

Staged Fixation Strategy of Tibial Plateau Fracture with Acute Compartment Syndrome

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Purpose: High-energy tibial plateau fractures often accompany acute compartment syndrome, and are usually treated by fasciotomy with external fixation followed by secondary plating after open reduction. Initial soft-tissue injury may influence the bony union. Fasciotomy wound or pin site of external fixator may provoke wound infection and exert adverse effect on lower limb function. We tried to assess the result of staged open reduction and plating for tibial plateau fracture with acute compartment syndrome.

Methods: 30 patients with tibial plateau fractures in company with acute compartment syndrome were enrolled. There were 23 men and 7 women, with a mean age of 59.7 years (range, 37-82). The mechanism of injury was motor vehicle accidents in 19, fall from a height in 7, and direct injury in 4. According to the AO/OTA classification, 2 were C1, 5 were C2, and 23 were C3 fractures, including 2 cases of open fractures (I: 1, IIIC: 1, Gustilo-Anderson classification). In Schatzker fracture classification, 12 were type V and 18 were type VI. Immediate fasciotomy was performed once acute compartment syndrome was diagnosed, and stabilization of fracture was followed with external fixation. After the soft-tissue condition normalized and the fasciotomy wound was closed, the internal conversion was done in an average of 31 days (range, 9-55 days) after index trauma. At the time of internal conversion, the external fixator pin site grades were 0 in 2 cases, 1 in 12 cases, 2 in 9 cases, and 3 in 7 cases, as described by Dahl. Radiologic assessment with bony union and alignment, functional assessment using Knee Society Score and American Orthopaedic Foot & Ankle Society (AOFAS) score were carried out. The average follow-up period was 33.2 months (range, 12-85 months).

Results: 29 cases achieved primary bony union (96.7%) at an average of 20.7 weeks (range, 12-35) after internal conversion. One case of nonunion healed after autogenous bone grafting and additional plate augmentation. The mean Knee Society Score and AOFAS score were 92.5 (range, 65-100) and 95.5 (range, 74-100), respectively, at the latest follow-up. Complications included 2 cases of deep infection (6.7%) and 3 cases of posttraumatic arthritis caused by severe articular comminution. The presence of an open fracture, fracture classification, and duration of external fixation and fasciotomy were not related to the occurrence of infection. However, the grade 3 pin site of the external fixator at the time of internal conversion had a significant risk of deep infection (Fisher exact test, $P = 0.048$).

Conclusion: Staged fixation for tibial plateau fracture with acute compartment syndrome may achieve satisfactory osseous union and functional results while decreasing deep infection and soft-tissue complications. Attention should be paid to manage the pin site of the external fixator to avoid deep infection.