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Antibiotic rod as a single stage treatment option in infected tibia I/L nail

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Abstract

Objective: To assess the use of antibiotic rod as the definite treatment option in case of infected tibia fracture.

Method's: This study was conducted in the Orthopedics Department of Liaquat National Hospital, Karachi, Pakistan during June 2016 and July 2018.

Patients who presented to us with infected intramedullary nail of tibia were included in study. All patients were enrolled only after obtaining written and informed consent.

Result's: Mean follow up 6 +/- 0.3 months while final follow up were taken 12 months, it was noticed that infection was controlled in all the patients while 11 out of 14 patients achieved union while the remaining 3 patients required a second stage surgery due to non-union. Hence in this study 11 (90%) patients, were treated only with single stage antibiotic rod procedure and obtained satisfactory results in terms of infection control and union.

Discussion: Cement Antibiotic Rod can be used as an effective and definitive single stage treatment option in case of infected tibia nail

Keywords: Antibiotic rod, infected tibia

Introduction

A fracture is a break in the continuity of a bone [1]. Tibia is a long bone of the lower limb present between the knee and ankle. Tibia fracture is one of the most common long bone fractures of the human body, with mid shaft being the most commonly fractured part of the bone [2]. The treatment of choice for tibial fractures is intramedullary nailing as it is found to be the most effective surgical management [3]. The goal of the treatment is to achieve bony union with minimal chances of infection and least complications [5].

Although the fracture care has improved throughout the years, there is still a risk of infection after the intramedullary nailing of tibial fracture and it's even more in cases of open fractures [4]. Infection is stated to be one of the most important causes for non-union of bone and infected non-union causes problem both to the patient and the surgeon as it is both cost and time effective [7]. The risk of infections has decreased by the prophylactic use of antibiotics at the time of surgery [6]. The conventional method of treating infection after nailing involves two main steps. The first one is to remove the infection and the second one is to provide stability to the fracture again by external or internal fixation and bone grafting [7, 8]. However this method involves two procedures which are much cost and time effective [8].

The use of antibiotic coated intramedullary nails involves a single procedure, with a low risk of infection and is also much time effective [8, 10]. Also, it leads to a more local delivery of antibiotics i.e. at the site of fracture than systemic antibiotics and has less side effects [9]. Thus, this method requires a single procedure for both infection control and bone stability [8]. The rationale of our study is to provide a method which is both cost and time effective, is both beneficial for the patient and the surgeon, provides stability along with decreasing the risk of infection and can be used as a definite treatment for tibia fracture.

Materials and Method

This study was conducted in the Orthopedics Department of Liaquat National Hospital, Karachi, Pakistan during June 2016 and July 2018.

Patients who presented to us with infected intramedullary nail of tibia were included in study All patients were enrolled only after obtaining written and informed consent.

All patients were taken to operation theater after preoperative baseline and infective workup and underwent surgery. after all aseptic measures, proper positioning and preparation approached why previous scar mark and and infected tibia nail was removed followed by thorough wash of medullary canal and reaming along with placement of chest tube made cement antibiotic rod and application of above knee full cast after standard wound closure and aseptic dressing.

Results

During specified period a total of 19 patients who presented to us with infected tibia nail. 5 patients didn't participated in study and excluded while all other 14 patients who were willing to participate in study and were included in study after taking written and informed consent Among those 14 patients 8 were males and 6 were females. Of these 14 patients, 9 had presented with right infected intra medullary nails while 5 patients presented with left infected intra medullary nails.

Patients were followed for mean followup of 12 months and after regular follow ups of 12 months, it was noticed that infection was controlled in all the patients while 11 out of 14 patients achieved union while the remaining 3 patients required a second stage surgery due to non-union. Hence in this study 11 (90%) patients, were treated only with single stage antibiotic rod procedure and obtained satisfactory results in terms of infection control and union.

Results are further simplified in below given charts and tables along with X-ray's of two cases

Table 1: Showing the description of different characteristics of included patients which includes Age, Gender, Site, C & S, Resolved Infection and Bone Union

Age	Sex	Site	Tissue CS	Infection Control	Achievement of Union
34y	F	Left	K.Pneummonae	YES	YES
26y	F	Right	S. Aureus	YES	YES
46y	M	Right	S. Aureus	YES	YES
54y	M	Left	S. Aureus	YES	YES
26y	M	Left	S. Aureus	YES	YES
19y	M	Right	S. Epidermidis	YES	YES
32y	F	Right	MRSA	YES	NO
30y	M	Right	P.Aeruginosa	YES	YES
39y	F	Right	MSSA	YES	YES
30y	M	Right	P. Aeruginosa	YES	NO
29y	F	Left	MRSA	YES	YES
16y	M	Left	MSSA	YES	YES
27y	M	Right	S. Aureus	YES	YES
44y	F	Right	S.epidermidis + E.coli	YES	NO
52y	M	Right	K.Pneummonae	YES	YES

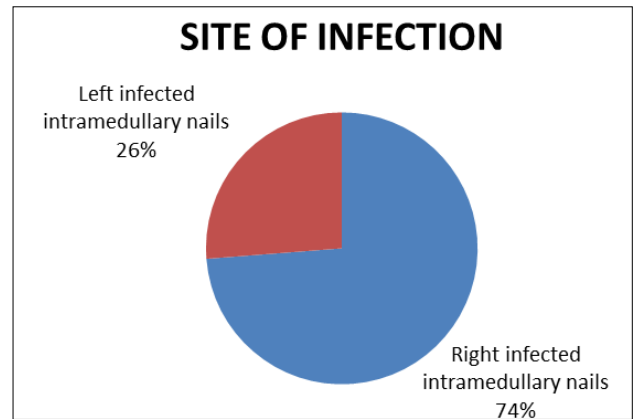


Chart 2: Showing the Site wise distribution of Infection

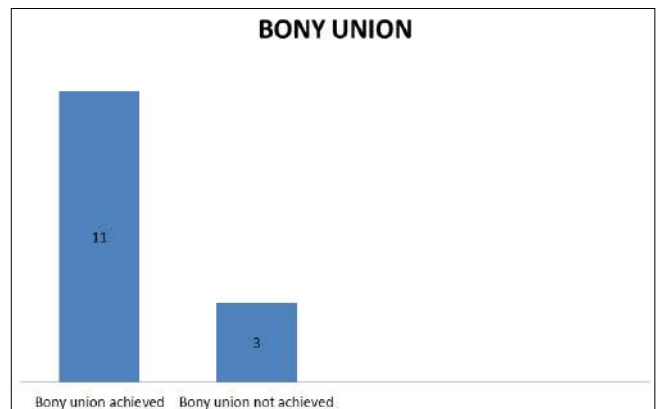


Chart 3: Describing Union achievement

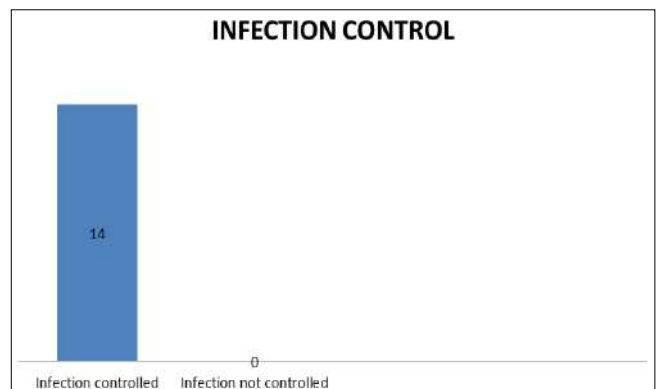


Chart 4: Bar chart describing Infection control

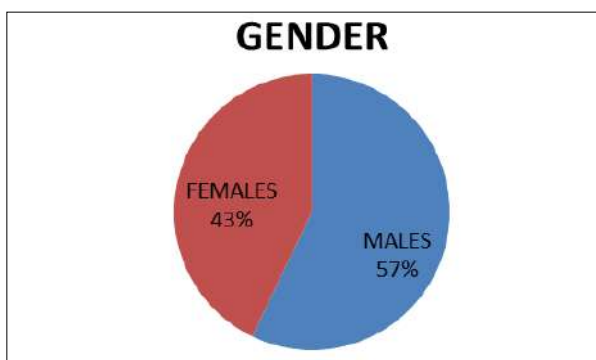


Chart 1: Showing the distribution of gender



Fig 1: Showing Infected Non Union



Fig 2: Union with Antibiotic rod



Fig 5: Same Patient Infection, showing Multiple Sinuses



Fig 3: Showing Tibia Mid shaft



Fig 6: After Cemented Antibiotic Rod placement

Segmental Fracture

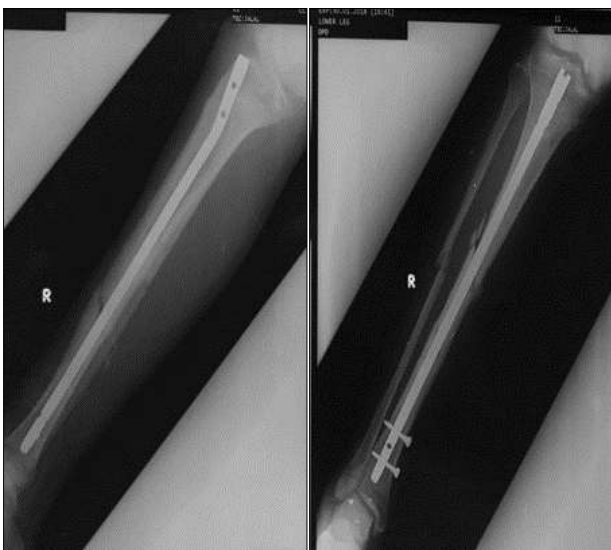


Fig 4: Showing Tibia I/L Nail Placement



Fig 7: After removal of Antibiotic rod and achievement of bone union

Discussion

Tibia is one of the most commonly fractured bones. The treatment of tibia fracture involves the placement of intra medullary nail which is considered to be the treatment of choice^[11]. One of the main complications seen postoperatively after intramedullary nailing of tibia is infection^[12, 13] which also delays the time of fracture healing and bone union^[14]. Traditionally, the infection is treated by a 2 staged operation which involves the eradication of infection in the first procedure and external or internal fixation in the next step^[15, 16].

Antibiotic rod placement can be used in place of the two staged surgical procedure and has many advantages over it. It is a single staged procedure, rather than the conventional two staged surgery, thus saving time and money. It also helps in the local delivery of antibiotics leading to the treatment of infection and achieving fracture union at the same time, thus reducing the risk of infection to a much lower level^[17].

In our study total of 14 patients were included all of them underwent removal of infected IMN and thorough wash of medullary canal and reaming along with placement of chest tube made cement antibiotic rod along with application of above knee full cast which later converted to PTB cast after 4 weeks and later on PTB cast was removed after 6 weeks, all patients were kept on NWB mobilization for first 6 weeks allowed them PWB mobilization after first 6 weeks and were allowed FWB mobilization after 12 weeks by evaluating radiological findings.

In order to control infection successfully I/V antibiotics were also used for first 2 weeks later switched to oral antibiotics and continued for further 4 weeks based on culture and sensitivity.

All patients were followed in outpatient department for at least 12 months and evaluated for control of infection, healing of fracture and bone union by monitoring infective markers and using radiological investigations thus in our study we came out with a conclusion that in case of infected tibia intramedullary tibia nail antibiotic rod can be used as definitive treatment option as a single stage procedure for both infection control and achievement of union rather using a conventional two stage surgical procedure as single stage procedure is effective and less expensive than the traditional two stage surgical procedure.

Conclusion

Antibiotic Cement impregnated rod is a simple, less expensive, easily available and effective single stage procedure for the management of infected IMN as it is effective in both controlling infection and also provides stability to bone in order to achieve union

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