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Comparative Study to Document the Effect of Usage of Povidone Painted Intramedullay (IM) Nails in Reducing the Incidence of Postoperative Infections after the Surgeries for Closed Tibial Shaft Fractures

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Abstract

Postoperative infections are common side effect of any surgical procedure. Orthopaedic surgeries in specific have an increased chance of postoperative infections as complications due to the implant being introduced and placed at the operative site. By following simple inexpensive methods this post operative infections can be reduced.

50 Patients with closed fractures of the tibial shaft were chosen. Patients with closed tibial shaft fractures operated on Monday, Wednesday and Friday were operated with povidone iodine painted intramedullary interlocking nails for fracture fixation. The patients with closed fractures of tibial shaft operated on Tuesday, Thursday and Saturday were operated with plain intramedullary nails for fracture fixation .

It was noted that, in patients operated with plain intramedullary nails for fracture fixation, the incidence of postoperative infections was about 4% where as the incidence of postoperative infection rate with povidone iodine painted intramedullary nails was zero.

With the use of povidone iodine painted nails the emphasis is on reduction of even the 1-2% infection rates postoperatively.

There is a considerable reduction in the incidence of infections postoperatively after intramedullary nailing of closed fractures of tibial shaft by using povidone iodine treated intramedullary nails. Simplicity,easy availabilty and cost effectiveness of this small step would make a noteworthy difference.

Keywords: Tibial Fractures; Povidone; Intramedullary Nail; Infections.

Introduction

Tibial fractures are severe injuries commonly resulting from high energy road traffic collisions [1]. Tibia is the most common long bone to be fractured [2]. Intramedullary (IM) nailing is considered the gold standard of treatment for closed shaft fracture tibia [3-4]. The risk of infection following IM nailing of closed tibial shaft fractures is similar to the general risk of infection after any orthopedic trauma procedure [5].

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Postoperative infections are common side effect of any surgical procedure. Though aseptic measures are followed and prophylactic antibiotics administered perioperatively have minimize the incidence of infections, the fact remains that postoperative infection are yet difficult to prevent and control [6]. In any surgical procedure, there remains chance of introducing pathogens into the operative site or the body due to exposure of the operative site and use of surgical instruments. Orthopaedic surgeries in specific have an increased chance of postoperative infections as complications due to the implant being introduced and placed at the injured site [7,8]. This study was designed and conducted to document the effect of usage of povidone painted intramedullay (IM) nails in reducing the incidence of postoperative infections after the surgeries for closed tibial shaft fractures.

Povidone-iodine or polyvinyl pyrrolidone-iodine, is a complex of iodine, the bactericidal component, with polyvinylpyrrolidone, a synthetic polymer [9].

The characteristics of iodine arise from its ability to substitute for covalently bound hydrogens in compounds containing -OH, -NH, -SH, or CH functional groups [10]. The microbiocidal action of PVP-Iodine, is related to the non-complexed, freely mobile elemental iodine [11].

Materials & Method

50 Patients with closed fractures of the tibial shaft admitted in the orthopedic department of our hospital were purposively selected and enrolled in the study after obtaining consent.

Inclusion Criteria

1. Fresh (<24 hours) closed fracture of tibia
2. Age >18 years and <60 years
3. Giving written informed consent about participating in the study.

Exclusion Criteria

1. Open fractures of tibia
2. Associated injuries to head, chest or other systems
3. Associated co morbidities like hypertension, diabetes, etc.
4. Age <18 years and > 60 years.
5. Patients medically unfit for surgery.

In this study, patients with closed tibial shaft fractures operated on Monday, Wednesday and Friday were operated with povidone painted intramedullary nails for fracture reduction. The patients with closed fractures of tibial shaft operated on Tuesday, Thursday and Saturday were operated with plain intramedullary nails for fracture reduction.

The enrolled patients were followed up at intervals from the date of surgery. The patients were followed up during their outpatients visits after surgery.

Follow up were done weekly for first 1 month after discharge of patients, bi weekly for next 3 months and once in a month for next 2 months.

Results

50 Patients were enrolled under each cohort were followed up post surgery to assess for postoperative recovery.

Povidone Iodine Painted IM Nails	Developed POSTOP Infections in First 1 Month	Developed POSTOP Infections In 2-4 Months	Developed POSTOP Infections In 4-6 Months	Total
Used	1	1	0	2
Not Used	0	0	0	0

Povidone Iodine Painted IM Nails	Developed POSTOP Infections	Did Not Develop POSTOP Infections	Total
Yes	0	50	50
No	2	48	50

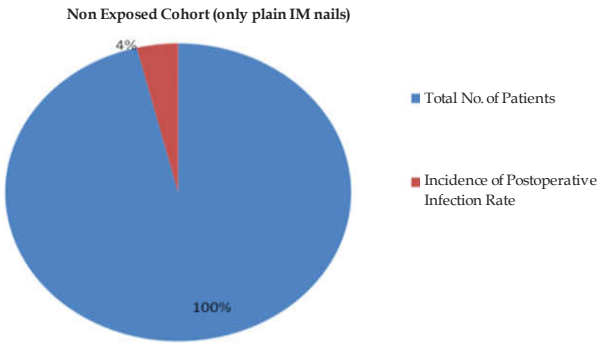
A. Calculation of Incidence Rate

1. Incidence rate of postoperative infections among exposed (i.e., povidone iodine painted nails): 0.
2. Incidence rate of postoperative infections among non exposed (i.e., plain IM nails) : 2/50 = 0.04 (4%).

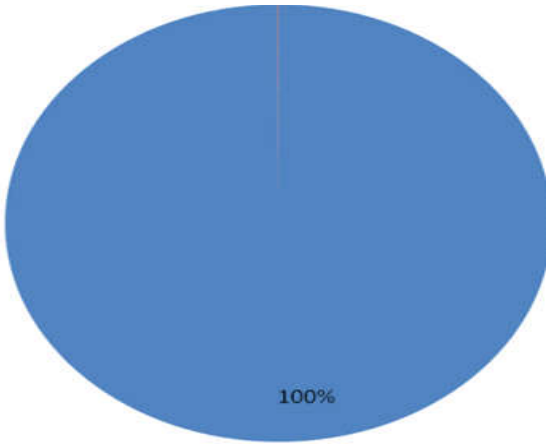
B. Estimation of Risk

The relative risk and attributable risk in this study is zero.

It was noted that, in patients operated with plain intramedullary nails for fracture reduction, the incidence of postoperative infections was about 4% where as the incidence of postoperative infection rate in the cohort managed with povidone iodine painted intramedullary nails was zero/nil.



Exposed Cohort (povidone iodine painted IM nails)



Discussion

Povidone iodine is a broad spectrum antiseptic used for topical application in the treatment of prevention of infection in wounds [12]. It is also used as a surgical scrub in pre and post operative skin cleansing. The use of povidone iodine painted intramedullary nail as a prophylactic measure in the surgeries of closed fractures of tibial shaft has been shown to diminish the rate of postoperative infections to a large extent as seen in our study where the postoperative infection rate in the cohort in whom povidone painted intramedullary nails have been used is nil. The incidence of postoperative infection rate following intramedullary nailing of fracture shaft tibia is around 1-2% generally [13]. In this study it was found to be around 4%. Though 1-2% of the postoperative infection rates seem to be trivial, the effects of postoperative infections on the patients condition and also on the success of surgery in hazardous. Hence, there is a need to prevent infections following surgery for greater success rates. A postoperative infection is one of the surgical complications that is preventable to a large extent by use of simple measures such as asepsis, prophylactic antibiotic use [14]. With the use of povidone iodine painted nails the emphasis is on reduction of even the 1-2% infection rates postoperatively. Though statistically the results are not significant, clinically there was no evidence of postoperative infections in the patients managed with povidone iodine painted nails on examination during follow up. Moreover, povidone iodine is readily available at the time of surgery and hence can be used. This small step of painting intramedullary nails with povidone iodine and inserting it at site for fracture reduction does not require any expertise and it also prevents postoperative infections. It is cost effective as it makes use of locally available resources, hence saving the cost and efforts needed to procure it.

Conclusion

There is a considerable reduction in the incidence of infections postoperatively after intramedullary nailing of closed fractures of tibial shaft by using povidone iodine treated intramedullary nails as noted from the clinical examination and follow up of patients. This significant finding emphasizes the importance of use of antiseptic treated intramedullary nails in tibial shaft fractures. Simplicity and cost effectiveness of this small step would make a noteworthy difference.

Limitations of the Study

1. We could enroll the patients as per the calculated sample size due to time constraints.
2. Loss to follow up.
3. The relative risk and attributable risk was estimated to be zero and the P value was also found to be statistically insignificant probably due to enrollment of lesser samples than calculated and hence did not co-relate with the findings from clinical examination of the patients.

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