The Missing Piece of the Trauma Armory: Medial Femoral Condyle Plate

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Purpose: Fixation of distal femur fractures is often challenging due to the fracture configuration or poor bone quality. When nailing is not possible, dual plating (lateral/medial) has become an acceptable option to provide improved stability versus single plating. Although there are several commercially available anatomically designed plates for the lateral femoral condyle, to our best knowledge, there is no specifically designed plate for the medial femoral condyle (MFC). As such, surgeons often have to improvise and make "on-table" choices using available implants. This can result in wastage or bending of plates to achieve a better fit that can weaken the construct. Our aim is to determine the best suited precontoured plate for stabilizing the MFC.

Methods: Right femur sawbones were used to determine how well various precontoured anatomical plates fit the MFC. 17 different plates were used (Depuy Synthes). These included both ipsilateral and contralateral plates, which are anatomically designed for the following regions: distal tibia (medial, anterolateral), proximal tibia (anterolateral large/small bend, medial, posteromedial), proximal humerus (PHILOS), distal humerus, and contralateral lateral distal femoral condyle. Plates incorporated either variable angle (VA) or standard locking options. The following were assessed and recorded independently by 4 orthopaedic trauma surgeons: diaphyseal lift off (mm): plate lift off measured 12 cm from adductor tubercle; condylar lift off (mm): plate lift off from MFC; sagittal fit, condylar fit; the number of screws in each MFC quadrant (The MFC was divided into 4 quadrants in the sagittal plane. A vertical line was drawn bisecting the MFC with a second horizontal line drawn from the adductor tubercle perpendicular to the first. The quadrants were: proximal anterior [PA], proximal posterior [PP], distal anterior [DA], and distal posterior [DP].); and notch penetration.

Results: The ipsilateral anterolateral proximal tibial (VA and 4.5-mm non-VA), PHILOS, posteromedial proximal tibial, and ipsilateral lateral distal humeral plates offered good sagittal fit and less than 2 mm lift off at the condyles and 1 mm or less diaphyseal lift off. Most of these fit best in the PA quadrant. The ipsilateral VA anterolateral proximal tibial plate and PHILOS allowed at least 4 screws to be placed in the PA and 2 in the PP quadrant but the PHILOS plate lacks the advantage of VA locking and had the potential for notch penetration. The remaining plates had poor sagittal fit, offered fewer screws in the quadrants, or had >2 mm lift off at either the condyles or the diaphysis, which would require significant contouring of the plate. No plate had screws that captured the DP quadrant, but the humeral plates allowed 1 screw in the DA quadrant.

Conclusion: Ipsilateral VA anterolateral proximal tibial plates provided the best anatomical fit for the MFC with the most screws in the condylar quadrants.