Introduction & Review:
Comminuted fractures of the tibial plafond are difficult to treat mainly due to associated soft-tissue injury and high-energy fracture patterns. These fractures account for approximately 1% of all lower extremity fractures and 5 to 10% of tibial fractures. The complexity of these fractures is often a result of the high-energy nature of the injury and the mechanism of axial compression with components of shear and bending forces. Various treatment methods have been proposed to address these fractures. There is no consensus on a gold standard method of treatment for these fractures. Open reduction internal fixation (ORIF) has historically been utilized as the preferred treatment method, as restoration of limb length and wound-healing, arthrodesis and overall complications. However, ORIF no longer has no gold standard for surgeons to follow. Literature associates this method with high rate of superficial infection, deep infection, and osteomyelitis. Alternately, external fixation with limited internal fixation (EFLIF) was proposed as a method to reduce soft tissue compromise by limiting the need for excessive incisions and surgical dissection, which can result in damage to the underlying tissue and articular surface. Theoretically, this method would provide reduction of the articular surface, and with the addition of the limited internal fixation further reduce the surface area. Literature has been unclear thus far favoring one method over the other.

Methods:

- **Search Strategy:**
  - The PubMed, MEDLINE, and Cochrane Library databases were searched for the following criteria: "internal fixation," "open reduction internal fixation," "ORIF," "staged ORIF," "staged open reduction internal fixation," "external fixation," "EFLIF," "LIFIF," "external fixation limited internal fixation," "pilon fracture," and "tibial plafond fracture."
  - The databases were searched for eligible articles that were published on or after January 1st, 2006.
  - Articles were reviewed for inclusion/exclusion by two authors (DR & DB)

- **Inclusion:**
  - Published on or after January 1st, 2006
  - English language
  - Rüedi-Allgöwer Types 2 & 3 fracture
  - AO/OTA Type 43B & 43C fractures
  - Studies evaluating pathological fractures
  - Studies with Rüedi-Allgöwer Types 2 & 3 fractures
  - Studies with ORIF = 255 fractures
  - Significantly increased rate of superficial infection in the EFLIF group (4.71% ORIF vs 17.84% EFLIF)
  - Significantly increased rate of malunion of 4.5% ORIF vs 12.43% EFLIF and significantly decreased incidence of union (91.37% ORIF vs 82.16% EFLIF) in the EFLIF group
  - No difference in arthrodesis, nonunions, rates of infection and occurrence of osteomyelitis

- **Exclusion:**
  - Review articles and cadaveric studies
  - Studies evaluating patients under age 18 years
  - Studies with level of evidence 5 or a case study
  - Studies with less than 12 months of follow-up
  - Studies evaluating pathological fractures

Results:

- In total 8 articles were included in the final data analysis:
  - Total fractures = 440
  - ORIF = 255 fractures
  - EFLIF = 185 fractures
  - Quality and Level of Evidence:
    - 5 prospective studies
    - 3 Prospective studies
    - Level of evidence 2 = 3 studies
    - Level of evidence 3 = 5 studies
  - Comparative results across studies regarding EFLIF vs ORIF, with slightly less complications achieved with ORIF
  - Postoperative Findings:
    - Significantly increased rate of superficial infection in the ORIF group (4.71% ORIF vs 17.84% EFLIF)
    - Significantly increased rate of malunion of 4.5% ORIF vs 12.43% EFLIF and significantly decreased incidence of union (91.37% ORIF vs 82.16% EFLIF) in the EFLIF group

Discussion:

Tibial pilon fractures are severe injuries with a multitude of complications. Causes of pilon fractures can include motor vehicle crashes and falls from great heights. These fractures account for approximately 1% of all lower extremity fractures and 5 to 10% of tibial fractures. The high axial load and torsion of these injuries not only contributes to tibial plafond destruction but also results in significant soft-tissue injury and the mechanism of axial compression with components of shear and bending forces. Various treatment methods have been proposed to address these fractures. There is no consensus on a gold standard method of treatment for these fractures. ORIF has historically been utilized as the preferred treatment method, as restoration of limb length and wound-healing, arthrodesis and overall complications. However, ORIF no longer has no gold standard for surgeons to follow. Literature associates this method with high rate of superficial infection, deep infection, and osteomyelitis. Alternately, EFLIF was proposed as a method to reduce soft tissue compromise by limiting the need for excessive incisions and surgical dissection, which can result in damage to the underlying tissue and articular surface. Theoretically, this method would provide reduction of the articular surface, and with the addition of the limited internal fixation further reduce the surface area. Literature has been unclear thus far favoring one method over the other.

References: