

Assessment of Patients Associated with Implant Failure in Orthopaedic Surgery: A Retrospective Study

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ABSTRACT

Background: Trauma may differ from low velocity to high to very high velocity varying the radiological and clinical profile in each case. Implant failure elevates patient's morbidity, prolongs the healing process and increases the management cost. The aim of the present study was to patients associated with implant failure in orthopaedic surgery.

Materials and Methods: The subjects presenting to OPD of Department of Orthopedics, Government S K Hospital, Sikar, Rajasthan (India) with the complain of fractures of long bones managed in past, in cases where the primary implant underwent failure to achieve the concerned outcome and repeated surgery was needed were enrolled in the study. The subjects were categorized into three groups- plate, unlocked nail and locked intermedullary nails. The data thus obtained was arranged in a tabulated form and analyzed using SPSS software.

Results: Out of these there were 30 cases amongst males and 20 cases amongst females. The mean age of the subjects was 37.22+/-5.3 years. There were 21 cases (42%) of failed plates,

17 cases (34%) of unlocked nails and 12 cases (24%) of locked nails.

Conclusion: In this study there were 50 cases of implant failure. The maximum failure incidence was that seen with the plates due to their superficial location.

Keywords: Orthopaedic, Implant, Failure.

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INTRODUCTION

Long bones fractures are commonly encountered in Orthopaedic surgery. They occur as a result of significant trauma and are frequently related with significant soft tissue damage. Trauma may differ from low velocity to high to very high velocity varying the radiological and clinical profile in each case. Frequency of trauma associated surgeries has elevated in order to achieve early rehabilitation and good excellence of life. The implants are used to establish stability to fractured segment of bone and maintaining reduction and thus aiding in reducing fracture condition. Orthopaedic surgeons are using a variety of implants since past. Some implants do not show good patient compatibility that lead to non-union and infection amongst few cases. They are manufactured with different kinds of materials like cobalt-chromium, stainless steels, titanium and other alloys that allow biocompatibility, resistance to corrosion, mechanical strength and are cost effective.^{1,2} Implant failure elevates patient's morbidity, prolongs the healing process and increases the management cost. An implant failure mostly leads to re-fracture that complicates the Process of healing and leads to a more complicated second Surgery. In majority of these patients

mechanics of fracture, implant design and surgical treatment are to be blamed. The aim of the present study was to patients associated with implant failure in orthopaedic surgery.

MATERIALS AND METHODS

The subjects presenting to OPD of Department of Orthopedics, Government S K Hospital, Sikar, Rajasthan (India) with the complain of fractures of long bones managed in past, in cases where the primary implant underwent failure to achieve the concerned outcome and repeated surgery was needed were enrolled in the study. The study was approved by the institutional ethical board and all the subjects were informed about the study and a written consent was obtained from them in their vernacular language. The failure to achieve the desired union could be attributed to implant based factors; like breakage, bending, reaction of metal, patient induced factors like rapid ambulation, excessive than weight, poor hygienic practices, non-compliant to the instructions or the surgeon oriented risk factors or an amalgamation of the above factors. The subjects with failure of implant were enrolled and retrospective analysis for evaluating

the implant failure. After selection of the subjects, a complete history including the mode of trauma, related injuries and illnesses, post-operative incidents like range of motion, initiation of ambulation and weight bearing before the bone healing. The

subjects were categorized into three groups- plate, unlocked nail and locked intermedullary nails.

The data thus obtained was arranged in a tabulated form and analyzed using SPSS software.

Table 1: Frequency of failed implants

Group	Frequency (n=50)	Percentage
Plates	21	42
Unlocked nails	17	34
Locked nails	12	24

Table 2: Reasons for implant failure

Implant group	Plates	Unlocked nails	Locked nails	Total
Infection	2	2	3	14% (n=7)
Bending	3	10	-	26%(n=13)
Loosening	4	3	2	18%(n=9)
Fatigue fracture	10	3	8	42%(n=21)

RESULTS

In the present study, there were 50 cases of implant failure. Out of these there were 30 cases amongst males and 20 cases amongst females. The mean age of the subjects was 37.22+/-5.3 years.

Table 1 illustrates the frequency of failed implant. There were 21 cases (42%) of failed plates, 17 cases (34%) of unlocked nails and 12 cases (24%) of locked nails. There were least failure rate was that of locked nails.

Table 2 shows the reasons of failure amongst the subjects. There were 14% cases of infection, 26% cases of bending, 18% cases of loosening and 42% cases of fatigue fracture. Bending was observed in 10 cases of unlocked nails. Fatigue fracture was observed in 10 cases of plates. 8 cases of locked nails also demonstrated fatigue fracture. Infection was observed in 2 cases of plates, 2 cases of unlocked nails and 3 cases of locked nails.

DISCUSSION

With every management and implant placement in Orthopaedic surgery there begins a race amongst the implant failure and healing course of fracture.³ Implant failure can be seen in the form of deformation, corrosion or fatigue fracture. Mechanical implant failure can be due to repetitive stress loading. In nonappearance of union even the hardest metallic device and finest designs of implants are expected to fail.⁴ Technical considerations of failure of implant have been explored in different studies.^{2,5-8} As per the laboratory investigations from two different studies in Azevedo, Brazil and Amel Farad H, Iran, productions did not track the standards in the cases of implant failures. There is possibility of variation in implants in terms of purity and alloy composition from manufacturer to manufacturer.⁸ In a similar study by Barbosa amongst three cases of implant failure, it was the surgical technique and design of implant, selection of implant that were regarded as an important reason of implant failure.⁶ In survey by Sharma et al 2.4% failures of implant failure were related to deep infection.⁵ In the present study, there were 21 cases (42%) of failed plates, 17 cases (34%) of unlocked nails and 12 cases (24%) of locked nails. There were least failure rate was that of locked nails. There were 14% cases of infection, 26% cases of

bending, 18% cases of loosening and 42% cases of fatigue fracture. Bending was observed in 10 cases of unlocked nails. Fatigue fracture was observed in 10 cases of plates. 8 cases of locked nails also demonstrated fatigue fracture. Infection was observed in 2 cases of plates, 2 cases of unlocked nails and 3 cases of locked nails. Increased body weight of the subjects and early load bearing on fractured lower limb leads to more stress on the implant during the time of healing of fracture. Alfred O. Ogbemudia et al in their research found that a patient non-compliant with excessive body weight is a major reason for implant failure and suggests cautious ambulation and gradual weight bearing.⁹ Fatigue failure of plates is commonly seen than nails due to intramedullary location of nails at shaft that prevents few bending forces that responsible for the fatigue failure.¹⁰ Plate ends serves as a stress riser that lead to fresh new fractures at the bone ends. Plate fixation needs perfect reduction with anatomical reconstruction and this may interfere with the periosteal blood supply.^{11,12}

CONCLUSION

Orthopedic fractures are very common these days due to increased number of road traffic accidents. There is also an increased rate of implant failures along with these. In this study there were 50 cases of implant failure. The maximum failure incidence was that seen with the plates due to their superficial location.

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