat ients under the age of 18 are not eligible for treatment. Injury to the head, as well as the abdomen and thorax. Patients having posteromedial fracture fragment.

Operative steps

This process is carried through under general and spinal anaesthesia. Patients was placed on the operative table in a supine posture with just a knee flexion of 15 to 30. To reduce blood loss, a tourniquet was applied and deflated for no more than 2 hours. The fracture reduction was seen using an image intensifier during the procedure, and arthrotomy was always performed to ensure that the articular surface was congruent. Temporary fixation with Kirschner wire or an interfragmentary screw proved beneficial, and allogenous or allogeneic bone grafts were used to raise the osseous gaps. The wound was largely closed after a suction drain tube was inserted in the surgery wound. Following the post-operative regimen outlined below, all patients were followed up on. Patients were taught to avoid weight bearing for the first six weeks after surgery, and then were prescribed partial weight bearing ambulation on a walking frame for the next six weeks. After firm union was observed on plain film, full weight-bearing walking was permitted. At 6-week intervals, we scheduled follow-ups to collect radiographs and track clinical performance to confirm union on plain films, three criteria were used: (1) bridging callus between fragments, (2) obliteration of previous fracture. Following complete weight-bearing ambulation, serial follow-up images revealed no additional movement of the fracture fragment, including the articular surface. Standard anteroposterior (AP) radiographs of the injured knee should be taken immediately postoperatively and during the fracture healing period by two competent observers. Angles with a valgus deformity were assigned a positive value, whereas angles with a varus deformity were assigned a negative value.

Result

Our study's youngest patient was 18 years old, while the oldest patient was 68 years old. The bulk of the patients (41 of 50) were between the ages of 20-50. (82 percent). The patients in the research were on average 39.24 years old. In this study, 24 percent (12 out of 50) of patients were female, whereas 76 percent (38 out of 50) were male. In our study, the right side was engaged 58 percent (29 out of 50) more than the left side 42 percent (21 out of 50). In our current study, the majority (90%) of patients (45 out of 90) experienced trauma due to a road traffic accident, 8% owing to a fall from height, and the remaining 2% had a history of assault. In our current study, 23 individuals out of 50 had Type V fractures, whereas the remaining 27 had Type VI fractures (according to Schatzker's categorization). In our research, 40 patients (or 80%) were operated on within seven days. In just 21 days, 10 patients (20%) were operated on. The average period from injury to operation was 4.58 days. 90 percent of patients (45 out of 50) were released within 14 days. After 14 days following surgery, 10% of patients were released. In our study, the average length of stay in the hospital was 11.2 days Eight patients out of 50 experienced early post-operative problems, with five instances having superficial infection and three cases having wound dehiscence (in high energy type fractures). Out of 50 instances, 42 (84%) yielded satisfactory results (either excellent or good). High energy type V and type VI fractures were found in 16 percent of the patients, resulting in unsatisfactory outcomes

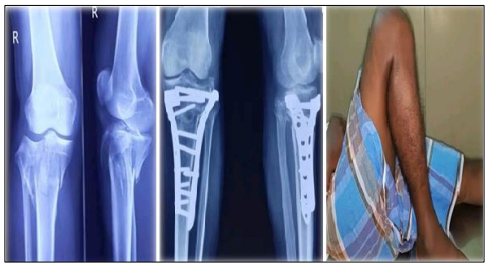

Fig 1: Case 1 pre op, 6month follow-up, Movement

Fig 2: Case 2 Pre-Op, 2 month follow, Movement

Discussion

The Schatzker classification system was used to separate low-energy split/depression fractures from higher-energy bicondylar fractures (Schatzker type V/VI). Because the knee is a

biomechanically complex joint, bicondylar TPFs remain a difficult task for most surgeons. These fracture patterns are frequently associated with damage to the surrounding soft tissue. To get the best possible result, a well-designed preoperative surgical plan with the least amount of soft tissue injuries must be planned during OT. A number of therapeutic methods have been established in recent years, including simple skin traction, cast immobilisation, external skeletal fixation, open reduction, and internal fixation with screws. a variety of implants in this article, we'll be using a standard 3.5-mm camera. dynamic compression plates, buttress plates (DCPs), anti-gliding and pre-contour 1/3 tubular plates LCPs (periarticular locking compression plates) used with the purpose of fixing Anatomic reduction, particularly in the restoration of articular congruity, secure fixation for early rehabilitation, and prevention of comorbidities, infection and non-union, were the aims of surgical therapy for TPF. Visual reduction and proximal tibial alignment are advantages of the two-plate approach, however soft tissue problems and injury to the periosteal blood supply are important concerns with this form of internal fixation) [17, 18]. While a single lateral locking plate can reduce the risk of soft tissue injury and wound infection, it cannot provide enough stability for multipart fractures, according to some experts [6, 12, 16]. In bicondylar tibial plateau fractures, the posteromedial fracture fragment has been observed to occur 33 percent of the time [19]. In all bicondylar tibial plateau fractures, a single lateral locking plate repair may not provide sufficient stability, Dual locking plate fixation provides for even less collapse than lateral locking plate fixation in bicondylar tibial plateau fractures, according to biomechanical and cadaver investigations [20, 21]. Weaver *et al*. [15]. found a higher frequency of plateau collapse and failure in lateral locking plate fixations in fractures with medial coronal fracture lines. They came to the conclusion that utilising two plates to treat such breaks is the best option. Because of the study's unique treatment method, complicated fractures with a posteromedial fragment were eliminated. There were a variety of different assessment tools proposed.

To find out just how tibial plateau fractures affect one's ability to walk, Rasmussen's (1972) criteria were also used to evaluate the final results, and no difference was found among the dual versus single plating groups. In addition, additional studies have found that 65-89 percent of individuals in the literature gave high or outstanding evaluations [5, 14]. With satisfaction ratings of 80%, our results are comparable to earlier published research. the lateral Less Invasive Stabilization System group had a greater incidence of proximal tibia malalignment after surgery than the dual plate group, according to Jiang et al. [14]. As a result, they discovered that in bicondylar tibial plateau fractures, the lateral locking plate cannot replace the traditional double plate method) [14]. A cadaveric model of the bicondylar tibial plateau fracture indicated that double plate fixation caused less cyclic loading collapse than single lateral locking plates in a separate investigation. This shows that for bicondylar tibial plateau fractures, the lateral locking device is insufficient [21]. The one-sided locking plate fixation and the double locking plate obsession were compared in a tibial level fracture model by Mueller et al., [13]. The findings were similar to those of Yao et al.[12], who suggested that the status of the average condyle crack plays a crucial role in the application of single or double plates. They found no significant difference between double plates and sidelong locking plates used to repair bicondylar tibial level fractures in patients with a relatively pristine average condyle in terms of early postoperative malalignment or malreduction. In the surgical area, soft tissue issues are a common cause of concern. Bicondylar tibial plateau fractures with plates are estimated to be as common as 5% to80% of the time [22, 23]. In tibial plateau fractures, optimal surgery scheduling, operative time, soft tissue protection, and infection control are all essential concerns [12]. The use of a single incision and minimal soft tissue injury, as in the lateral l, may enhance fracture recovery. Deeper plates contamination has been found to develop as approximately to 22 percent of total of tibial plateau fractured [4, 5, 22, 23]. Throughout this analysis, we found four deep infection incidences: three with in dual plate category and 1 in the single plate category. 3 participants throughout the dual plate category had superficial tissue infection, that was handled given oral antibiotics as well as wound care. There in lateral plated group, single 1 patient became infected. Articular inconsistency as well as joint instability, according to studies, might contribute to premature post - traumatic joint degeneration. [5, 24] Overall prevalence is arthritis after proximal tibia fractures ranges from 17% to 83 %. [5] Because the follow-up period in this research seemed comparatively short, overall probability of postoperative arthritis significantly lower than the previous research. Our findings, we feel, are comparable to those of earlier published research. Non-union of bicondylar tibial plateau fractures occurs at a 4 percent rate. This problem can be caused by nutritional vascular damage, a bone defect, or a lack of sufficient fixation [6, 10, 16]. In our study, there was no non-union, which is connected to the preservation of tissue blood circulation during surgery. A spongious bone defect is prevalent in tibial plateau fractures. The bone transplant does keep the mechanical support intact and prevents late collapse [6, 12, 23, 24]. In our study, one patient in the Dual plate group received a bone transplant.

Conclusion

In this analysis, there was no statistically significant difference in the rate of unionisation between the two categories. Several significant points were highlighted based on our clinical follow-up: soft tissue issues must be considered, and the use of a locking plate can significantly decrease the pain of hardware impingement. TPF surgery with a single lateral approach and locking plate takes less time and requires less time in the hospital. If the medial buttress cannot be formed by lateral fracture reduction, an open reduction of the medial side is required, with twin plates buttressing the medial fragment.

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