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ORIGINAL ARTICLE

Posteromedial Buttress Plate for Schatzker 6 Fractures as Double Column Fixation

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ABSTRACT

Objective: Treatment of Schatzker Type 6 fractures is to use a posteromedial buttress plate as part of a double-column fixation technique.

Materials & Methods: The design of this study was a cross sectional study design and this study was conducted in DHQ Teaching Hospital Gujranwala. patients with posterior medial fracture of Schatzker type 6 and having associated damage of some soft tissue present within the joint underwent surgery at our institutional operation theatre. In this Study setting we included total 20 patients (14 male [70%] and 6 females [30%]) who came with Bicondylar fractures having Comminuted Posteromedial Fragments of tibia.

Results: Of the Patients, 12 (60%) had excellent results, 5(25%) had good results , and 3 (15%) had fair results. In total, 17 patients (85%) achieved cheering results. Walking, Stability, and motion were good or excellent in all cases.

Practical Implication: One of the main advantages of the posteromedial buttress plate fixation technique is that it provides support to the medial column of the tibia, which is an important weight-bearing structure in the lower extremity. By restoring the structural integrity of the medial column, the technique can help promote early weight-bearing and facilitate early rehabilitation. All displaced posteromedial tibial plateau fractures should be surgically stabilized and buttressed using plate to restore joint congruity and prevent late subluxation and early arthritis. The aim is to study the role of posteromedial plating in the management of complex tibial plateau fractures with a posteromedial fragment

Conclusion: Use of a posteromedial buttress plate as part of a double-column fixation technique can be an effective approach for treating Schatzker Type 6 fractures.

Keywords: Fixation of Posterior Column, Buttress plate, Schatzker 6 fracture

INTRODUCTION

About One third of Orthopedic Trauma association C-type Bicondylar Tibial Plateau fractures are Posteromedial [(1)]. Fixation of the posterior fracture fragments has generally necessitated intraoperative movement of the patient from the supine to the prone position. Posteromedial buttress plate fixation is a surgical technique used to treat Schatzker type 6 fractures, which involve a complete articular depression of the medial plateau of the tibia. In this procedure, a pre-contoured posteromedial buttress plate is fixed to the tibia using screws to support the medial column of the tibia, which can help restore joint stability and function [(2)]. A buttress plate is an orthopedic implant composed of a metallic material, usually titanium or stainless steel, that is utilized to provide additional structural support and stabilization to a bone that has been weakened or fracture [(3,4)]. The plate is anatomically designed to match the contour of the bone and is fixated to the bone using screws that are inserted through holes or slots in the plate [(5)]. The implant's purpose is to prevent failure of the bone fragments under compressive loads by resisting bending and shearing forces that could compromise bone stability [(6)].

Buttress plates are typically employed in surgeries of the distal femur, proximal tibia, and other long bones of the body [(7)]. They may be utilized alone or in combination with other orthopedic devices such as screws, nails, or wires to provide enhanced stability to the bone [(8)]. Buttress plates are usually left in situ after the bone has fully healed, although in some cases they may need to be removed if they cause pain or impair the bone's normal function [(9)]. One of the main advantages of the posteromedial buttress plate fixation technique is that it provides support to the medial column of the tibia, which is an important weight-bearing structure in the lower extremity [(10)]. By restoring the structural integrity of the medial column, the technique can help promote early weight-bearing and facilitate early rehabilitation [(11)].

Tibial plateau fractures have a complicated intra-articular fracture pattern, representing approximately 1.2% of all fractures [(1)]. Fracture reduction can be a challenge to experienced hands and the soft-tissue conditions are intolerant of careless dissection. Fractures which involve the articular cartilage of the proximal tibia often require open reduction and internal fixation to restore the joint surfaces and the alignment of the limb. The advent of computed tomography (CT) and its three-dimensional reformation (3D) has allowed for an accurate assessment of this fracture pattern. The advent of computed tomography (CT) and its three-dimensional reformation (3D) has allowed for an accurate assessment of this fracture pattern Luo et al. described the morphology of this fracture based on the CT scan [(5)]. These studies help to understand the geometry of this fracture pattern. The three-column classification demonstrates higher interobserver reliability and can be used as a supplement to the conventional Schatzker classification, especially in the complex and posterior comminuted tibial plateau fractures. Furthermore, the three-column classification is clinically relevant and, to some degree, can instruct the surgeon in preoperative planning [(5,6)]. The occurrence of the posteromedial fragment is relatively common in high-energy tibial plateau fractures and that the use of a posteromedial approach with direct fracture visualization, anatomic reduction, and absolute stability appears to result in satisfactory outcomes. Hence now, posteromedial column fractures should be considered unstable, as fractures in this area tend to undergo displacement even at low flexion angles in contrast to anterior column fractures, although they may initially appear to be nondisplaced after injury [(6)].

In addition to providing structural support, the buttress plate also serves as a double-column support, which can help prevent mal-union and loss of reduction [(12)]. By providing support to both the medial and posterior columns of the tibia, the buttress plate can help distribute forces more evenly across the tibial plateau and reduce the risk of implant failure or joint instability [(13)]. Carlson recognized risk of injury to the Saphenous vein and Saphenous Nerve when he designed a Posteromedial Exposure for fracture fragments [(14,15)]. To avoid the need for substantial soft-tissue dissection and the associated danger of neurovascular injury, we devised a method. We hypothesized that Surgical correction with buttress plate would result in accurate perfect reduction of fracture

with doing little or no dissection of tissue resulting in positive outcome for tibial plateau fractures with broken posterior sections.

MATERIALS AND METHODS

The design of this study was a cross sectional study design and this study was conducted in DHQ Teaching Hospital Gujranwala and the duration of this study was From Jan 2020 to May 2022, Total 20 patients with posterior medial fracture of tibia Schatzker type 6 fractures and surrounding intra-articular soft-tissue injuries under gone surgery at our institutional Orthopedic Operation theatre. In this Study setting we included total 20 patients (14 male [70%] and 6 females [30%]) who came with Bicondylar fractures having Comminuted Posteromedial Fragments of tibia. All patients signed consent forms for institutional review board approval (No34-7890A) before their surgery and gone under the same Surgical Treatment protocol of with buttress plate and fixation of posteromedial tibial plateau fractures without stripping of excessive soft-tissue.

Surgical Procedure: The surgical techniques used for the repair of Schatzker type 6 fractures is the posteromedial buttress plate fixation. Here is a detailed procedure for the posteromedial buttress plate fixation for Schatzker type 6 fractures:

Anesthesia: The patients were placed under general anesthesia, and a tourniquet is applied to the affected limb.

Incision: An incision was made over the medial aspect of the knee, starting at the pes anserinus and extending distally along the tibia. The skin and subcutaneous tissue were dissected, and the sartorius muscle is retracted medially to expose the fracture site.

Reduction: The fracture was reduced by elevating the depressed articular surface with a periosteal elevator or bone tamp. The reduction is confirmed with intraoperative fluoroscopy.

Preparation of the tibial plateau: The articular surface was prepared by removing any interposed soft tissue, clots, or small bone fragments using a curette or rongeur. The articular surface was then irrigated with saline solution.

Buttress Plate preparation: A pre-contoured posteromedial buttress plate was chosen based on the size and shape of the tibial plateau. The plate was bent to fit the curvature of the tibia using a bending press.

Plate fixation: The plate was fixed to the tibia using screws. The first screw is inserted into the proximal hole of the plate, and the plate is temporarily secured with a clamp. The remaining screws were inserted in a sequential fashion along the plate until all screws were in place. Care is taken to ensure that the screws do not penetrate the joint surface.

Wound closure: The Sartorius muscle was repositioned, and the wound was closed in layers. A sterile dressing was applied, and the limb was placed in a plaster splint.

Postoperative care: The patients were monitored in the recovery room and discharged when stable. A physical therapy program is initiated, beginning with gentle range-of-motion exercises and progressing to weight-bearing activities as tolerated. The patients were followed up regularly to assess healing and joint function.

RESULTS

Total 20 patients participated in this study. 12 (60%) had outstanding results, 5 (25%) had Satisfactory results , and 3 (15%) had fair results (Table 2). In total, 17 patients (85%) achieved satisfactory results. Motion and walking were also Excellent in all cases. From the Total 20 Patients, 17 (85%) experienced no pain during walking, whereas 2 (10%) Noted mild pain during walking and 1 (5%) experienced moderate pain while walking. No patient experienced any serious complications. Only two patients developed mild fever which got resolved within 3 days by giving Antibiotics.

Table 1: Basic Information of The Patients Undergoing Posteromedial Buttress Plate Insertion for Schatzker 6 Fractures

No. of patients	20
Mean age (yrs.)	40(30-50)
Sex Male Female	 14 6
Associated injuries Meniscus ACL avulsion PCL avulsion	 12 2 1

Table 2: Demonstrating Results After Buttress Plate Insertion

Fracture Type	Type 6
Results:	
Excellent	12 (60%)
Good	5 (25%)
Fair	3 (15%)
Pain:	
Severe pain	17 (85%)
Less pain	2 (10%)
Moderate pain	1(5%)

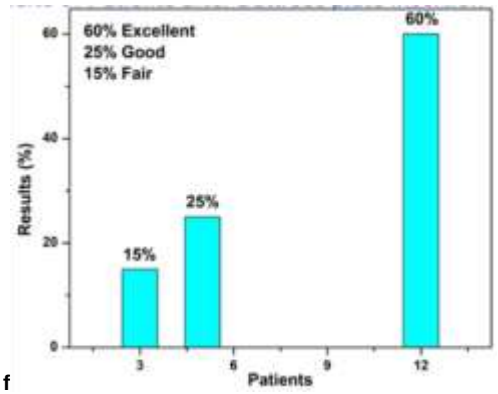

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Figure 1: Result of Patients after Buttress plate insertion

DISCUSSION

Schatzker Type 6 fractures are complex injuries involving the tibial plateau, which is the flat surface at the top of the tibia bone [16]. These fractures typically result from the trauma such as fall from height or from a motor vehicle accident [17]. The severity of Type 6 fractures can vary, with some cases involving a split in the tibial plateau and others involving significant fragmentation and displacement of the bone. One surgical approach for treating Schatzker Type 6 fractures is to use a posteromedial buttress plate as part of a double-column fixation techniques [18]. This involves stabilizing both the lateral and medial columns of the tibial plateau using internal fixation devices such as screws, plates, or rods. Posteromedial buttress plate is placed on the medial side of the tibia and serves to support the joint surface of the tibial plateau. It is typically placed through a posteromedial incision and secured to the bone using screws or other fixation devices. The plate is contoured to fit the shape of the bone and is designed to resist the forces that would otherwise cause the fracture to shift or collapse [19].

The proximal tibial articular surface is one of the critical load-bearing areas of the human body. Fracture of this area can occur due to a combination of axial loading and valgus or varus applied forces. Stability of the joint, alignment of the lower limb, and motion of the knee joint are severely affected as a result of tibial plateau fracture. The more energy applied to the limb; more complex is the fracture. In general, higher Schatzker types of fractures were categorized as high-energy related. These X-ray-based classifications are insufficient to determine the severity of the fracture, particularly in patients with posterior column fractures after high-energy trauma [7]. Luo's CT-based three-column classification is clinically relevant and can instruct the surgeon in preoperative planning. Some fracture patterns can only be evident in a CT scan. Knee instability will result if these injuries are left untreated. The optimized treatment protocol should include

assessing and reconstructing the stability apparatus of all columns in the primary fixation of fractures. Therefore, tibial plateau fractures are now commonly classified according to the three-column theory using 3D CT together with the Schatzker classification, and fixation is planned accordingly. A posteromedial fragment in CT scan warrants fixation [8,10,11].

Shear fractures of the posteromedial tibial plateau need special attention while treating proximal tibial fractures. Efforts must be taken to buttress the fragment posteriorly to achieve anatomical reduction and early mobilization of the knee. Locked plate prevents collapse while performing knee movements and also during weight-bearing. In our study, 90% of patients achieved excellent to good results which are in concordance with most other studies evaluating fixation of posteromedial fractures [12,13]. Even though some studies show there is no difference in complication rate using an anterior mid-line incision for fixation of posteromedial fractures, we feel it involves unnecessary soft tissue stripping in case of an isolated posteromedial fracture [12]. Moore et al., reported that nine of 11 patients treated by medial and lateral plating through an anterior incision became infected or had wound problems [14].

Through the Modified Lobenhoffer approach, one can reach the fracture site easily without much soft-tissue devitalization. It helps in the easier placement of the posteromedial buttress plate also. In our case series, we encountered only one wound infection which is in par with other studies [12,15]. Carlson treated five patients with posterior bicondylar tibial plateau fractures by direct fracture exposure and fixation through posteromedial and posterolateral incisions. A posterior plate is covered by a large muscular envelope and is not palpable, unlike direct medial plating [14,15].

By using a double-column fixation approach with a posteromedial buttress plate, the surgeon can achieve stable fixation of the fracture and help promote healing of the wound [20]. In this study 12 (60%) had excellent results, 5(25%) had good results , and 3 (15%) had fair results. In total, 17 patients (85%) achieved satisfactory results. Walking, motion, and stability was good or excellent in all cases.

This approach has been shown to have good outcomes in terms of pain relief, functional recovery, and joint stability. However, the use of a posteromedial buttress plate can also increase the risk of soft tissue complications such as wound healing problems and infection [21]. In addition to the use of a posteromedial buttress plate, other surgical techniques may be employed in the treatment of Schatzker Type 6 fractures [22,23]. These include the use of bone grafts or other materials to help support the joint surface and promote healing, as well as the use of external fixation devices to stabilize the bone while it heals [24,25]. However, the surgeon must carefully consider the risks and benefits of this approach and take steps to minimize the potential for complications. With proper surgical technique and postoperative care, patients with these fractures can achieve good outcomes and regain function and mobility in the affected joint.

CONCLUSION

Overall, the use of a posteromedial buttress plate as part of a double-column fixation technique can be an effective approach for treating Schatzker Type 6 fractures. Posteromedial buttress plating using anatomical precontoured plate through a modified Lobenhoffer approach is a safe, easy, and effective procedure in the management of posteromedial shear fractures of the tibial plateau.

Conflict of Interest: There is no conflict of interest in this study.

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