

Blind Area of Reverse-L Posteromedial Approach Compared with Posterolateral Approach for Posterolateral Tibial Plateau Fractures: A Cadaveric Study

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Background/Purpose: Fractures involving the posterolateral (PL) tibial plateau are surgically challenging. The reverse-L posteromedial (R-PM) approach is commonly used for anatomic reduction and fixation of a posterior tibial plateau fracture. This approach provides adequate exposure to the PM and posterior area of the medial tibial plateau, but some parts of the PL tibial plateau cannot be accessed, especially in patients with large muscle mass. The PL approach without fibular osteotomy allows direct access to the PL articular surface for PL buttress fixation. No published studies have explored the blind area of the R-PM approach compare with the PL approach. The aim of this study is to compare the surgical exposure area between the R-PM approach versus the PL approach using the lateral plateau width as a guide for choosing the correct surgical approach for fractures involving the PL tibial plateau.

Methods: Ten fresh-frozen cadavers with 20 lower extremities were included. The R-PM approach was done and the boundary of the articular surface and posterior cortex exposure were marked with metal pins. After that, the PL approach was performed and the exposure area was similarly marked with metal pins. After removing all soft tissue, an imaginary line was drawn from the lateral plateau rim locating anterior to fibular head (L) to the PM ridge of tibia (M). The bony reference landmarks on the lateral tibial plateau including the lateral tibial spine (S), the lateral boundary of PM approach (LPM), the medial boundary of PL approach (MPL), and the lateral boundary of PL approach (LPL) were marked with metal pins. The distances between L and S (A) refer to lateral tibial plateau width; S to LPM (B); and LPL to LPM (C). AP radiographic studies of the proximal tibia were done and the same distances were measured.

Results: The average percentage of distance from S to LPM (B), S to MPL, S to LPL, and MPL to LPL was 43.72% (95% confidential interval [CI]: 38.61%-48.82%), -53.22% (95% CI: -57.95% to -48.49%), 81.41% (95% CI: 77.21%-85.61%), and 120.54% (95% CI: 113.56%-127.53%) of lateral plateau width, respectively. (See accompanying figures.) The average distance from L to S (A) was 32.62 mm (standard deviation = 2.19; range, 27.73 to 36.01). The average percentage of blind distance of R-PM from LPM to LPL (C) was 58.45% (95% CI: 51.48%-65.41%) of lateral plateau width. Distance L to LPL which represents the invisible distance of both approaches located on approximately 15.37% (95% CI: 10.59%-20.16%).

Conclusion: The PL approach provides more access to the lateral tibial plateau than the R-PM. The blind area of R-PM starts approximately 43.72% and then ends at 81.41% from the lateral tibial spine. When the fracture is located more than 43.72% of the posterior lateral plateau width, it is recommend to use the PL approach.

Figure 1: Illustration of surgical approach and visible boundary measurement

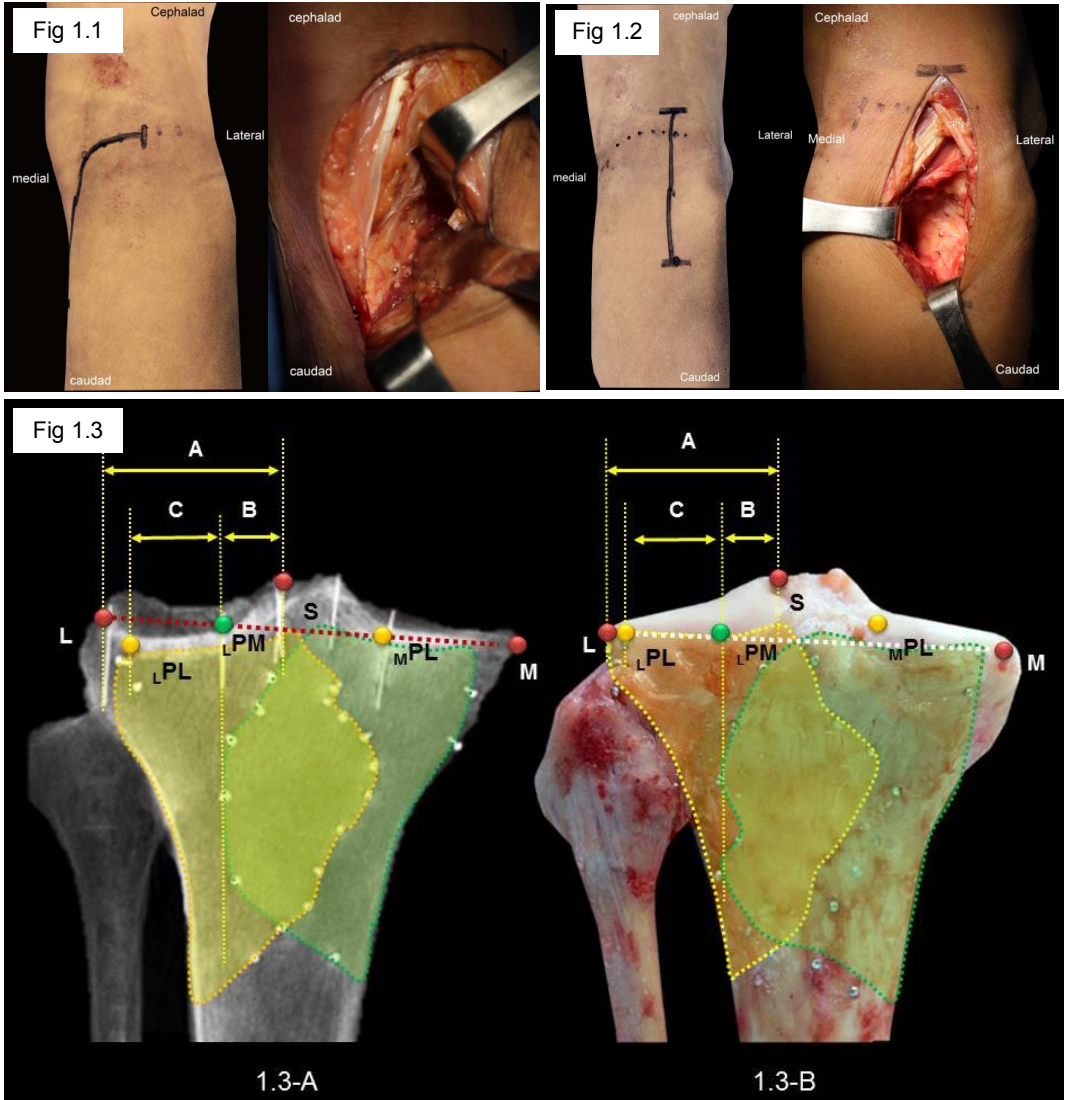


Figure 1.1, 1.2 Reverse-L posteromedial approach (1.1), posterolateral approach (1.2)

Figure 1.3 : The measurement methods of the reversed L-incision of posteromedial approach visible boundary and the posterolateral approach visible boundary

1.3-A : Plain radiography of tibial plateau marked with metal pins

1.3-B : Posterior aspect of tibial plateau marked with metal pins

- A Lateral tibial plateau width (L to S)
- B Lateral tibial plateau area which could be accessed via R-PM (S to L_{PM})
- C The blind area of R-PM (L_{PL} to L_{PM})
- L to L_{PL} The blind area of both R-PM and PL

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.