

Assessment Of Outcome Of Submuscular Plating In Paediatric Femoral Shaft Fractures

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ABSTRACT

Background: Femoral shaft fractures constitute only 1.6% of all paediatric fractures but at the same time they are the most common fractures which require hospitalization in children. The present study was conducted to assess outcome of submuscular plating in paediatric femoral shaft fractures.

Materials & Methods: 56 paediatric femoral shaft fractures patients of both genders were selected and fracture characteristics, intra-operative and post-operative findings, radiological findings, intraoperative or post complication was recorded. Preoperative anteroposterior and lateral view x ray of femur were taken to see the type of fracture.

Results: Out of 56 patients, males were 30 and females were 26. The mean duration of hospital stays was 10.2 days, fluoroscopy time per surgery was 65.2 minutes, average time of callous formation was 3.2 in weeks and average time of fracture union was 8.1 weeks. Mechanism of injury was RTA in 32, fall in 20 and others in 4. Fracture pattern was oblique in 10, spiral in 14, transverse in 8 and comminuted in 24. Fracture site was proximal 1/3 in 12, middle 1/3 in 30 and distal 1/3 in 14. The difference was significant ($P < 0.05$). Common complications reported were delayed union in 2, non-union in 3, refracture in 1 and superficial infection in 2 patients. The difference was non-significant ($P > 0.05$).

Conclusion: Sub-muscular plating is a surgical method with learning curve and is a very effective method of fixation for paediatric femur fractures.

Keywords: Femoral shaft fractures, fluoroscopy time, delayed union

Introduction

Femoral shaft fractures constitute only 1.6% of all paediatric fractures but at the same time they are the most common fractures which require hospitalization in children.¹ Etiology varies from child abuse and trivial trauma in smaller children to high energy trauma in adolescents.² Conservative management with Hip spica cast is the standard method used universally for children less than 6 years of age with excellent

results. However, controversy continues to exist in literature about the ideal treatment method above 6 years till skeletal maturity though.³

The treatment of an infant's femoral shaft fracture rarely involves operative stabilisation. Most of the fractures in this age group can be treated either by traction methods or spica casting or by a combination of the two.⁴ If the child is under 18 months, the most common traction modality is Bryant's or gallows

traction, where the child is supine with the hips flexed 90°, the legs being pulled directly upwards. This form of traction, which sounds extremely simple, needs to be applied with care to avoid complications.⁵ Submuscular plating can be effectively used for proximal and distal femur fractures where other surgical methods are not feasible. However, most of the studies reported about submuscular plating have reported short term results.⁶ The present study was conducted to assess outcome of submuscular plating in paediatric femoral shaft fractures.

Materials & Methods

The present study comprised of 56 paediatric femoral shaft fractures patients of both genders.

Parental consent was obtained before starting the study.

Data such as name, age, gender etc. was recorded. Parameters such as fracture characteristics, intra-operative and post-operative findings, radiological findings, intraoperative or post complication was recorded. Preoperative anteroposterior and lateral view x ray of femur were taken to see the type of fracture. In the post-operative period patients were regularly followed and sequential X rays were taken on first postoperative day, 3 weeks, 6 weeks, 12 weeks. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

Results

Table I Distribution of patients

Total- 56		
Gender	Males	Females
Number	30	26

Table I shows that out of 56 patients, males were 30 and females were 26.

Table II Assessment of parameters

Parameters	Variables	Mean	P value
Average duration of hospital stays (in days)		10.2	-
Fluoroscopy time (minutes) per surgery		65.2	-
Average time of callous formation (in weeks)		3.2	-
Average time of Fracture union (in weeks)		8.1	-
Mechanism of injury	RTA	32	0.01
	Fall	20	
	Others	4	
Fracture pattern	Oblique	10	0.04
	Spiral	14	
	Transverse	8	
	Comminuted	24	
Fracture site	Proximal 1/3	12	0.05
	Middle 1/3	30	
	Distal 1/3	14	

Table II shows that mean duration of hospital stays was 10.2 days, fluoroscopy time per surgery was 65.2 minutes, average time of callous formation was 3.2 in weeks and average

time of fracture union was 8.1 weeks. Mechanism of injury was RTA in 32, fall in 20 and others in 4. Fracture pattern was oblique in 10, spiral in 14, transverse in 8 and comminuted

in 24. Fracture site was proximal 1/3 in 12, middle 1/3 in 30 and distal 1/3 in 14. The difference was significant ($P < 0.05$).

Table III Complications

Complications	Number	P value
Delayed union	2	0.72
Non-union	3	
Refracture	1	
Superficial infection	2	

Table III, graph I shows that common complications reported were delayed union in 2, non-union in 3, refracture in 1 and superficial infection in 2 patients. The difference was non-significant ($P > 0.05$).

Discussion

Various studies have proven submuscular plating as an excellent method for femoral shaft fractures with distinct advantages of this method over other surgical methods.⁷ The aetiology of femoral shaft fractures in these children is nearly always a straightforward accident, either a fall from playground equipment or a simple fall.^{8,9} Gallows traction is inappropriate for these children and they can be managed on traction either straight on the bed or over a pillow, in a splint, or on some form of balanced traction, such as Hamilton-Russell traction. A traction pin is not required in this age group. Successful results have been described with all forms of traction, although the use of a Thomas or Liston splint can be associated with skin problems.¹⁰

The principles of treatment of the child's femoral shaft fracture stated that the simplest satisfactory treatment was the best treatment. The initial treatment should be definitive whenever possible. Anatomic reduction was not required for perfect function. Alignment must be restored, especially rotational alignment.¹¹ The more growth that remained, the more remodelling was available. The limb should be immobilised in a splint until

definitive treatment had been instituted.¹² The present study was conducted to assess outcome of submuscular plating in paediatric femoral shaft fractures.

We found that out of 56 patients, males were 30 and females were 26. Bhat et al¹³ evaluated long-term results of submuscular plating in paediatric femur fractures. Out of 37 patients 34 patients were followed up till skeletal maturity. Average follow up was of 442 weeks. 4 patients developed superficial infection, 1 patient had limb length discrepancy of more than 2 cm, 5 patients had varus/valgus union of less than 10 degrees, implant breakage occurred in 2 patients. The average blood loss per patient was 77 ml and average C arm fluoroscopy time was 55 minutes. The average length of plate used was 8.5 holes to 12 holes in 3rd year. Most of the complications reported occurred in patients operated in the first year of study.

We found that common complications reported were delayed union in 2, non-union in 3, refracture in 1 and superficial infection in 2 patients. We found that the mean duration of hospital stays was 10.2 days, fluoroscopy time per surgery was 65.2 minutes, average time of callous formation was 3.2 in weeks and average time of fracture union was 8.1 weeks. Mechanism of injury was RTA in 32, fall in 20 and others in 4. Fracture pattern was oblique in 10, spiral in 14, transverse in 8 and comminuted in 24. Fracture site was proximal 1/3 in 12, middle 1/3 in 30 and distal 1/3 in 14. External

fixation is another method used for femoral shaft fractures mostly in open fractures and polytrauma patients. Higher chances of refracture, scar formation and pin site infection make this method less acceptable. Plate osteosynthesis remains a viable option for most of the femoral shaft fractures in paediatric age group.¹⁴ Open plating allows anatomical reduction however higher incidence of complications like excessive bleeding, ugly scar, infection and non-union makes this method less popular. Submuscular bridge plating is increasingly being used for paediatric femoral fractures with advantages of preserving fracture biology, less blood loss, smaller scar and lesser chances of infection compared to open plating.¹⁵ The advantages of plating over other surgical methods is that it can be used for both stable and unstable fractures, pathological fractures, fractures of proximal and distal end of femur and patients with narrow medullary canal and deformed femur where intramedullary nailing is not possible.¹⁶

The limitation the study is small sample size.

Conclusion

Authors found that sub-muscular plating is a surgical method with learning curve and is a very effective method of fixation for paediatric femur fractures.

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