

COMPARING OUTCOMES OF INTRAMEDULLARY NAILING AND PLATE FIXATION IN ADULT FEMORAL SHAFT FRACTURES IN 2 REFERRAL HOSPITALS IN DOUALA: A 10-YEAR RETROSPECTIVE STUDY

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Introduction

The incidence of femoral shaft fractures ranges between 10 and 21 per 100,000 person year worldwide (Weiss et al, 2009). The femur is the 2nd most commonly fractured bone following road traffic accidents. The most common causes include automobile accidents, and falls from heights or ground-level falls. Treatment options: intramedullary nailing (IMN), fixation with plates and screws, and external fixation (Ghoury et al, 2021). IMN: Pros - limited interference with the soft tissue around the fracture. Cons - difficult placement technique; high rates of postoperative pain (Hu et al, 2019). Plate fixation (PL): Pros - ensures accurate reduction and rigid/stable fixation. Cons - requires extensive dissection of the host bone and soft tissue. Increased risk of infection, nonunion, hardware irritation and failures (Xue et al, 2014). In high resource settings, intramedullary nailing (IMN) is the treatment of choice of closed adult femoral shaft fractures. But in many low- and middle-income countries, plate fixation (PF) is still being used with some measure of success, though with its attendant risks. About half of trauma survivors suffer loss of productivity and/or permanent disability which carries a substantial economic burden (Tissingh et al, 2022). Femoral shaft fractures need appropriate and cost effective fixation in our setting. A paucity of studies published establish the outcomes of the use of IMN and plate fixation in low-resources settings.

Materials and Methods

A 10-year retrospective hospital-based analysis of patients' files managed for closed femoral shaft fractures from March 2012 to March 2022 carried out at the Douala General Hospital and Laquintinie Hospital Douala. Data were analyzed using SPSS version 26. Statistical significance was set at a p-value <0.05, with a confidence interval at 95%.

Results

We included 151 medical files of patients. The mean age of our patients was 36.5±12.7 years, Males constituted 62.9%. There were 77 cases (51%) of plate fixation, and 74 cases (49%) of IMN. Outcome of PF vs IMN was postoperative osteomyelitis 8.6% vs 3.3%; malunion 5.9% vs 2.9%, nonunion 8.6% vs 6.6%, delayed union 6.6% vs 3.3%, re-operation 9.9% vs 5.3%, post fixation pain 3.3% vs 13.3%. Patients aged between 59 to 78 years were nine times more likely to have post-operative osteomyelitis (COR: 9.886, 95% C.I: 2.304, 42.431, p < 0.002). Patients managed with IMN were five times more likely to experience post fixation pain as compared to patients managed with plates and screws (AOR: 5.621, 95% C.I: 1.941, 16.275, p < 0.001). Female patients were twice as likely to experience post fixation pain as compared to male patients (AOR: 2.810, 95% C.I: 1.120, 7.046, p < 0.028).

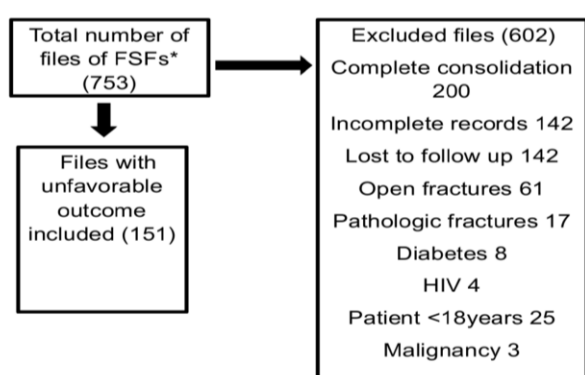


Figure 1: Study Flowchart *FSF: Femoral Shaft Fracture

Table 1: General characteristics of study population

Parameter	Frequency	Percentage (%)
Mean age ±SD	36.55±12.7	
Gender	Female	37.1
	Male	62.9
Age range (years)	18-38	64.9
	39-58	29.1
	59-78	6.0

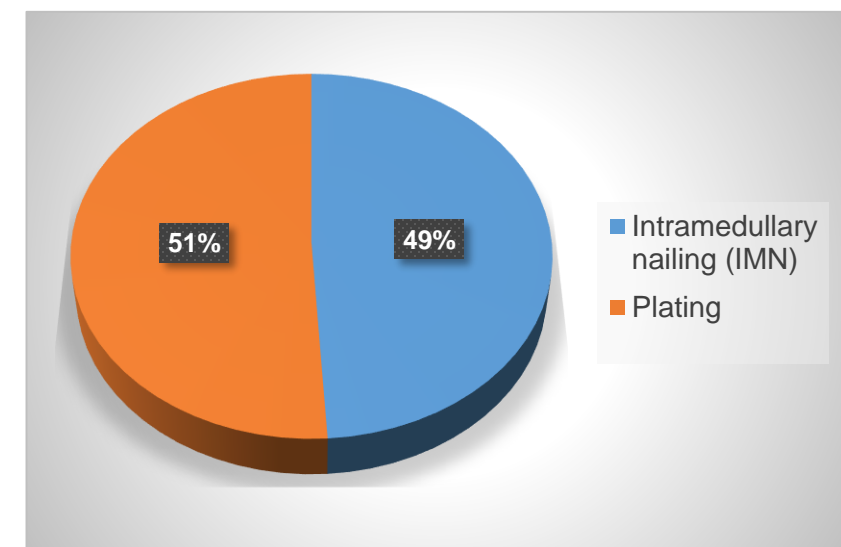


Figure 2: Prevalence of patients managed either by IMN or plate fixation

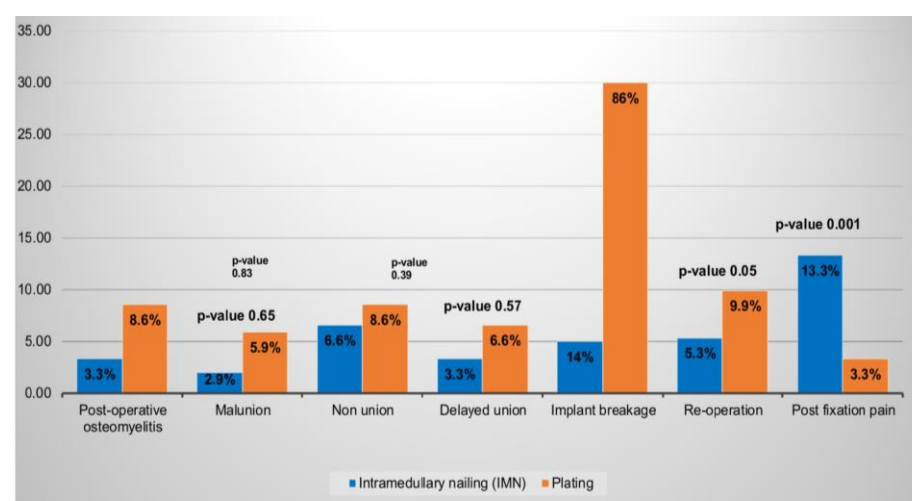


Figure 3: Outcomes following management of closed adult femoral shaft fractures with intramedullary nailing or plate

Table 2: Association between post-operative osteomyelitis and management modality using Chi-square test

Parameter	Method of fixation		p-value
	Intramedullary nailing (IMN)	Plating	
Post-operative osteomyelitis	No	69	0.05
	Yes	5	

Table 3: Association between post-operative osteomyelitis and age using bivariate analysis.

Age range	p-value	COR*	Confidence Interval	
			Lower	Upper
59-78	0.002	9.886	2.304	42.431
39-58	0.217	0.377	0.080	1.776
18-38		1		

*COR: Core Adjusted Ratio

Table 4: Association between implant breakage and management modality using Chi-square test

Parameter	Method of fixation		p-value
	Intramedullary nailing (IMN)	Plating	
Implant breakage	No	69	0.001
	Yes	5	

Table 5: Association between post fixation pain, gender and intramedullary nailing for closed adult femoral shaft fractures using multivariate analysis

Parameter	p-value	AOR*	Confidence interval	
			Lower	Upper
Intramedullary nailing (IMN)	0.001	5.621	1.941	16.275
Plating		1		

*AOR: Adjusted Odds Ratio

Table 6: Distribution of post fixation pain and intramedullary nail locking for closed adult femoral shaft fractures.

Parameter	Locking	Both	Post fixation pain	
			No	Yes
Intramedullary nailing (IMN)	None	Proximal locking	5	4
			47	16
			2	0

Discussion

The male preponderance and average age of 44 years in our study like in most studies is due to the high activity level in males and in this active age group. In our study, there were more cases of malunion in patients managed with plate fixation (5.9%) compared to 2.9% of cases in patients managed with IMN. Though this difference was not significant. This is in contrast with a study by Gausden et al., (USA, 2021) reported that IMN (43.5%) had significantly higher rates of malunion compared to plating (13.5%), (p=0.002). This difference could be attributed to difference in surgical techniques and post-operative care. In our study, 8.6% of cases of non-union were reported in patients managed with plate fixation and 6.6% in patients managed with IMN. Also, 6.6% of cases of delayed union were reported in patients managed with plate fixation and 3.3% in patients managed with IMN. This is in line with our study by Kesemenli et al., (Türkiye, 2012) which reported that patients managed by plate fixation had more cases of nonunion and delayed union. A study by Eliezer et al., (Tanzania, 2017) reported that IMN was associated with lower risks of re-operation. This is comparable to our study where 5.3% of

Conclusion

Plate fixation was the commonest method of management of closed adult femoral shaft fractures, followed closely by intramedullary nailing. Plate fixation showed higher rates of post-operative osteomyelitis, malunion, nonunion, delayed union, implant breakage and reoperation. IM nailing was associated with post fixation pain. IM nailing and plating are both suitable methods of fixation in our setting. IM nailing is a better fixation method than plating in our setting.