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POSTEROLATERAL APPROACH FOR THE POSTEROLATERAL TIBIAL CONDYLE FRACTURE: AN ALTERNATE APPROACH

Orthopedics

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ABSTRACT

The posterior tibial condyle coronal fracture pattern is a difficult fracture to adequately reduce and stabilize by conventional techniques and approaches. We discuss a new approach which involves Common peroneal nerve exploration and Arthrotomy and also compare it with other available exposures.

KEYWORDS

Background

Treatment of posterolateral tibial plateau fractures is controversial, and information regarding this specific fracture pattern is lacking. Lateral tibial plateau fractures that are located posterolaterally are difficult to reduce through an anterolateral surgical approach because of the lack of direct visualization of the fracture.[1,2]

This posterior tibial condyle coronal fracture pattern is a difficult fracture to adequately reduce and stabilize by conventional techniques and approaches. A reduction problem is created because of posterior displacement of the lateral tibial condyle fragment on knee flexion. Furthermore, biomechanical principles require placement of a posterior buttress plate requiring direct exposure.

Both aforementioned considerations i.e. difficult reduction, mandatory anatomical reduction, imply that the posterolateral tibia plateau fractures cannot be optimally treated by conventional anterior, or anterolateral approaches in the supine position[3,4,5]

The posterolateral (PL) tibial plateau quadrant is laterally covered by the fibular head and posteriorly covered by a mass of muscle ligament and important neurovascular structures. There are several limitations in exposing and fixing the PL tibial plateau fractures using a posterior approach. This article discusses a new approach to the posterolateral tibial condyle fragment involving Common peroneal nerve exploration and Arthrotomy.

Pathophysiology:

The direction of, magnitude, and location of the force, as well as knee position at the moment of impact, determine the fracture pattern, location, and degree of displacement. The mechanism of posterior shearing fractures of the lateral tibia plateau is from an axial compression load and valgus moment with the knee in flexion or semi-flexion position (Usually aroud 90° flexion).[6] With low-energy injury, it results in an isolated posterolateral tibial condylar fracture.

Method & Surgical Technique

This study was undertaken at a tertiary care, urban, public hospital in India, with unicondylar posterolateral tibial plateau fracture were treated through a direct posterolateral approach and prospectively studied. Fracture reduction and maintenance of reduction were assessed radiographically over 6 months. Knee function was assessed clinically and using the Rasmussen Knee score.

Approach and Exposure:

The patient is placed in a lateral decubitus position with the injured limb maintained in a slightly flexed position. A thick pad was applied under the distal femur; thus, the weight of the lower leg can be used to open the lateral compartment of the knee. After sterilization, preparation, draping and exsanguination the tourniquet was inflated.

Starting at 2 cm above the popliteal crease, an 8cm long skin incision is put straight down along the medial border of the fibular head.

The subcutaneous tissue and popliteal fascia are incised by sharp dissection.

Then the common peroneal nerve is identified in the fatty tissue under the femoral biceps tendon. It is isolated distally until the peroneal tunnel of the fibular neck and protected to the lateral side carefully. (The peroneal nerve sends a branch from the medial side at the popliteal level, the lateral sural cutaneous nerve, and is protected to the medial side. Further dissection is carried down between these two nerves.)

The lateral gastrocnemius muscle is retracted from its lateral border to the medial side.

Then the soleus muscle is divided from its posterior attachment of the proximal fibula and tibia, from lateral to medial as needed to gain exposure of the fracture, and retracted medially.

The distal dissection should be restricted to no more than 5 cm below the joint line, as vascular bundle remains exposed here, i.e. the anterior tibial vessel, passes forwards between the tibial and fibular heads of posterior tibialis and the upper edge of the interosseous membrane and reach the anterior compartment. The medial retractors have to be placed carefully to avoid shearing injuries to these vascular bundles.

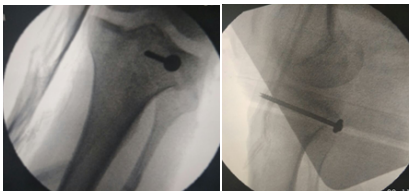
The popliteus muscle is identified. The inferior lateral genicular artery which passes on the muscle surface is ligated. Then inferior border of the popliteus muscle is dissected and retracted upwards and the posterolateral wedge of the fracture is fully exposed.

For split fractures, reduction is achieved under direct vision by hyperextension with axial traction and pushing the fragment with the help of a periosteal elevator. The reduced fracture is fixed with 2-3 Kirschner wires of 2.0-mm thickness, and the reduction is assessed by fluoroscopy in posterior-anterior (PA) and lateral views.

For split-depression fractures, the articular surface is elevated by

working through the cortical fracture site under direct vision to assess the quality of reduction.

The closure of the wound is simple because the implant is automa The closure of the wound is simple because the implant is automa tically covered by muscles after removal of the retractors. A drain can be placed subfascially, and the deep fascia is closed, followed by closure of the subcutaneous layer and the skin layerwise.



Post-operative, AP and Lateral view Xrays

Discussion

Comparison of approaches:[6,7,8,9,10,12]

Approach	Benefit	Risk
Direct posterol ateral	**Direct Visualization of Fracture Fragment, Easier plate fixation, No massive dissection**	**1. Injury to CPN**
Trans-fibular	Good visualization, Posterior buttress plate fixation possible	1. Need osteotomy and 2. dissection of CPN
Lateral femoral epicondylar osteotomy	Direct visualization No injury to FCL	1. Need osteotomy and 2. Only for Screw fixation
Partial fibular resection	No dissection of neurovascular structures Direct visualization of articular surface	1. Need osteotomy 2. Only for Screw fixation
Supra-fibular head	Direct visualization, fixation through locking plate No dissection of neurovascular and PL corner structures	Limited indications, i.e.Intact PL cortex or minimal displacement
Extensile lateral	Direct visualization Posterior buttress plate fixation Can fix the AL fragment	1. Massive dissection 2.Need dissection of CPN 3. Injury to PLC
Tscherne-Johnson extensile	Increased lateral exposure and maintenance of Ligament and other soft tissue anatomy	1. Need osteotomy. 2. Despite being poseriorly Difficulty in PL fragment fixation, Screw fixation
Postero-central	Good visualization Possible buttress plate fixation	1. Need dissection of popliteal neuro & vascular structures
Posteromedial	No dissection of neurovascular structures. Possible buttress plate fixation	1.Difficulty in exposure and 2. Difficult fracture reduction
Modified anterolateral cortical window	No dissection of neurovascular structure	1. Difficulty in exposure and 2. Difficult fracture reduction, 3. Only for Screw fixation

In the current case, a posterolateral approach was used, in which after exploration of Common peroneal nerve and Arthrotomy the fracture was visualized and reduced using reduction clamp. In the current case fixation was achieved using a CC Screw only as adequate fixation was achieved. At 6 months follow up good knee function was achieved.

Knee bending at 6 months

Conclusion

The posterolateral approach can provide direct visualization of the posterolateral tibial plateau quadrant and allows to put the plate more posteriorly to provide a raft for the fragments. Screw fixation can also be done. Following direct exposure and possible better anatomical reduction, good clinical outcomes can be anticipated.'

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