ORIGINAL ARTICLE

Our local Bailan antibiotic cement rod versus standard chest tube cement rod preparation technique: Comparison of clinical outcomes and technique efficiency

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Abstract:
Objective: To compare the two antibiotic rod techniques in terms of clinical outcome and efficacy.
Material and Methods: This study was conducted in the orthopaedic department Liaquat National Hospital, Karachi during January 2016 till March 2018. Total of 19-patients were enrolled in this study and divided in two groups. 10-patients were enrolled in group-A in which there were 3-patients with infected femur IMN and 7 with infected tibia IMN while 9-patients were enrolled in group-B out of which 2-patients were with infected femur IMN and 7 with infected Tibia IMN
Results: In this study 3(30%) out of 10-patients in group-A required change of antibiotic rod while no patient requires exchange of rod in group-B and another 3 patients underwent a second stage surgery IMN in group-A where as in group-B only one patient had a second stage surgery of intramedullary nailing.
Conclusion: Bailan technique of cement-antibiotic rod preparation is also comparable in terms of union and eradication of infection to the standard chest tube rod technique.

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Introduction:
Long bone fractures are severe injuries usually results from high energy trauma mainly during road traffic accidents, substantial amount of energy is transferred to the limb leading to damage of both soft tissues and bone, Intramedullary nailing (IMN) is considered the gold standard treatment of closed and many open long bone shaft fractures upto Gustillo III A and B. The risk of infection in the setting of open fractures has been reported to range between 4% and 7%.

The development of post-operative intramedullary infection after stabilization of long bone fracture with IMN is most dreadful complication and its management have been a topic of vast discussion, traditionally 2-stage procedure is usually involved in order to treat a infected intramedullary nail which requires removal of nail, deberidement and placement of antibiotic rod in first stage surgery once infection settles down second it follows the second stage surgery that is removal of antibiotic rod and placement of IMN.

The aim of this study is to collect and analyze local existing evidence related to the incidence and management of infection following IMN of long bone fractures and to compare two different antibiotic rod preparation techniques.

Material and Methods:
This study was conducted in the Orthopaedic department Liaquat National Hospital, Karachi during January 2016 till March 2018. Patients who presented to us with infected intramedullary nail of tibia and femur were included in the study. All patients were enrolled only after obtaining written and informed consent.

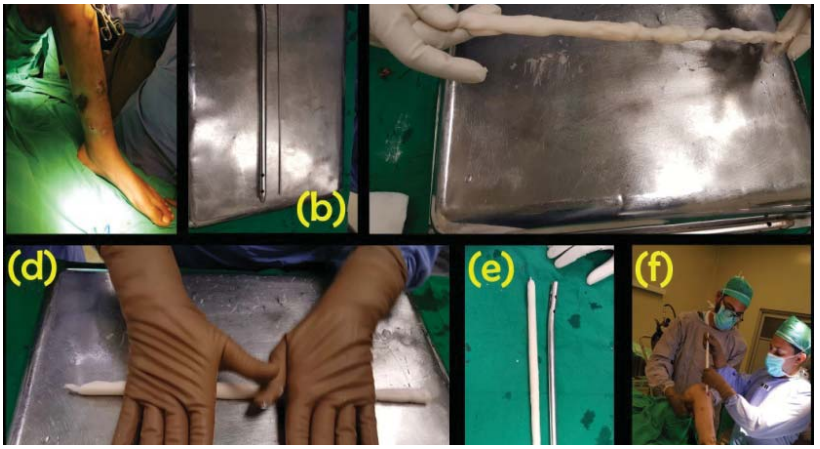
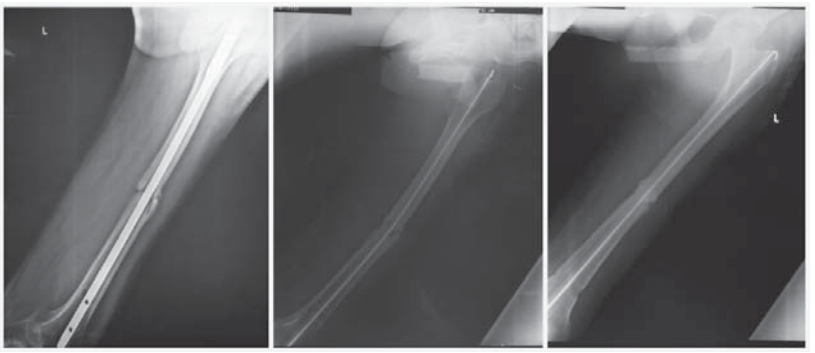


Figure 1(a):

Figure 1(b):



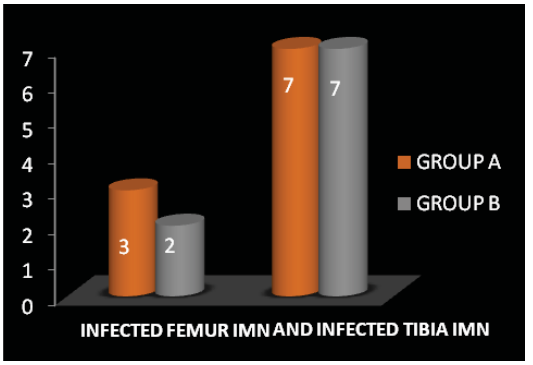
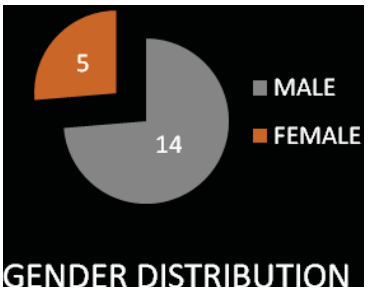
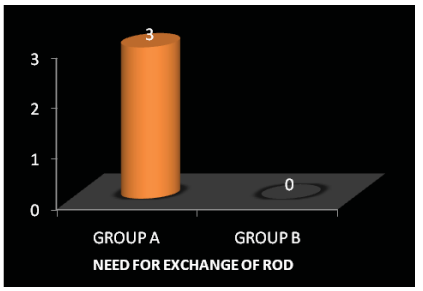
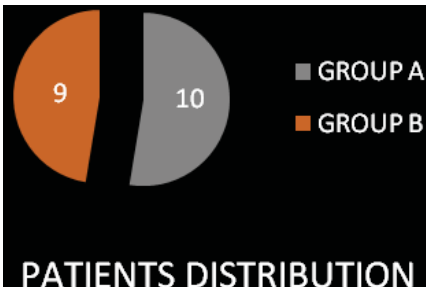
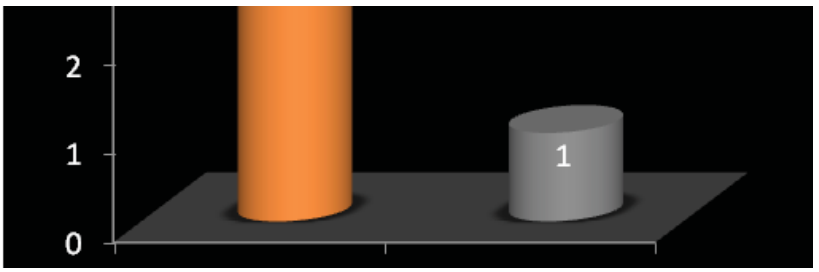


Figure 2: *Shows placement of antibiotic rod and union*









Patients were allocated in two groups via simple random sampling. Group "A" underwent removal of IMN and placement of antibiotic cement rod which was prepared using standard chest tube technique. Group "B" underwent removal of IMN and placement of cement rod that was made by our local bailan technique. This method involves application of antibiotic loaded cement in its sticky or doughing state directly on the wire by hand. A metal wire that is beaded at

Table 3:

Parameter	Group A	Group B
Operative time	Same	Same
Cost	High	Low

the end is cut equal to the length of the nail that was previously inserted and cement is applied on the beaded wire while moulding it continuously to attain a cylindrical mass of cement all around the wire. Then this rod is rolled over a flat surface of a flipped special tray to further contour a uniformity of cement over wire until the cement sets. The diameter of the cement rod while contouring is repeatedly compared to the removed IMN to ensure size compatibility and also through the template of reamers present in femur and tibia nail sets. Group A and B were compared in context of cost for preparing cement rod, operative time, need of exchange of cement rod and achievement of union.

Results:

During the specified time period a total of 32-patients presented to our clinic with infected IMNs. Out of these 13-patients refused to participate in the study. Therefore a total of 19-patients were enrolled in our trial. Mean age of our patients in the two groups were comparable (29 vs 31). 10-patients were enrolled in group-A in which there were 3-patients with infected femur IMN and 7 with infected tibia IMN while 9-patients were enrolled in group-B out of which 2-patients were with infected femur IMN and 7 with infected Tibia IMN. In this study 3(30%) out of 10-patients in group-A required change of antibiotic rod while no patient requires exchange of rod in group-B and another 3-patients underwent a second stage surgery IMN in group-A where as in group-B only 1-patient had a second stage surgery of intramedullary nailing.

Results are further simplified in below given charts and table.

Discussion:

Intramedullary Nailing is an gold standard option for the treatment of closed and many open tibial shaft fractures however intramedullary infection is a severe known complication of intramedullary nailing after trauma, the incidence of infection after intramedullary nailing is ranges from 0.5 to 14 % as reported in literature, main foreign body is the metal nail in intramedullary cavity which is considered to be the trigger for developing infection in intramedullary cavity, infected nonunion needed to control infection, provide stability and achieve union. Traditional management includes removal of nail, debridement and reaming of medullary cavity and delivery of local and systemic antibiotics to control infection. Various different techniques have been used for delivering of antibiotics locally However placement of antibiotic rod intramedullary not only delivers antibiotic locally but also provides structural support although it does not fill any bony defect (segmental defect).

No sufficient antibiotic concentration contacting cement rods are available commercially in our setup so if cement impregnated antibiotic rod need to be use to treat infection , the surgeon must have to prepare the self made cement rod by using various high dose of heat stable antibiotics through different techniques.

In this study we have compared two different antibiotic-cement rod techniques. Standard chest tube rod and local self hand made antibiotic rod with Bailan technique. One of our orthopaedic resident Dr. Osama Bin Zia in our setup come up with this self hand made antibiotic rod preparation idea and pioneered this Bailan technique which is easy and simple to made, apply and cost effective and desired diameter rod can be obtained for medullary canal which gives additional stability, coverage of dead space and minimizes the chances of breakage of antibiotic cement rod as compared to standard technique which is difficult to extract from the chest tube and is a time taking procedure.

Group-B patients in our study needed no exchange of rod as compared to three patients who required exchange of rod in Group A due to persistent infection.

In our study, 3-patients in group-A needed ex-

change of rod. Two because of the persistent infection and one due to breakage of antibiotic. Another 3-patients in group-A underwent a second stage surgery of IMN due to non union. While in group-B, no patient needed exchange of rod where as only one patient had a second stage surgery and of intramedullary nailing.

Conclusion:
Bailan technique of cement-antibiotic rod preparation is much simple and easier to made, cost effective, stable with less operative time and results are also comparable in terms of union and eradication of infection to the standard chest tube rod technique.

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Role and contribution of authors:
Dr Arslan Abro, collected the data, referenes and did the initial writeup

Dr M. Sufyan, collected the data and helped in discussion writing.

Dr M.Kazim, collected the data, referecens and helped in data analyzing

Dr Osama Bin Zia, collected the data

Dr Mehroz Zamir, collected the data
Dr Noman Khan, collected the references

Dr Mirza M.Ali, critically review the article and made final changes

Nargis Aftab, collected the data

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