

TREATMENT OUTCOMES OF OPEN FEMORAL FRACTURES AT A COUNTY HOSPITAL IN NAKURU, KENYA

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ABSTRACT

Background: Fracture femur is a common injury seen in patients presenting to the emergency unit. The management is mostly operative and in few selected cases, cast application or traction this is mainly in children and patients who cannot withstand anaesthesia for surgical operation to be done. Operative care is done for either open or closed fractures. Open femur fractures are uncommon injuries at the Nakuru County Hospital. The advent of motorbikes as a convenient mode of transport and proliferation of small arms in untrained (criminal) hands has aggravated the burden of open femur fractures either alone or as part of other injuries. Early fixation of such fractures is the practice at the hospital yet the outcomes of this approach have not been documented.

Objective: The study evaluates the treatment outcomes of patients admitted with open femur fractures and relates these to fracture patterns and the modified Gustillo- Anderson classification.

Method: This was a prospective review of patients admitted with open femur fractures in Nakuru County Hospital Kenya between January 2017 and July 2017. The fractures were managed by primary intramedullary nailing after debridement. Data extracted included mechanism of injury, the classification using Gustillo- Anderson classification -location of the fracture and treatment outcome four months after immediate open reamed interlocking nailing.

Results: One hundred and seventy six femur fractures were recorded. Thirty six patients with unilateral and two with bilateral open femur shaft fractures were enrolled. Majority (85.1%) were male; with a mean age of 31 years (range 25-60 years). Twenty four fractures were in the distal third of the femur constituting 57.89%, (n = 24): Gustillo- Anderson grade IIIA and above were 76.31% and majority of the open fractures were due to road traffic accidents 68.42%, (n=26) and gunshot 15.79%,(n=6) respectively. Overall, open femur fractures in 30 (78.95%) patients healed without complications at 4 months.

Conclusion: Open femoral fractures are common following road collisions. Most are severe but managed by primary intramedullary fixation at debridement healed with excellent results.

Key words: Open femoral fracture, Gustillo-Anderson, Intramedullary nail fixation

INTRODUCTION

Nakuru is an agricultural town and has huge vehicular transport through the town. But the infrastructure is not quite adequate to handle this huge population of people and automobiles. Thus there are a lot of road accident injuries which are managed in the county referral hospital. The bulk of these patients who get admitted have long bone fractures; the patient with femur fractures occupying most of the beds.

Traditionally, open fractures have been managed largely by long hospitalization on traction or external fixation This leads to many complications of long hospital stay; loss of work hours and huge financial burden to the patient's family. Operative management shortens hospital

stay and allows the patient to recover at home. Moreover it allows early rehabilitation to avoid joint stiffness and muscular atrophy.

MATERIALS AND METHODS

This was a prospective review of patients with open femoral fractures admitted at the Nakuru County Hospital Kenya between January 2017 and July 2017. Nakuru County Hospital is the county referral hospital which handles trauma patients.

All patients with open femoral fractures were assessed for the extent of injury; mode of injury and other associated emergency injuries by the principal investigator who is a practicing orthopaedic surgeon and in charge of the unit. After ruling out life threatening injuries by thorough

physical examination and relevant investigations, stable patients were enrolled in the study after fulfilling the inclusion criteria.

The inclusion criteria were:

- (i) Open femur fractures from any cause
- (ii) Open femur fractures with no co existing infection of the limb

The exclusion criteria were:

- (i) Open femur fractures with coexisting infection of the limb
- (ii) Open femur fracture presenting more than 8 hours after injury

The patients enrolled received 1 gram of intravenous third generation cephalosporin (ceftriaxone), the limb was splinted and the patient was admitted to the ward. Within 6-8 hours, they were taken to theatre for debridement and primary fixation of the fracture. The operation was done once theatre was available but within 6-8 hours; if a patient took more than 8 hours before surgery he was excluded from the study.

All fracture assessments and surgical procedures were performed by the author with assistance from a resident. The fracture was graded according to the modified Gustillo-Anderson classification (1984). After the debridement, fracture fixation was achieved by use of open reamed antegrade or retrograde nailing. No antibiotic-coated intramedullary nail was used. The wounds were primary closed or left open depending on the status of the soft tissue at time of surgery.

A further three doses of antibiotic (ceftriaxone 1 gram daily) was given for 72 hours and wounds left open were closed secondarily before discharging the patient. The patients were discharged once they were stable and the wound cleaned for follow up in the outpatient clinic monthly, or as need arose for 6 months.

Fracture union was assessed clinically by feeling for callus as a hard mass around the fracture site on palpation and eliciting no pain at the fracture site and radiologically by visible callus on both anteroposterior and lateral radiograph views. The data were analyzed using statistical program (SPSS) on prospective case series and presented using frequencies and tables.

RESULTS

During the period under study, 176 femoral fractures were recorded. Among these, 38 open femoral shaft fractures in 36 patients were noted. This constituted 21.59% of the fractures. There were 32 (85.9%) males and 4 (15.78%) females. Two patients (5.26%) had bilateral fractures.

The demographic range of patients seen was between 11 and 60 years. The mean age was 31 years. The characteristics of the patients are listed on Table 1.

Table 1

Age distribution of open femoral fracture

Age distribution (years)	No.	(%)
0-10	0	0.00
11-20	2	7.89
21-30	24	63.16
31-40	7	21.06
41-50	2	5.26
50-60	1	2.63
Total	36	100

Most of the patients were between 21 and 30 years which constitute 68.16% of the population under study. Most open fractures were caused by road traffic accidents 25 (68.42%), followed by gunshot wounds in 6 (15.79%) as shown in Table 2.

Table 2

Cause of open fracture

Causes of open fractures	No.	(%)
Road traffic accidents	26	68.42
Gunshot	6	15.79
Fall	4	10.53
Sport	1	2.63
Pathological	1	2.63
Total	38	100

The Gustillo- Anderson grades of the open fractures are shown in Table 3. Majority, 29 (76.31 %) were Gustillo-Anderson grade IIIA and above. Majority of the fractures were fixed by intramedullary nailing at debridement (92.11%, n= 35). One limb, (2.63 %) was amputated because of unsalvageable vascular injury.

Table 3

Classification of open fracture based on Gustillo – Anderson classification

Classification grade	No.	(%)
I	3	7.89
II	6	15.79
III A	25	65.79
III B	3	7.89
III C	1	2.63
Total	38	100

The distribution of the fractures of the femur is illustrated in Table 4. Most fractures, 22 (57.89%) were in the distal third of the femur. One fracture

in an elderly patient was in the intertrochanteric region; this was a pathological fracture which was managed by reconstruction nailing.

Table 4
Location of fracture of femur

Location of open fracture	No.	(%)	Type of implant
Intertrochanteric	1	2.63	PFN
Upper 1/3 of shaft	2	5.26	Antegrade nail
Middle 1/3 of shaft	11	28.95	Antegrade nail
Lower 1/3 of shaft	24	63.16	Retrograde nail
Total	38	100	

Four patients (10.53%) developed superficial surgical site infection while another five (13.45%) developed joint stiffness. Overall healing rate without complications was 30 (71.13%) at 4 months. This is shown in Table 5.

Table 5
Table of outcome

Complications	No. of patients	(%)
Superficial infection	4	10.25
Stiffness	5	13.15
Deep infection	1	2.97
No complication	27	71.13
Amputation	1	2.97
Total	38	100

DISCUSSION

Open femur fractures are more common than was previously thought (1). This is due to increase in use of motorcycles as a mode of transport hence many accidents, and proliferation of firearms in the hands of criminals, and terrorist attacks.

In this study, open femoral fracture constituted about 21.5% of all femoral fractures seen in the hospital. Majority of the patients were in the age group between 21-30 years which is the productive age. In the UK over a 10 year period, 1.2% of admitted femoral fractures were open fractures (2). Extrapolated over the same duration; the current study period was 6 months, the high incidence obtained necessitates deep understanding of open femur fractures and develop local protocols for their management.

Road Traffic Accidents (RTAs) constituted 68.42% of the causes of open femur fractures, followed by gunshot injuries constituting 15.79%. This is because of proliferation of firearms in criminal hands and the menace of terrorism. The least contributor is sport injuries in the young age group constituting 2.43%.

In the current study, 24 (63.16%) of the open femoral fractures were in the distal third of the femur. In the study by Robinson *et al* (2) only 7% of the open fractures were in the distal third of the femur thus it is a more common site than previously documented. These fractures in the distal femur have higher propensity to complicate due to tethering of the neurovascular bundle as it enters the popliteal fossa and their proximity to the joint. They thus pose a challenge in the best method of fracture stabilization.

One patient with an open fracture had to undergo amputation since the popliteal vessel was severed and an attempt to repair and reperfuse the limb was futile. External fixation (3-6) when used for distal third open femur fractures requires that the knee is spanned, making it likely to have stiffness and it also entails unnecessary surgery on the unaffected tibia.

Lowe *et al* (4) did nailing on 67 patients with open femoral fractures immediately after debridement. All healed within 4 months with an infection rate of less than 10% and malunion rate of less than 2%. Bone *et al* (5) randomized open femoral fractures into early and delayed nailing groups. All open femoral fractures healed within 5.2 months with no infection regardless of whether they were immediately nailed or nailed late. In the current study, all patients who had nailing immediately after debridement had an infection rate of 10.53%. This infection rate in open fracture is low and therefore nailing did not increase the risk of infection (6-8).

The grading system of Gustillo and Anderson (9) was used and most fractures were in grade IIIA. High energy trauma due to RTA and gunshots caused comminution and or segmentation leading to higher grades in the classification. Most of the fractures in this study (65.79%) were grade IIIA, grade III B (7.89%) and grade IIIC (2.63%). In the Edinburgh series 2(16%) were grade I (14%) were grade II, 34% were grade IIIA, grade IIIB were 24% and grade IIIC were 12%. This is not in keeping with Edinburgh study which shows fewer patients with high grades of Gustillo Anderson, hence the problem is more severe in our setup.

In distal femoral fractures, maintaining reduction by other methods other than internal fixation is quite challenging due to the action of the muscles. Patients who had internal fixation had best outcome. Decker (10) had similar conclusion, that the displacement rate without internal fixation was 70% requiring revision and risk of repeat or delayed surgeries.

Debridement and stabilization was done in this study within 8 hours but infection rate was 10.53% and this was mainly superficial infection. Only one patient had deep-seated infection, therefore meticulous debridement, gentle and careful tissue handling even with some delay (in the current study, all patients who were included had surgery within 8 hours) does not compromise outcome in open femoral fracture following internally fixation by nailing. Antonio *et al* (11) showed delaying nailing did increase infection rate. It remained at less than 11.2% (8).

Gunshot wounds (GSW) pose a special group. In the studies by Tornetta *et al* (12) and Olasinde *et al* (13) most were due to civilian conflicts and robberies, unlike in the current study where most were due to police shootings to subdue thugs. In the study, 15.79% of the open femur fractures were due to GSW in just six months. All were debrided and nailed at primary surgery with excellent results. None developed infection or non-union. Tornetta *et al* (12) reported 38 open femur fractures due to gunshots in 5 years, all were nailed after debridement and none had infection.

Levy *et al* (14) and Oboirien *et al* (15) reported similar results in 56 patients, in which only 2 had delayed healing. Incidence of these fractures is higher than in the studies by the above authors. The management was by debridement and intramedullary nailing with excellent results and should thus be practiced in managing these patients.

The patients healed well and therefore rehabilitation was quite easy, due to the generous muscle cover. None of these patients required secondary procedure to cover the wound. Overall the outcome of early primary internal fixation was good.

CONCLUSION

Open femoral fractures can be stabilized by intramedullary nailing during initial debridement without increased infection and non-union rates.

RECOMMENDATION

There is need for longer multicenter study on open femur fracture.

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