

# FUNCTIONAL OUTCOME OF OPERATIVE MANAGEMENT OF FEMORAL SHAFT FRACTURES IN CHILDREN WITH TENS (TITANIUM ELASTIC NAILING SYSTEM)

## ABSTRACT

### BACKGROUND

Femoral shaft fractures account for 1.6% of all bony injuries in children, usually caused by assault or fall during normal play. Male to female ratio being 2.6:1. Low velocity trauma leads to transverse fractures and high speed trauma causes comminuted or segmental fractures.[1-3]

In children who are five years of age or younger, early closed reduction and application of a spica cast is an ideal treatment for most diaphyseal femoral fractures [1]. In skeletally mature adolescents, use of an antegrade solid intramedullary rod has become the standard of treatment [4, 5]. The best treatment for children between six and sixteen years of age is still debated. The evaluation and management of patients with femoral shaft fractures in children between 6-14 years of age continue to evolve on the basis of the improved understanding of the local anatomy, impact of treatment, and the biomechanics of fixation techniques.

### STUDY DURATION

1st September 2014 to 1<sup>st</sup> September 2015 at the Department of Orthopaedics, Calcutta National Medical College Kolkata

### METHODS AND MATERIALS

*Nail Selection:* Titanium Elastic Nails are available in five diameters: 2.0 mm, 2.5 mm, 3.0 mm, 3.5 mm and 4.0 mm; and are 440 mm in length.

The following sizes were typically used for children of

Average stature:

6–8 years old 3.0 mm nails

9–11 years old 3.5 mm nails

12–14 years old 4.0 mm nails

Two nails of the same diameter were selected so the opposing bending forces are equal, avoiding misalignments. Femoral fractures in children are typically stabilized with two nails inserted in a retrograde manner from medial and lateral entry points above the distal physis

- a. Countouring the nail
- b. Creating the entry points
- c. Insertion of the nail
- d. Reduction of the fracture
- e. Cutting of the nails

#### *After treatment*

The patient was kept non weight-bearing for 2 weeks. During this time a long leg back slab was applied for patient comfort. After 2 weeks the back slab along with the skin sutures were removed. Active knee bending exercises were allowed. The patient was allowed partial weight bearing with axillary crutches after 4 weeks. Radiographs were obtained after 6 weeks and progression to full weight bearing was done depending on the status of fracture and amount of callus formation.

#### *Removal of the nails*

The patient was planned for implant removal after consolidation of the fracture which was on an average of 6 months from the date of injury. Self locking extraction pliers were used for this purpose

### RESULTS

During the study period, 30 cases were randomly selected for inclusion in the study following the inclusion criteria mentioned earlier. Cases were managed operatively with internal fixation using titanium elastic nails (TENS). All cases were initially treated by surface traction. Applied at the earliest possible moment. Followed by, the patients underwent proper pre operative investigations and pre-anaesthetic check up followed by the definitive surgical procedure. The age range of the patients in the study was 6-14 years, with a mean of 10.2 years treated operatively by TENS. There is no significant difference in between both groups in terms of demographic data (age, sex ), fracture type and pattern, hospital stay and co morbidities at the time of presentation. All fractures in the operative group united clinically by 8 weeks and radiologically by 10 weeks the difference was statistically significant, proving that patients in the operative group achieved healing milestones at an accelerated pace.

Although there was knee flexion (avg. 131.50 in the operative group were found to be insignificant on statistical analysis. Shortening was found in the operative group (mean 0.1 cm), and the difference was found to be highly significant on statistical analysis. Degrees of angular malalignment in the operative group with means of 1.80

No major complications were seen in patients.

There is no significant difference in between both groups in terms of demographic data (age, sex), fracture type and pattern, hospital stay and co morbidities at the time of presentation. All fractures in the operative group united clinically by 8 weeks and radiologically by 10 weeks the difference was statistically significant, proving that patients in the operative group achieved healing milestones at an accelerated pace.

Although there was knee flexion (avg. 131.50 in the operative group were found to be insignificant on statistical analysis. Shortening was found in the operative group (mean 0.1 cm), and the difference was found to be highly significant on statistical analysis. Degrees of angular malalignment in the operative group with means of 1.80

No major complications were seen in patients.

## **CONCLUSION AND RECOMMENDATIONS**

During the study period, 30 cases were selected to be included in the study which had transverse and short oblique diaphyseal fractures of the femur.30 cases were treated by operative intervention by closed intramedullary nailing with titanium elastic nails.

The age range of the patients was from 6-14 years, with a mean of 8.3 years in the operative group. Males were more frequently affected than females, the ratio being 2.3:1.

The most common mode of injury was motor vehicle accident (MVA) accounting for 70% of the cases and the rest being falls from height. The left side was more frequently found to be injured (in 60% cases). Most of the cases (in 70% cases) in the operative group had their surgeries completed by the 5th post-injury day.

- **Introduction:**

Femoral shaft fractures account for 1.6% of all bony injuries in children, usually caused by assault or fall during normal play. Male female ratio being 2.6:1. Low velocity trauma leads to transverse fractures and high speed trauma causes comminuted or segmental fractures.[1-3]

In children who are five years of age or younger, early closed reduction and application of a spica cast is an ideal treatment for most diaphyseal femoral fractures [1]. In skeletally mature adolescents, use of an antegrade solid intramedullary rod has become the standard of treatment [4, 5]. The best treatment for children between six and sixteen years of age is still debated. The evaluation and management of patients with femoral shaft fractures in children between 6-14 years of age continue to evolve on the basis of the improved understanding of the local anatomy, impact of treatment, and the biomechanics of fixation techniques.

### **Aims and objectives**

- \* To determine the demographic (age and sex distribution) of paediatric diaphyseal and proximal third diaphyseal fractures of femur.
- \* To study the advantages of TENS
- \* To study the union rates and functional outcome of closed reduction and internal fixation of paediatric widely displaced diaphyseal fractures of femur with TENS.
- \* To compare the results with those in literature.

### **SPECIFIC OBJECTIVES OF THE STUDY:**

- To assess the different types of Paediatric femur fractures, their mechanism of injury
- To find the efficacy of application of TENS in femur fractures
- Analysis of result of TENS in Paediatric femur fractures
- Study any complication associated with TENS technique

### **Biomechanics of Fracture, Elastic Nailing and Traction:**

The femur is subject to significant bending, axial, torsional stresses that can exceed three to four times body weight during normal activities. The torsional rigidity of a femur fracture treated with intramedullary nails is determined by a combination of nail characteristics and fracture characteristics.

The aim of this biological, minimally invasive fracture treatment is to achieve a level of reduction and stabilization that is appropriate to the age of the child. The biomechanical principle of the Titanium Elastic Nail is based on the symmetrical bracing action of two elastic nails inserted into the metaphysis, each of which bears against the inner bone at three points viz. the three point fixation principle. This produces the following four properties: flexural stability, axial stability, translational stability and rotational stability. All four are essential for achieving optimal results.

## **FIG 1: PRINCIPLE OF FLEXIBLE NAILING**

F = force acting on the bone  
R = restoring force of the nail  
S = shear force  
C = compressive force

Traction used for stabilizing femur fractures in our study surface traction. The traction was used with the intention to overcome the muscle spasm and maintaining the alignment of the fracture fragments by stretching of the soft tissues. The muscles in spasm tend to draw the distal part of the body in a proximal direction. A traction force applied to the affected part of the body will overcome muscle spasm only if force acting in the opposite direction---counter-traction--- is applied at the same time as the traction force. If counter traction is not applied, the whole body will tend to be pulled in the direction of the traction force, and muscle spasm will not be overcome.

The counter traction in case of Thomas' splint was the force applied by the padded ring on the groin while in case of skeletal traction in Bohler-Braun splint, counter traction was applied by elevation of the foot end of the patient's bed and allowing the body weight of the patient to act as the counter traction.

### **Materials and methods**

The study will be conducted at the Department of Orthopaedics, Calcutta National Medical College Kolkata during the period from SEPTEMBER 2014 to SEPTEMBER 2015.

#### **□ Study area:**

Department of Orthopaedics Surgery, Calcutta National Medical College, Kolkata

#### **□ Inclusion criteria:**

- a) Children and adolescent patients from 5 to 15 year with diaphyseal femur fracture.
- b) Children of both the sexes are included in the study
- c) Children with fresh closed diaphyseal fractures of femur
- d) Patient fit for surgery

***Exclusion criteria:***

- Patients less than 5 years of age and more than 15 years of age.
- Patients unfit for surgery
- Comminuted and segmental fractures
- Patients not willing for surgery
- Open fractures
- Old Fracture involving the distal 1/3rd of femoral shaft.

***Operative management with titanium elastic nails***

1. *Initial management:* The patient was put on a simple surface traction with a weight, deemed appropriate for the weight of the patient was applied. The foot end of the bed was simultaneously raised to provide the counter traction.

2. The relevant blood and other investigations were done and cardiological and physician's opinion was taken for surgical fitness of the patient. The patient was then referred to the anaesthesiologist for proper pre-anaesthetic check-up.

3. The patient was then put up for operation.

a. The patient was positioned in the supine position on the fracture table. Traction was then applied using the fracture table foot holder. The image intensifier was positioned on the lateral side of the affected femur for AP and lateral views of the leg from knee to hip. Trial reduction was then attempted under C-arm guidance and proper rotational alignment was determined. In most cases rotational alignment was obtained with 15 degrees of internal rotation to neutralize the anteversion of the femoral neck.

b. After proper preparation of the operative site, the affected limb was draped and sterile C-arm covers were applied to the camera as well as to the intensifier arms of the C-arm. Meanwhile, a prophylactic antibiotic was administered intravenously.

***c. Operative procedure:***

□ *Nail Selection:* Titanium Elastic Nails are available in five diameters: 2.0 mm, 2.5 mm, 3.0 mm, 3.5 mm and 4.0 mm; and are 440 mm in length. The nails are color-coded for easy identification. The narrowest diameter of the medullary canal was measured with a ruler. The proper nail diameter is no more than forty percent of the width of the canal as per Flynn et.al [2]. Another method was used as suggested by Kasser and Beaty [20] which stated that

Nail size = ——— Internal diameter ——— - 0.5 mm

The following sizes were typically used for children of

Average stature:

6–8 years old 3.0 mm nails

9–11 years old 3.5 mm nails

12–14 years old 4.0 mm nails

Two nails of the same diameter were selected so the opposing bending forces are equal, avoiding malalignment. Femoral fractures in children are typically stabilized with two nails inserted in a retrograde manner from medial and lateral entry points above the distal physis. Distal Nail tip of 1 cm of nail was left out as to help the nail removal once the fracture is united.

- Countouring the nail:
- Creating the entry points:
- Insertion of the nail:
- Reduction of the fracture
- Cutting of the nails

*After treatment*

The patient was kept non weight-bearing for 2 weeks. During this time a long leg back slab was applied for patient comfort. After 2 weeks the back slab along with the skin sutures were removed. Active knee bending exercises were allowed. The patient was allowed partial weight bearing with axillary crutches after 4 weeks. Radiographs were obtained after 6 weeks and progression to full weight bearing was done depending on the status of fracture and amount of callus formation.

*Removal of the nails*

The patient was planned for implant removal after consolidation of the fracture which was on an average of 6 months from the date of injury. Self locking extraction pliers were used for this purpose

**All the patients in the study were assessed for complications, both major and minor according to Flynn’s criteria.**

**Evaluation:** The results are evaluated with TENS SCORING SYSTEM used by FLYNN et al as shown in table 1

**Table 1:  
The Scoring Criteria for Tens**

	<b>Excellent</b>	<b>Successful</b>	<b>Poor</b>
Limb length			
Discrepancy	< 1cm	< 2cm	> 2cm
Sequene			
Disorder	5°	10°	>10°
Pain	Absent	Absent	Present
Complication	Absent	Mild	Major

The patients were put into groups as excellent, satisfactory and poor depending on these parameters

**Results and Analysis**

During the study period, 30 cases were randomly selected for inclusion in the study following the inclusion criteria mentioned earlier. Cases were managed operatively with internal fixation using titanium elastic nails (TENS). All cases were initially treated by surface traction. Followed by, the patients underwent proper pre operative investigations and pre-anaesthetic check up followed by the definitive surgical procedure. The age range of the patients in the study was 6-14 years, with a mean of 10.2 years treated operatively by TENS.

There is no significant difference in between both groups in terms of demographic data (age, sex ), fracture type and pattern, hospital stay and co morbidities at the time of presentation. All fractures in the operative group united clinically by 8 weeks and radiologically by 10 weeks the difference was statistically significant, proving that patients in the operative group achieved healing milestones at an accelerated pace.

Although there was knee flexion avg. 131.50 in the operative group were found to be insignificant on statistical analysis. Shortening was found in the operative group (mean 0.1 cm), and the difference was found to be highly significant on statistical analysis. Degrees of angular malalignment in the operative group with means of 1.80

No major complications were seen in patients.

Sex	Frequency	Percent
Female	10	33.3
Male	20	66.7
Total	30	100.0

## Statistical Methods

Categorical variables are expressed as Number of patients and percentage of patients and compared across the groups using Fischer's exact test.

Continuous variables are expressed as Mean  $\pm$  Standard Deviation and compared across the 2 groups using Mann-Whitney U test.

The statistical software SPSS version 20 has been used for the analysis.

An alpha level of 5% has been taken, i.e. if any p value is less than 0.05 it has been considered as significant.

## **Discussion:**

Although femoral shaft fractures constitute fewer than 2% of all paediatric fractures, the choice of treatment has remained a constant challenge to the orthopaedics fraternity. Until recently conservative treatment was preferred method for the treatment of diaphyseal fractures in children and young adolescents. However to avoid the effects of prolonged immobilization to reduce the loss of school days and for better nursing care the operative approach has been gaining popularity for the last two decades. Plate osteosynthesis is still widely used. It is associated with a large exposure relatively longer duration of immobilization and the risks of delayed union, infection and a large dissection for plate removal. The external fixator provides good stability and early mobilization but is associated with the risk of pin tract infections and it takes a longer time for weight bearing. Intramedullary K-wire fixation has also been used for pediatric femoral fracture. But stability and fracture angulations is a disadvantage to be taken care of. Interlocking nail is ideal for skeletally matured children. Reports of avascular necrosis of femoral head coxa valga have been reported with interlocking nail when attempted in skeletally immature patient's. However there have been proponents for using interlocking nail in the 11-16 years of age group avoiding the piriformis fossa as entry site with good results. Nail length Jugement was made from the as to measure the isthmus of the medullary cavity in x ray images.

Titanium elastic nail seems advantageous over other surgical methods particularly in this age group because it is simple is a load-sharing internal splint that doesn't violate open physis, allows early mobilization and maintains alignment. Micromotion conferred by the elasticity of the fixation promotes faster external bridging callus formation. The periosteum is not disturbed and being a closed procedure there is no disturbance of the fracture hematoma, thereby less risk of infection. Flynn et al. found TEN advantageous over hip spica in treatment of femoral shaft fractures in children. Buechsenhuetz et al, documented titanium nail superior in terms of union, scar acceptance and overall patient satisfaction compared to traction and casting. Ligier et al, treated 123 femoral shaft fractures with elastic stable intramedullary nail. All fractures united. Thirteen children developed entry site irritation. Similarly Narayanan et al, found good outcome in 79 femoral fractures stabilized with TEN. There is no comparative study regarding the efficacy of Ender Nail, Rush Nail, or Titanium Elastic Nail. All the nails give good results. Moreover, Ender Nail is not elastic and flexible enough for pediatric fractures as stated by Ligier. Heinrich et al, observed good results in 78 femoral fractures treated with Ender Nail. Fracture geometry and the location is an important determinant for selection of surgical techniques. Transverse, short oblique are suitable for TEN as stated by Flynn et al. Narayanan et al, stated that transverse short oblique short spiral fractures with minimum comminution in the 5-12 years age group were the best indications for TEN. Lascombes et al, stated that TEN could be indicated in all femoral diaphyseal fractures of children above six years of age till epiphysis closed except severe Type III open fractures. Titanium elastic nail does not provide adequate stability in comminuted, long oblique or spiral fractures. Even if it is contemplated, postoperative immobilization becomes essential. Appropriate alternatives other than titanium elastic nail should be considered in such circumstances.

The most common complication of Titanium elastic nail is entry site irritation and pain. Other complications include limb length discrepancy, angulation of fracture, refractures and infection. Entry site irritation in our series was seen in two cases. We found that entry site irritation was significantly associated with long and prominent nail end (>2cm). All these findings were statistically significant. Fractures are more common in boys (2.6:1), and occur in an interesting bimodal distribution with a peak during the toddler years (usually from simple falls) and then again in early adolescence (usually from higher-energy injury).

Over the past 20 years, however, there has been a dramatic and sustained trend towards the operative stabilization of femoral shaft fractures in school-aged children using flexible intramedullary nails, external fixation, locked intramedullary nails, and more recently, submuscular plates. The ideal device for the treatment of most femoral fractures in children would be a simple, load-sharing internal splint that allows mobilization and maintenance of alignment and extremity length until bridging callus forms. The device would exploit a child's dense metaphyseal bone,

Rapid healing and ability to remodel, without risking damage to the physes or the blood supply to the capital femoral epiphysis. Both Ender nails and titanium elastic nails offer these features. The titanium flexible nail with its newer design and improved material, however provide better inherent stiffness resulting in adequate strength and elasticity as compared to the older Ender's nails. These advances have decreased the substantial early disability for the children, as well as the family's burden of care during the recovery period.

### **Summary**

During the study period, 30 cases were selected to be included in the study which had transverse and short oblique diaphyseal fractures of the femur. 30 cases were treated by operative intervention by closed intramedullary nailing with titanium elastic nails.

The age range of the patients was from 6-14 years, with a mean of 8.3 years in the operative group.

Males were more frequently affected than females, the ratio being 2.3:1.

The most common mode of injury was motor vehicle accident (MVA) accounting for 70% of the cases and the rest being falls from height. The left side was more frequently found to be injured ( in 60% cases). Most of the cases (in 70% cases) in the operative group had their surgeries completed by the 5th post-injury day. On follow up, we found some complications . They were managed accordingly.

The nail protrusion required another stint to the operating room for trimming of the nail. Fractures after operation, clinical union at 6.2 weeks on an average and radiological union at 9.3 weeks was seen.

2 cases had their nails removed at 6 months. The other cases were lost to follow up before removal could be done.

The results were graded according to Flynn et al criteria. The operative group yielded 8 excellent and 2 satisfactory results.

### **Conclusion**

Age, sex, side of the patient have no significant effect on the final outcome in our study group. There was no significant difference between two groups in terms of demographic data, fracture type and associated co-morbidities.

Internal fixation with titanium elastic nails provide better results, at least in the short term, than conservative treatment in traction. Long term follow up was not done, hence commenting on the final outcome would be inappropriate keeping in mind the remodeling potential in the patients of the study group.

Hence we concluded that internal fixation with titanium elastic nails (TENS) is a better treatment modality for treating pediatric shaft of femur fractures as compared to treatment in traction. The reasons behind this conclusion were the short period of immobilization, shorter interval between trauma and progression to full weight bearing and accelerated achievement of milestones of fracture healing. The patients in the operative group also had lesser degrees of malalignment at the fracture site

### **Bibliography**

1. Rockwood and Wilkins Fractures in Children, Beaty, James H.; Kasser, James R, 7th Edition,(2010) Lippincott Williams & Wilkins, Femoral Shaft Fractures, p.798-838
2. Flynn JM, Schwend RM. Management of pediatric femoral shaft fractures. *J Am Acad Orthop Surg* 2004;12(5):347-359.
3. Hedlund R, Lindgren U. The incidence of femoral shaft fractures in children and adolescents. *J Pediatr Orthop* 1986;6(1):47-50.
4. Flynn JM, Skaggs D, Sponseller PD, Ganley TJ, Kay RM, Leitch KK. The operative management of pediatric fractures of the lower extremity. *J Bone Joint Surg Am.* 2002;84:2288 -300
5. Stans AA, Morrissy RT, Renwick SE. Femoral shaft fracture treatment in patients age 6 to 16 years. *J Pediatr Orthop.*1999; 19:222 -8
6. Fabiano Prata Nascimento et al. Short hospitalization period with elastic stable intramedullary nails in the treatment of femoral shaft fractures in school children. *J Child Orthop* (2010) 4:53–60

7. Beaty JH, Austin SM, Warner WC, Canale ST, Nichols L. Interlocking Intramedullary nailing of femoral shaft fractures in adolescents : preliminary results and complications. *J Pediatr Orthop* 1994; 14:178-83
8. Letts M, Jarvis J, Lawton L, Davidson D. Complications of rigid intramedullary rodding of femoral shaft fractures in children. *J Trauma* 2002;52:504-16
9. Lagvender Shekhar, JC Mayengar. A clinical study of Ender's nail fixation in femoral shaft fractures in children. *Indian Journal Of Orthopaedics; Jan 2006; Volume 40 : Number 1 : p 35-37*
10. Rockwood & Green's Fractures in Adults, Bucholz, Robert W.; Heckman, James D.; Court-Brown, Charles M, 6th Edition(2006) Lippincott Williams & Wilkins, Fractures of the Tibia and Fibula, p2080-2143.
11. Rockwood & Green's Fractures in Adults, Bucholz, Robert W.; Heckman, James D.; Court-Brown, Charles M, 6th Edition(2006) Lippincott Williams & Wilkins, Fractures of the Shaft of the Femur, p 1845-1914.
12. Gustilo RB, Mendoza RM, Williams DM. Problems in the management of type III (severe) open fractures. A new classification of type III open fractures. *J Trauma* 1984;24:742-746.
13. Traction and Orthopaedic appliances, John DM Stewart, Jeffrey P Hallett, 2nd edition(1993),BI Churchill Livingstone Pvt. Ltd., Traction; The Thomas's and Fisk Splints; Fixed traction; Sliding traction, p1-55.
14. The Titanium Elastic Nailing System; Technique Guide; Issued by *Synthes*.
15. John M. Flynn, MD1, Lael M. Luedtke, MD2, Theodore J. Ganley, MD1, Judy Dawson, RN1, Richard S. Davidson, MD1, John P. Dormans, MD1, Malcolm L. Ecker, MD1, John R. Gregg, MD1, B. David Horn, MD1 and Denis S. Drummond, MD. Comparison of Titanium Elastic Nails with Traction and a Spica Cast to Treat Femoral Fractures in Children. *The Journal of Bone and Joint Surgery (American)* 86:770-777 (2004)
16. KC Saikia, SK Bhuyan, TD Bhattacharya, SP Saikia. Titanium elastic nailing of femoral diaphyseal fractures in children in 6-16 years of age. *Indian Journal of Orthopaedics*, Oct-Dec 2007; Issue 4.
17. MK Mam, DJ Dwyer, B John. Fracture shaft of femur in children-Results of treatment. *IJO*, vol 35, no 2, April 2001, p 28-30
18. Atul Bhaskar et.al. Treatment of long bone fractures in children by flexible titanium elastic nails. *IJO*; vol. 39, no.3, July 2005; p 166-168.
19. Usha S. Mani, MD, Christopher T. Sabatino, MS, Sanjeev Sabharwal, MD, David J. Svach, MS, Adam Suslak, MS, and Fred F. Behrens, MD. Biomechanical Comparison of Flexible Stainless Steel and Titanium Nails with External Fixation Using a Femur Fracture Model. *J Pediatr Orthop* 2006;26:182Y187.
20. Kasser JR, Beaty JH. Femoral shaft fractures. In: *Rockwood and Wilkins Fractures in Children*. 5th ed. New York: Lippincott Williams and Wilkins; 2001. 941-80

21. González-Herranz P, Burgos-Flores J, Rapariz J, Lopez- Mondejar J, Ocete J, Amaya S (1995) Intramedullary nailing of the femur in children eVects on its proximal end. J Bone Joint Surg [Br] 77(B):262–266

22. Gray's anatomy : the anatomic basis of clinical practice, Susan Standring, 40th edition (2010), Churchill Livingstone, Chapter 80, Pelvic girdle, Gluteal region and Thigh. p 2013-2078.

**PATIENT CONSENT FORM**

For clinical study titled "Comparison of results of treatment of short oblique and transverse diaphyseal fractures of femur by non-operative methods and internal fixation with titanium elastic nail in children aged 6-14 years"

I.....Age.....  
D/O,S/O,W/O.....Resident  
of.....

.....  
Exercising my free power of choice, hereby consent myself/ my ward  
Mr/Ms..... to be included as a subject/participant  
in the above study. I have been informed to my satisfaction, by the attending physician  
the purpose of the clinical study and the nature of drug treatment and follow up,  
including the laboratory investigations to monitor and safeguard my/my ward's body  
functions.

I am also aware of my right to opt out the trial at any time during the course of the  
study without having to give the reasons for doing so.

I agree to provide relevant information and adhere to the doctor's instructions and co-  
operate fully. Further the attending doctor will not be held responsible for any adverse  
effects arising out of the proposed treatment.

.....  
Signature of the Signature of the Signature and left  
Attending physician witness thumb impression  
Of the patient/  
Guardian

Date:  
Place: