Augmented Wagner’s External Fixator in Proximal Tibial Fractures

Dr. S. M. Hardikar M.B. F.R.C.S., Dr. S. Prakash M.S. Ortho AIIMS,
Dr. M. S. Hardikar M.S. Ortho., Dr. M. V. K. Reddy M.B.B.S.
Hardikar Hospital, Pune.

Key Words

◊ Abstract ◊
Tibial plateau fracture are complex and pose management problems. There is tremendous soft tissue damage, displaced intraarticular fragments & fracture comminution.

Between 1997 to 2002, 63 proximal tibial fractures were treated with Augmented Wagner’s External fixator. Average follow up was 2 yrs (range 1 to 4 yrs). Union occurred in all cases. Using IOWA knee score 89% had good or excellent results. 6% fair & 5% poor results. Poor results were in those cases associated with either ipsilateral intercondylar or shaft fractures.

Material and Methods
63 proximal tibial fractures were treated with Augmented Wagner’s External Fixator between 1997 to 2002.

57 were male & 6 female. Age distribution was between 18-87 yrs and average follow up of 2.5 yrs (1-4 yrs).

All the fractures were classified using OTA Classification.

Proximal Tibial Fractures OTA Classification

- Extra articular
- A1 Avulsion
- A2 Metaphyseal simple
- A3 Metaphyseal multifragmentry
- Partial articular
- B1 Pure split
- B2 Pure depression
- B3 Split-depression
Augmented Wagner’s External Fixator

The augmentations are:

1. 4 clamps instead of 2, 1 clamp with Ilizarov quarter mounted with 3 Rancho cubes placed at right angles to the other 3.

2. Stud of clamp is 8 mm in diameter & 32 mm in length instead of 6 mm & 20 mm respectively to accommodate an Aesculap clamp.

* Percutaneous & intra-articular K wires used to manipulate fragments.
* If necessary limited incision to elevate depressed fragments & limited internal fixation of meta/diaphyseal fracture.
* Maintaining tenaculum forceps AWEF positioned parallel to medial tibial surface.
* Initially the proximal & distal most Schanz introduced 90° to tibia.
* 1st proximal Schanz is through posteromedial tibia 1 cm from joint.
* 2nd proximal Schanz is through anteromedial tibia.
* 3rd proximal Schanz is anteroposterior through medial condyle.
* The rest of Schanz are appropriately directed to hold the meta/diaphyseal fracture.
* All nuts of clamps and bolts of Rancho cubes fastened.
* Gentle compression to bring bone on bone contact at metaphysis is carried out.
* The apparatus is finally locked.

Post Op Regimen

* Motion of knee initiated from 2nd post op day (achievement of larger ROM not emphasized in early weeks to minimize drainage from proximal pins)

Technique

* Pre op assessment of X-rays & 3-D scans
* Ligamentotaxis - fracture table.
* Closed reduction of condyles with tenaculum forceps under image control.
Other Measures:
- Standard pin care.
- Fixator compression if required.
- When no pain at fracture site & clinically / radiologically fracture is healed then fixator is removed in OPD.

100 point scale with 5 categories of knee functions assessed

ADL: 35 points
Pain: 35 points (no pain) & 0 points - (severe pain)
Gait: 10 points
ROM: 10 points (1 point for each 15° motion)
Absence of deformity, ligament laxity: 10 points

Score of
90 to 100 = excellent
80 to 89 = good
70 to 79 = fair

Augmented Wagner’s External Fixator in Proximal Tibial Fractures

Our Results - IOWA Score
- Follow-up: average 2 years (range 1 to 4 years).
- Mean time of union (as determined by removal of external fixator) 7 months (range 4 to 11 months).
- 89% good or excellent, 6% fair and 5% poor. Average IOWA Score - 92.
- Poor results of 5% were in those cases associated either with ipsilateral intercondylar / shaft femoral fractures.

Complications - Instability
- No patient had functional instability
- 7 patients had clinical instability of which 4 were posterior and 3 were medial.
3 of the 4 posterior and all 3 medial instabilities were Gr 1+ (< 5 mm)
The remaining 1 case of posterior instability was of Gr. 2+ (5-9 mm).

- Articular surface and metaphyseal / diaphyseal fractures can be well maintained.
- Construct can be compressed, allows deformity correction as consolidation progresses.
- Fixator is mechanically stable with no cantilever loading.
- Low incidence of infection.
- Permits plastic / vascular repairs.
- Excellent patient compliance.

Proximal Tibial C1 Fracture: 30 yr M, Closed, Fix Off 6 Months
Proximal Tibial C1 Fracture: 32 yr M, Comp Gr. II, Fix Off 4 Months

Proximal Tibial C2 Fracture: 37 yr M, Comp Gr. I, Fix Off 8 Months

Proximal Tibial C2 Fracture: 65 yr M, Closed Gr. I, Fix Off 8 Months
Proximal Tibial C3 Fracture: 52 yr M, Closed, Fix Off 5 Months

Proximal Tibial C3 Fracture: 50 yr M, Closed, Fix Off 6 Months

Proximal Tibial C3 Fracture: 38 yr M, Closed, Fresh, Fix Off 5 Months
• Ability to recognise & repair meniscal / ligament injuries / articular surface restoration not as accurate as open reduction and plate fixation.
• But Marsh JL et. al. mentioned that it is unlikely that a more intensive approach would improve outcome.
• Watson JT et. al. warned that in face of tremendous soft tissue disruption, repairs would be ill advised.

Discussion

The proximal tibial fracture is one of the commonest injuries in road accidents and pose management problems due to tremendous soft tissue disruption, displacement of articular fragments and comminution of fracture fragments.

Closed reduction and immobilisation is ineffective and maintaining the reduction and joint congruency is difficult.

Open reduction and plate and screw fixation is suitable in split and split depression fractures, it has advantage of direct visualisation of articular surface but is not indicated in high energy trauma leading to comminution and wounds.

So external fixation with or without internal fixation is preferable as seen by the results using Augmented Wager’s External Fixator.

Reference:


