Outcomes Following Percutaneous Screw Fixation of Superior Pubic Ramus Fractures

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Background

- Superior pubic ramus (SPR) fractures are common in both high and low energy pelvic ring injuries

- Anterior ring is frequently still unstable following posterior fixation

- External fixation, plate and screw constructs, and intramedullary screws can be used to stabilize the anterior ring

- Percutaneous fixation of SPR fractures is becoming increasingly popular
Background

• Few studies have focused on outcomes following percutaneous fixation of ramus fractures

• Failure rates reported 4-15%
  • Defined by amount of fracture displacement

• Factors associated with failure
  • BMI
  • Female
  • Nakatani zones I & II
  • Unicortical screws
  • Smaller diameter screws
  • Retrograde placement

Nakatani Classification
Purpose

• Describe outcomes following percutaneous fixation of superior pubic ramus fractures
  • Fracture location
  • Implant size
  • Screw thread type
  • Insertion technique

• Primary outcomes
  • Union rates
  • Fracture displacement
  • Time to weight bearing
Methods

- Retrospective chart review of patients who had undergone fixation of the anterior pelvic ring (2011-2020)

- Inclusion criteria:
  - Patients >18yrs of age who underwent percutaneous fixation of SPR
  - Minimum 6 months follow-up or until fracture union

- Exclusion criteria:
  - Symphyseal fixation
  - Plate and screw fixation of SPR
  - Incomplete medical records
### Methods

- Patient demographics
- Fracture classification
  - AO/OTA
  - Young-Burgess
- Nakatani classification
- Implant type
  - Fully vs partially threaded
  - Screw diameter
- Method of insertion
  - Antegrade vs retrograde
- Fracture Displacement
- Time to union
- Time to weight bearing
Results

- 138 patients
  - 85 patients with 95 fractures fulfilled all inclusion criteria
  - 53 lost to follow up (38%)

- Average age 46.6 yrs

- 50 female (59%)

- 69 patients with high energy injuries (81%)

- Average follow up 6.3 months
Results

- **Technique**
  - Retrograde - 77
  - Antegrade - 18

- **Implant type**
  - Fully threaded - 72
  - Partially threaded - 23

- **Screw size**
  - 6.5mm - 64
  - 7.3mm - 23
  - 8.0mm - 2
  - 3.5mm - 6

- 94% of patients underwent posterior ring fixation
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Results

• **Union**
  • 80 patients (94.1%) healed uneventfully
  • Average time to union = 13.9 weeks

• **Displacement**
  • 69 fractures healed without measurable displacement
  • 21 fractures healed with average displacement of 3.9mm

• **Weight bearing**
  • All patients progressed to full weight bearing by 16 weeks
Results

- 5 fractures had not united by final follow up (5.2%)
  - 1 patient symptomatic

- Complications - 4
  - 2 infections required return to OR
  - 1 iatrogenic bladder injury
  - 1 early cutout/failure
Results

• No observable difference between screw type, screw size, or insertion technique
  • Underpowered to detect statistical differences in union and displacement

• Residual displacement, nonunion were more common with Nakatani I, II fractures and retrograde technique
Conclusions

• Superior pubic ramus fractures can be effectively treated with percutaneous screws by either antegrade or retrograde technique and with both fully and partially threaded implants

• Fractures medial to the lateral border of the obturator foramen and screws placed with retrograde technique may be at higher risk for displacement and nonunion

• Majority will proceed to union with minimal displacement

• Patients return to full weight bearing by 16 weeks