Objectives

- Why plate patellas?
- How to do it?
- Outcomes

Indirect trauma
Extensor mechanism force exceeds tensile strength of bone

Less * comminuted (transverse)
Articular cartilage less damaged
Direct Blows / Falls

COMPRESSION FAILURE:
- Considerable comminution *
- Significant articular cartilage damage

Subcutaneous nature

Transverse Patella Fractures

Tension Band with K-wires
AO-ASIF Tension Band!

Beating a Dead Horse

MATB (37 #) vs Cannulated Screws (35)

1. Shorter OR time
2. Biomechanically superior with lower loss of fixation
3. Lower rates of symptomatic hardware
4. Lower rate of re-operation

Wang et al, Chin J Traumatol, 2014 (retrospective)
Complications of Tension Bands

Comparative Study:

- **K-wires**
  - 315 # - 70%
  - VS
- **Cannulated Screws**
  - 133 # - 30%

Hoshino et al, JBJS(A), 2013 (retrospective, cohort)

- Fixation failure: 3.5 vs 7.5
- Infection: 1.5 vs 4.4
- Implant removal: 23 vs 37

- p=0.065
- p=0.003

Complications – Meta-analysis

- 24 studies / 737 #’s
  - F/U: min 6 month
  - Re-operation: 33.6%
- 18 studies / 522 #’s
  - Infection: 3.2%
- 15 studies / 464 #’s
  - Non-union: 1.3%

Comminuted #: 55% of surgically Rx #'s

- Undisplaced
- Transverse
- Lower or upper pole
- Multifragmented undisplaced
- Vertical
- Osteochondral

Partial Patellectomy

- Good proximal & distal pole fragments with severe fragmentation of middle patella
- Comminuted mid-portion shelled out, re-approximating proximal / distal poles
- Creating smaller but functional patella

Images of knee joints showing bone fragments and X-rays.
Patellectomy

- Poor outcome when > 40% removed
  - Bostman et al, Injury, 1981
- Contact stress increase as size of discarded patella increases: OA
  - Marder et al, JBJS(A), 1983
- Quads power = 60-85% of NL side
  - Lennox et al, JBJS(B), 1994
  - Saltzman et al, JBJS(A), 1990
Novel Approach?

Patellar Plating
Clinical reports of successful basket plating for comminuted inferior pole fractures


Tension Band vs Plating

- Superior strength in biomechanical studies of plates compared to anterior tension band through cannulated screws or with K-wires

Original Clinical Study

8 pts:
- 6 acute, comminuted complete articular #’s w/ 3 or more fragments (OTA 34-C3)
- 2 symptomatic non-unions of complete articular transverse #’s (OTA 34-C1)
- Reduction w/ clamps, k-wires, or inter-frag lag screws (7 of 8 cases)
- Followed by anterior neutralization plate

Taylor et al, JOT, 2014
Results

- All pts went on to union
  - Mean of 3.2 months
- 1 pt w/ mesh plate had small inferior fragment displacement w/ no symptoms
  - Rx non-op
- Arc ROM: 129 degrees
- No other complications or extensor lag
- Mean of 13.6 months post-op, no implant removal necessary
- All pts previously working had returned to work

Titanium 2.4 mm Mesh Plates *

- 9 pts
  - All women
  - Mean age: 65
  - 2 34 C-1 & 7 34 C-3 AO / OTA #’s

- Lateral para-patellar arthroscopy
  - Patella everted to directly visualize reduction & fixation

Lorich et al, JOT, 2015 (ePub ahead of print)
Plate spans lateral ½ patella circumferentially
Avoid predominant vascularity coming from infero-medially

F/U (avg): 18 months
- Mean ROM: 0-143
- 100% union
- Mean: 23 wks
- No AVN
- No infections
- 1 pt symptomatic hardware removal

Bilateral Polyaxial, Fixed-angle
2.7 mm Plate
- 19 pts / 20 #
- Btw 2011-14
Wild el. Injury, 2016
Results at 12 month F/U
- 100% eventual # union
  • Avg 3.2 months post-op
- 1 implant failure / # displacement
- 1 superficial infection req. implant removal
- All knee scores: good to excellent
  - Lysholm, Tegner, HSS, Turba, Oxford Knee, Knee Injury & OA Score
  - Bostman, Iowa Knee Scores

Technique
- Get reduction
- Confirm:
  1. Visual keys
  2. Fluoroscopy
- Wires +/- Cannulated screws

Plates
- 1. Mesh (cut to fit)
- 2. Pre-manufactured
  - Bicortical fixation from lateral to medial & from inferior to superior
  - Unicortical locking screws from A to P
- Confirm implant position
- ROM to check stability
Mesh Plates

- 2.4 / 2.7 mm
- Easily cut
- Contoured to fit pt anatomy
- Generally overlie a portion of patella or are curved around patellar edge to form a basket-type plate
- Multiplanar holes / Variable angle: fixation into each major # fragment
Conclusions

For very comminuted #'s, anterior plating a good option. Better than patellectomy. However, still occasional hardware removal.

Majority of transverse patella fractures can be Rx with tension band principles. High re-operation rates. Mostly for hardware irritation.