



The extended posterolateral approach for split depression lateral tibial plateau fractures extending into the posterior column: 2 years follow up results of a prospective study



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ABSTRACT

Objective: To prospectively study the outcome of surgically treated split depression lateral tibial plateau fractures extending into the posterior column using the extended posterolateral approach.

Methods: Twenty-one patients with split depression lateral tibial plateau fractures (AO: 41–B3) with extension into the posterior column were treated with open reduction and internal fixation through an extended posterolateral approach with osteotomy of the fibular neck ± Gerdy tubercle. Follow up radiographs was assessed for quality of articular reduction and limb axis. Functional assessment was performed at last follow up using the Tegner–Lysholm score. Complications pertaining to the surgical approach were recorded.

Results: The approach was performed in 15 patients with a fibular neck osteotomy alone and 6 patients required a Gerdy's tubercle osteotomy also. All fractures and osteotomies had united. Anatomical articular reduction was achieved in 16 patients. Radiological limb alignment was restored in all patients except for a reversed posterior slope in 1 patient. Arthritic changes were seen in 3 patients. The mean Tegner–Lysholm score was 87.3 (range: 76–95) at last follow up. No specific complications related to the surgical approach like common peroneal nerve injury and lateral instability of the knee was encountered.

Conclusion: The extended posterolateral approach offers excellent exposure posterior to the fibular head to perform articular reduction and fixation achieving satisfactory radiological and functional results in split depression lateral tibial plateau fractures extending into the posterior column.

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Introduction

Split depression lateral tibial plateau fractures can be high velocity injuries characterised by varying degrees of comminution and articular depression. Conventionally the anterolateral approach is used to address these fractures by direct reduction and plate fixation. However, fractures extending into the posterolateral corner (lateral part of the posterior column of tibial plateau) behind the fibular head are difficult to access with the conventional anterolateral approach [1,2]. Various approaches have been described to access isolated posterolateral condyle

fractures [3–7] in small number of patients but long term prospective studies are still lacking. With this background, we describe the mean 2 years follow up results of extended posterolateral approach in which the entire lateral structures namely the extensors of the leg, Gerdy's tubercle and the fibular head can be elevated safely to provide access to the entire lateral plateau to address complex split depression lateral plateau fractures extending into the posterior column.

Methods

The study was a prospective analysis of select patients with lateral tibial plateau split depression fractures approved by the institutional review board. Closed, displaced AO: 41–B3 fractures with extension into the lateral part of the posterior column (based on the 3 column classification of proximal tibia fractures, Fig. 1) on

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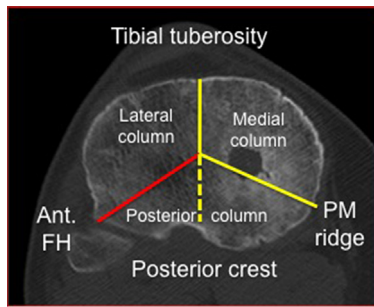


Fig. 1. The 3-column classification of proximal tibia fractures. The tibial tuberosity, posterior crest of tibia, anterior limit of the fibular head and the posteromedial ridge of tibia serve as landmarks to divide the plateau into lateral, medial and posterior columns. Fractures of the lateral column with extension into the lateral half of the posterior column form the study group.

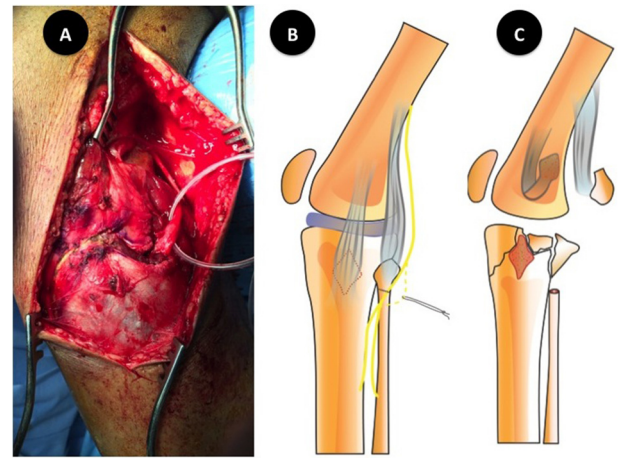


Fig. 2. Intra-operative image (A) and corresponding line diagrams (B, C) showing the extended posterolateral exposure. Once the CPN is safely isolated, osteotomies of the fibular head (dotted lines) and Gerdy's tubercle (diamond) can be performed followed by a submeniscal arthrotomy to expose the entire fractured lateral plateau.

the CT scan were included in the study. Undisplaced fractures, fracture extension into the medial part of the posterior column requiring dual surgical approaches, fractures with established compartment syndrome, open fractures and pathological fractures were excluded.

Twenty-one patients satisfying the inclusion criteria underwent internal fixation using an extended posterolateral approach with a fibular neck osteotomy \pm Gerdy's tubercle osteotomy. A CT scan was obtained to plan and develop the surgical tactic preoperatively.

Surgical approach

The surgery was performed with the patient supine under a sub-arachnoid block. A lazy S incision was made along the course of the biceps tendon crossing the knee joint between the fibular head and the Gerdy's tubercle.

The common peroneal nerve (CPN) was identified and released beyond the level of the planned osteotomy. The extensor muscles were elevated from the tibia leaving a cuff of tissue for later repair. The fibular neck was osteotomised with an oscillating saw without violating the proximal tibio-fibular joint. In cases with pre-existing fibular head or neck fracture, the fracture plane was developed to get access to the posterolateral corner. The fibular neck osteotomy provides posterolateral exposure from the PCL insertion to the posterior margin of the IT band allowing plating of the broken posterolateral rim, posterolateral articular reconstruction and lateral plating. The tubercle of Gerdy was osteotomised in complex cases where an unrestricted anterior access to the plateau was required to achieve articular reduction. The osteotomy was performed with an oscillating saw without violating the articular cartilage and the IT band was reflected anteriorly and proximally (Fig. 2).

Fracture reduction and fixation

The posterolateral wall was reduced first and stabilised provisionally with K wires and pointed clamps. Antigliding fixation of the posterolateral wall was performed using a 3.5 mm reconstruction plate. Plate fixation was avoided in undisplaced posterolateral wall fractures. Depressed articular fragments were then disimpacted and reconstructed to the reduced posterolateral wall under vision. The articular fragments were held together with subchondral K wires or 3.5 mm screws. Resultant metaphyseal void was bone grafted from the iliac crest. The lateral wall was reduced last and compressed to restore the condylar width before completing fixation with a 3.5 mm precontoured fixed angle raft plate. The fibular head was reduced and fixed with a 4 mm/6.5 mm intramedullary cancellous screw (Fig. 3). The Gerdy's tubercle was

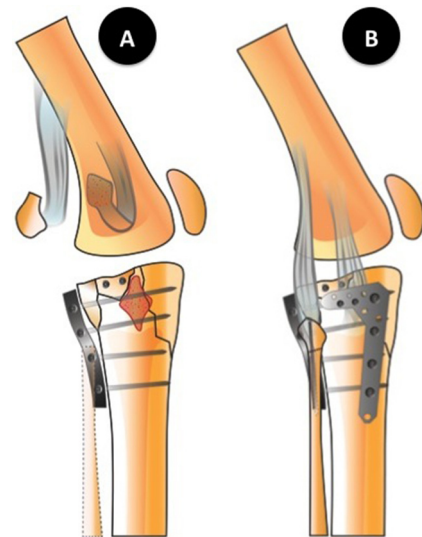


Fig. 3. Steps of fixation of a lateral plateau fracture with posterolateral depression and broken posterolateral cortex. Once the posterolateral rim is stabilised, the elevated articular surface is stabilised with 3.5 mm subchondral screws (A) following which the lateral cortical sleeve is closed and the osteotomies fixed (B).

reduced to its bed and secured with screws through the plate or independently.

Post operative regimen and follow up

Patients were allowed active knee range of movements from day 1. Weight bearing was restricted initially. Patients progressed to full weight bearing by 12 weeks. Outpatient follow up visits were done at 3, 6 and 12 weeks followed by 6 and 12 months. Range of motion analysis and plain radiographs were performed at each visit after 6 weeks to assess fracture union, alignment, articular reduction and loss of fixation or reduction during follow up. Articular reduction was classified as anatomical, good (<2 mm step) and poor (>2 mm step). Other radiological parameters assessed were the femoro-tibial angle (FTA, normal: $180 \pm 5^\circ$), medial proximal tibial angle (MPTA, normal: $87 \pm 5^\circ$), lateral posterior slope angle (LPSA, normal: $9 \pm 4^\circ$) and condylar width (CW, normal: <5 mm compared to opposite side) as described by

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