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# Femoral Shaft Fractures: Management and Outcome in Nigerian Children.

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**Abstract**

***Background:*** Traditionally, majority of femoral shaft fractures in children are managed by conservative methods with good results. Recently, there is a trend towards operative treatment. This study aims to determine the indications and outcome of dynamic compression plating in children and adolescents.

***Patients and Methods:*** This was a-10-year prospective study of open reduction and internal fixation carried out in three hospitals in North Central Nigeria. Data analysed included personal demographic data, aetiology, hospital of primary treatment, indications for surgery, methods chosen, duration of hospitalization and time to mobilization. Follow up was till removal of implants.

***Results:*** Thirty-one patients were treated by dynamic compression plating during this period. There were 20 males (64.5%) and 11 females (35.5%), with a mean age of 12.1(±3.3) years. Twenty-one (67.7%) fractures resulted from road traffic accidents, 9 (29.0%) from falls and one (3.3%) was spontaneous pathological fracture.

Twenty patients (64.5%) presented first to the traditional bone setters while 11(35.5%) to orthodox hospitals. The indications for intervention were mainly due to malunion of fractures in 20 (64.5%) and surgeons'/parents' preference in six (19.4%) patients.

The mean duration of hospitalization was 4 (SD±1.7) weeks. Fracture union was achieved in 8-13 weeks (mean = 10 ±1.7) weeks. Infection rate was 3.2% and mal-union occurred in one (3.2%) patient who had osteogenesis imperfecta.

***Conclusion:*** Compression plating is a suitable option in treatment of childhood and adolescent femoral fractures.

***Key Words:*** Femoral shaft fracture, Compression plating, traditional bone setters, children and adolescents.

## Introduction

Femoral shaft fractures accounts for less than 2% of all paediatric fractures[1-5]. Its importance lies in the fact that the femur is a major weight bearing bone and after a fracture healing with mal-union and limb-length discrepancy (LLD) are so readily noticed, with unacceptable and dire consequences in adult life.

Since the treatment of paediatric fractures relies on rapid healing and spontaneous correction of angulated fractures, conservative methods of treatment have been generally satisfactory[2] except for a small number of cases. In recent years, there has been a significant shift to a more aggressive approach in paediatric fracture treatment[6-8].

Several methods of internal fixation have been used, including intra-medullary (IM) nailing, inter-locking intra-medullary nail, compression and bridge plating and external fixation[2,4,5], with varying results. This study aimed at determining the indications and outcome of compression plating amongst children and adolescents in North Central Nigeria.

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## Patients and Methods

This is a-10-year prospective study carried out in three hospitals namely: Jos University Teaching Hospital Jos (JUTH); Federal Medical Center Gombe (FMCG), Gombe state and Bimma Hospital (BH), Jos Plateau state.

All the children aged 16 years and below with displaced, mal-united or pathological fractures managed between January 1995 and December 2004 were studied. Those with well aligned simple fractures and managed conservatively were excluded. Data collected included personal demographic, aetiology, primary treatment, indications for surgery, method of

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treatment, duration of hospitalization and time to mobilization.

Follow-up was in the outpatient clinic till removal of implants. Full weight bearing was allowed after clinical and radiological study confirmed union. Union was defined as absence of pain at the fracture site on weight bearing, absence of bony tenderness and abnormal mobility at the fracture site. Radiological union was defined by presence of callus bridging the fracture and partial obliteration of the fracture line in two views.

Limb overgrowth was monitored clinically by measuring real lengths using the anterior superior iliac spine and the medial malleolus at presentation, immediate post-operation, removal of implants and five years.

Data were analysed using Epi-info 2005 version 3.3.2 statistical software. Variables were presented as means with standard deviations and percentages where applicable.

## Results

Over the ten year period, 775 patients aged 5-16 years had femoral fracture. Thirty -one (4.0%) of these children fulfilled the inclusion criteria for open reduction and internal fixation; 20 (64.5%) were males and 11(35.5%) were females. Their mean age was 12.1 (SD±3.3) years (Figure 1). There were 17 (54.8%) right sided and 14 (45.2%) left sided femoral fractures. Twenty-one (67.7%) sustained their frac-tures in a road traffic accident; 9 (29.0%) in fall from a height while one (3.2%) was a pathological fracture secondary to osteogenesis imperfecta (Table I).

In 15 (48.4%) patients, the fractures were oblique, transverse in 10 (32.2%) and spiral in six (19.4%) patients. Twenty (64.5%) cases were treated first by traditional bone setters while 11 (35.5%) presented primarily to orthodox hospitals for treatment.

The indications for ORIF were mal-united fractures in 20 (64.5%), choice of the surgeons/ parents in six (19.4%) patients, mal-alignment during conservative management in four (12.9%) and

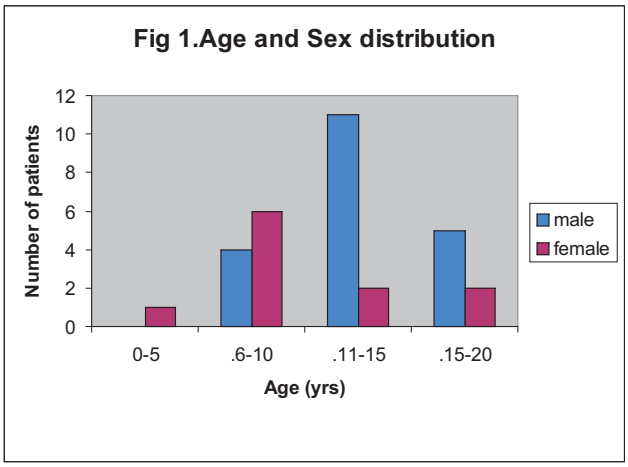



**Table 1: Indications for Open Reduction and Internal Fixation**

| Indication | Number of Patients |
|---|---|
| | n=31(%) |
| Mal-Union | 20 (64.5) |
| Primary Choice of Surgeon | 6 (19.40) |
| Failed Conservative Management | 4 (12.9) |
| Pathological Fracture | 1 (3.2) |
| Total | 31 (100) |

osteogenesis imperfecta in one (3.2%).

Complication rate was 6.4%, this included superficial surgical site infection in one (3.2%) patient and mechanical implant failure in one (3.2%).

Duration of hospitalization was 3.9 weeks (SD±1.7) with a range of 4-10 weeks. All the fractures united primarily after the primary surgery within 8-13 weeks [mean =10 (SD±1.7)] weeks.

The mean limb length discrepancy (LLD) at surgery ranged from 0-7cm [mean =3.4(SD±2.12)] cm. The mean gain in length immediate post operative period was 2.7 (SD± 1.6; range 0-5) cm. At removal of implants, there was no gain in LLD and at five years it ranged 0.5-1cm with a mean of 0.3 (SD±0.4) cm.

## Discussion

Majority of the femoral fractures in this study were

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managed non-operatively as in other studies[1-9], although in the series by Mostafa[7] childhood fractures were routinely treated by dynamic compression plating. Most surgeons would mobilize and discharge patients early so that they could return to school early and, therefore, reduce the psychosocial effects of hospitalization[3,5]. The indications for open reduction of fracture included poly-trauma; unacceptable position after conservative management; severe head injury; serial fractures of same limb and open fractures[7-9]. The results of open reduction and inter-nal fixation (ORIF) are excellent in most series[1-9] with 100% union rate[6,8,9] achieved within 6-14 weeks.

The main indication for operative treatment of fractures in this study was mal-union of femoral shaft fractures. This was due to the fact that the patients almost always present first to traditional bone setters (TBS) because they are considered cheaper with more prompt care with early return to full activity by the practitioners[10,11]. The activities of the TBS have been well documented[10-12]. In this study, more than a half of the patients presented first to TBS and all presented with mal-union. Compression plating was a useful method of internal fixation in children even though most authors[1-5] consider flexible intra-medullary as the gold standard. In this study, the outcome was excellent and compared favourably with other studies[3,5-7,9].

The preference of the surgeon for ORIF in children was informed by the better understanding of the growth dynamics, healing pattern and bone remodeling soon after fracture[2]. The advantages of ORIF have been well documented[3,5-7,9]. The resultant shorter hospital stay enables the patient to re-integrate with the family members early.

The 100% union rate after primary surgery in the present report compares with the reports by Caird[6], Eren[9] and van Niekerk[8] who also used compression plating, and Chitgobar[2] who used flexible intra-medullary Kirschner wires. Clinical and radiological union was achieved in our patients in a mean time of 10 weeks. This is within the range of 6-14 weeks that was reported in most other series[2-9].

The overall complication rate (6.4%) in this study compares well with the 2.5% rate reported by Eren[9]. The limb length discrepancies at one and five years, respectively in this study compares with other studies[9,13].

We like to conclude that compression plating is a viable option in the treatment of childhood fractures

## Fractures de l'os fémoral: gestion et résultat chez des enfants nigérians.

**Résumé**

***Arrière-plan:*** Traditionnellement, la majorité des fractures de l'os fémoral chez les enfants sont soignées par des méthodes conservatrices et avec de bons résultats. Récemment, il y a eu une tendance au traitement chirurgical. Cette étude se propose de déterminer les indications et les résultats du placage par compression dynamique chez les enfants et les adolescents. ***Malades et méthodes:*** C'est une étude prospective de 10 années sur la réduction de l'ouverture et de la greffe interne pratiquées à trois hôpitaux au nord central du Nigeria. Les données analysées comprennent des données démographiques personnelles, l'étiologie, l'hôpital de traitement primaire, les indications pour la chirurgie, les méthodes choisies, la durée de l'hospitalisation et l'intervalle précédant la mobilisation. Le suivi a continué jusqu'à l'enlèvement des implants. ***Résultats:*** Pendant cette période, trente et un malades ont été traités par le placage par compression dynamique. Il y avait 20 garçons (64,5%) et 11 filles (35,5%), avec un âge moyen de 12,1(±3.3) ans. Vingt et une (67,7%) des fractures avaient été causées par des accidents de voiture, 9 (29,0%) par des chutes et une (3,3%) était l'effet d'une fracture pathologique spontanée. Vingt malades (64,5%) avaient d'abord consulté des rebouteux traditionnels, alors que 11(35,5%) s'étaient présentés à des hôpitaux orthodoxes. Les indications justifiant l'intervention étaient dues principalement à des fractures mal reboutées chez 20 (64,5%) malades et à la préférence des chirurgiens et des parents dans six cas (19,4%). La durée moyenne de l'hospitalisation était de 4 semaines (SD±1.7). Le reboutement de la fracture a été accompli en 8 à 13 semaines (moyenne = 10 ±1.7). Le taux d'infection était de 3,2% et le mauvais reboutement s'est produit chez un malade (3,2%) affligé d'ostéogenèse imparfaite. ***Conclusion:*** Le placage par compression est une option convenable dans le traitement des fractures fémorales chez les enfants et les adolescents. ***Mots-clés:*** Fracture de l'os fémoral, placage, rebouteux traditionnels, enfants et adolescents.

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