

Outcome Of Internal Fixation Of Fractures In A Tertiary Hospital In A Developing Country: The Need For Paradigm Shift

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Citation

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Abstract

BACKGROUND: Internal fixation is a common method of fracture treatment with proven benefits. Complications do however occasionally occur. This study was aimed at reviewing internal fixation in our hospital and attendant complications with a view to identifying measures necessary to improve outcome.

METHODS: This is a retrospective study of internal fixation over a four year period at the University of Calabar Teaching Hospital. Patient records were retrieved and appropriate information extracted including attendant post operative complications.

RESULTS: One hundred and fifty patients had internal fixation during the study period but case notes of only 115 patients could be retrieved. Most patients were males with male to female ratio of 2.3:1. The mean age of patients was 33.78 ± 16.1 years and the mean duration of surgery was 2 ± 0.76 hours. Plate and screws constituted the most commonly used implants. Interval between surgery and fracture union was increased by long operation time (> 2 hrs) and occurrence of post operative complications.

CONCLUSION: Improvement in operating facilities and choice of implants would reduce operation time and post operative complications thereby impacting positively on fracture union time. Achieving this will require a paradigm shift in the allocation of health resources.

INTRODUCTION

Internal fixation is a common method of treatment of skeletal injuries. 1 The choice of internal fixation as a method of fracture treatment is determined by a number of factors including type of injury, facilities available and expertise of the attending surgeon. 2 Internal fixation like any other modality of fracture treatment can be attended by complications such as implant failure, infection, non-union among others. These are often related to certain factors such as the operation time, operating room conditions and availability of appropriate skills and facilities. 2

This study is aimed at reviewing the internal fixations done in the University of Calabar Teaching Hospital, Calabar with a view to determining the methods of internal fixation used, time taken for fractures to heal, factors influencing this, complications as well as duration of hospital stay post operatively. It is believed that the information so obtained will positively influence the institution of appropriate measures to improve quality of practice with ultimate benefit

to the patients.

PATIENTS AND METHODS

This was a retrospective study carried out at the University of Calabar Teaching Hospital, Calabar. The operation register was used to identify patients who had undergone internal fixation in the main theatre of the hospital over a four-year period were collected and their case notes were subsequently retrieved from the medical records unit of the hospital. Data pertinent to study interests were extracted using a questionnaire.

Data obtained from the case notes included patient's demographics, type of injuries, pre-operative prophylactic antibiotics and implants used, rank of surgeon, duration of surgery, type of anaesthesia, post operative complications and treatment, duration of hospital admission post operatively.

The data obtained analysis was done using SPSS version 17.0.1 and EPI INFO 7.0.8.3. Statistical methods such as

correlation and regression analyses, and non-parametric test for comparison of means were used to explore relationships between variables. A 0.05 significance level was used. Results are expressed as means, frequencies and tables.

RESULTS

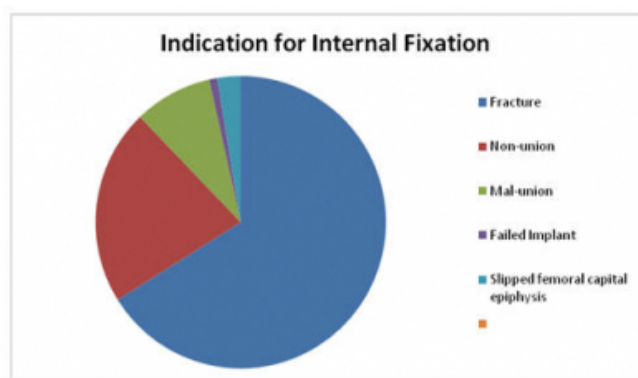
One hundred and fifty patients were recorded in the operation register as having had internal fixation over the period of the study. However, case notes of only one hundred and fifteen patients could be traced and retrieved for analysis representing a retrieval rate of 76.7%.

There were 80 males and 35 females, with a male to female ration of 2.3:1. Most of the patients (97.9%) had some form of formal education to varying levels. The mean age of patients was 33.78 ± 16.1 years; mean duration of surgery was 2 ± 0.76 hours; mean pre-operative Packed Cell Volume (PCV) was $36.79 \pm 5.2\%$; mean post-operative PCV was $30 \pm 5.7\%$; mean number of units of blood transfused was 1.57 ± 0.8 . There was a positive correlation between the packed cell volume and the decision to transfuse ($R=0.239$, $p=0.022$).

In one hundred and one cases (87.8%), surgery was done by a Consultant while 14 cases (12.2%) were done by resident doctors. The main indication for internal fixation was fracture (66.1%). See Figure 1.

Figure 1

Indication For Internal Fixation



*** 9.2% of the fractures were open

The femur was the most operated bone constituting 53.4% of cases followed by the tibia (23.0%). Plate and Screws (59.1%) and Interlocking intramedullary Nail (31.3%) were the most commonly used implants. Sub-Arachnoid block was the most common anaesthetic technique used (62.6%). See table 1.

Table 1

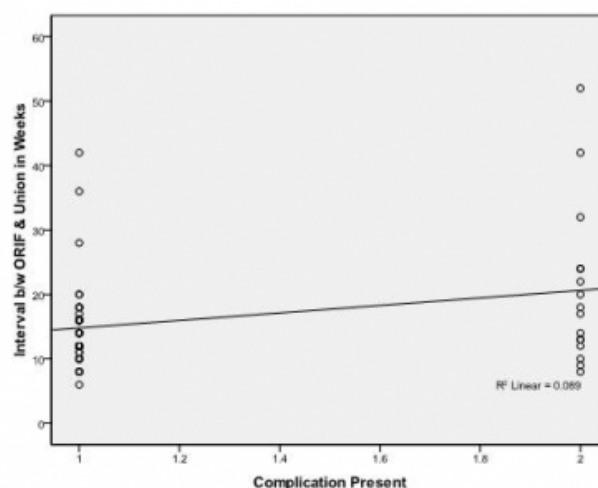
Anaesthesia Used

ANAESTHESIA	FREQUENCY (%)
Sub-Arachnoid Block (SAB)	72 (62.6)
General Anaesthesia (GA)	19 (16.5)
SAB & Epidural	7 (6.1)
Epidural	6 (5.2)
SAB & Total Intravenous Anaesthesia (TIVA)	5 (4.3)
Brachial Plexus Block	3 (2.6)
GA & Brachial Plexus Block	1 (0.9)
SAB & GA	1 (0.9)
Supraclavicular Block	1 (0.9)
Total	115(100)

The duration of surgery was found to be a statistically significant predictor of the interval between surgery and union of fracture, accounting for 15% of the interval ($R^2=0.155$, $p=0.001$) See Figure 2;

Figure 2

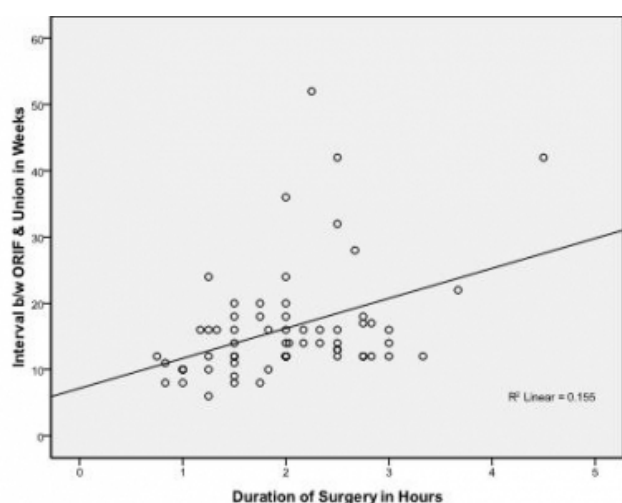
Relationship between the presence of post operative complications and interval between surgery and fracture union



Similarly, an occurrence of post-surgical complication was a predictor for longer intervals for fracture union ($R^2=0.089$, $p=0.015$) See Figure 3.

Figure 3

Relationship between the duration of surgery and interval between surgery and union



The mean interval between surgery and union was 10.67 ± 2.87 weeks (median value = 11 weeks) for upper limb fractures and 17.17 ± 8.12 weeks (median value = 14 weeks) for lower limb fractures. Mean duration of post operative admission was 19.19 ± 14.88 days.

Thirty eight patients had one or more complications. These were wound infection – 13, osteomyelitis – 13, implant loosening – 3, implant breakage – 6, knee stiffness – 5, non-union – 4, shoulder stiffness – 2, wound dehiscence – 1, limb shortening – 1, wrist drop – 1, exposed implant – 1, pin track infection – 1, common peroneal nerve injury – 1, faulty screw placement – 1.

Fifteen of the patients (13.0%) had post-operative infection. This constituted the most common complication. Organisms isolated were *Staphylococcus aureus* 11(73.3%), *Pseudomonas aeruginosa* 2(13.3%), *Coliforms* 1(6.7%), *Enterobacteria* 1(6.7%). Mixed infections were found in 7 patients (46.7%); six (85.7%) of which were mixed *Staph. aureus* and *Pseudomonas* infections.

Pearson's correlation coefficient showed no statistically significant relationship between the duration of surgery and occurrence of post-operative complications ($R = -0.164$, $p = 0.082$). There was negative correlation between the duration of surgery and the occurrence of post-surgical infections, this was however not statistically significant ($R = -0.055$, $p = 0.558$). There was no correlation between the rank of the attending surgeon and occurrence of complications ($R = 0.035$, $p = 0.707$).

The complications were treated by administration of antibiotics in 19 cases (16.5%), wound dressing 14(12.2%),

debridement 1(0.9%), removal of implant 10(8.7%), physiotherapy 6(28.6%), adjustment of screws 1(4.8%), flap cover 1(4.8%), ORIF with plate and screws and bone grafting 1 (4.8%).

DISCUSSION

Internal fixation is the preferred method of fracture treatment in many cases. Operative fracture treatment results in early mobilisation, short hospital stay, early return to productive economic activities and less social dislocations. 1,2,3 The cases of non-union and mal-union treated were mostly in patients who had previously received treatment from the traditional bone setters (TBS) which is a rather common practice in our society. 4,5,6 This study shows that fractures of the long bones of the lower limb are more frequently treated by internally fixation compared to the upper limb fractures - based on absolute numbers (6.4:1). The finding agrees with that of another study. 7 This may be due to the need to mobilise the patient early and prevent further complications. The more frequent fixation of femoral fractures (53.4%) compared to the tibia (23.0%) in this study is consistent with results of another local study 7 and may be due to the more common occurrence of severe open fractures in the tibia which makes them unsuitable for internal fixation. Furthermore, non operative method such as casting is widely used in treatment of tibial fractures. This practice is encouraged by the aversion of patients to operative treatment in our society. 4

Even though the trend is changing in recent years, plate and screws was the most common implant used for internal fixation in this study as in many local studies. 7,8 This may be due to easy availability of the implant and instrumentation as well as lower cost. All the interlocking intramedullary nails (IM Nails) inserted in these patients were done open due to the non-availability of intra-operative imaging facilities. This has greatly limited the use of the IM nails even in the treatment of femoral and tibial shaft fractures where it is the preferred method.

Post operative infection was 13%. Even though very high compared to results from developed societies, 9,10 the figure is consistent with finding of another local study in which a rate of 12% was recorded following internal fixation. 8 This may be partially attributed to extensive soft tissue dissection and periosteal stripping involved in insertion of plate and screws 1,2 – the most common method of internal fixation in our centre.

This study shows that the union time of the fractures was directly proportional to the operation time and occurrence of

post operative complications. In other words, it would take much longer time for a fracture treated by internal fixation to heal if the operation time is long (>2hrs) and there being associated post operative complication. A long operation time may actually reflect difficulty at surgery as a result of the complex nature of the fracture being treated. Even though it would be desirable to drastically reduce operation time without compromising accuracy and safety, it is also expedient that measures to prevent post operative complications are instituted.

CONCLUSION

Complications following internal fixation especially infection, as shown by this study, is still unacceptably high and limits the benefits derivable from internal fixation. This may be attributed to many factors including inadequate operating environment and facilities as well as the lack of choice of appropriate implants. It is therefore imperative that measures be taken by relevant authorities to improve on the facilities in our hospitals and ensure access to appropriate implants for more effective and result-oriented treatment of fractures in our society. This calls for a paradigm shift in allocation of health resources!

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