The aim of the present study is to evaluate the results of antibiotic cement impregnated nailing in the management of infected nonunion of tibia.

**AIMS AND OBJECTIVES**

The aim of the present study is to evaluate the results of antibiotic cement impregnated nailing in the management of infected nonunion of tibia.

**MATERIALS AND METHODS**

This prospective study was done on 20 cases of infected nonunion of the tibia at Government Medical College, Kurnool during the period of 2017-2019.

1. **Inclusion criteria**
   a) Cases of infected nonunion of the tibia.
   b) Bone gap of <2 cm

2. **Exclusion criteria**
   a) Patients less than 15 years.
   b) Allergy to vancomycin or gentamycin.

**Procedure**

Patients underwent a pre-operative evaluation including the following parameters: complete blood count, ESR, C Reactive Protein, culture and sensitivity. Standard radiographs of the part in two views were also obtained. The surgical technique involves a series of steps, each of which is critical for successful results. The first step involves thorough debridement of the infected bone and soft tissues. All the nonviable and infected tissues, including the skin, soft tissue and bone are excised until bleeding viable tissue is present at the resection margins. Specimens of the bone, soft tissues and any purulent material were sent for culture and sensitivity. Preparation of the intramedullary canal is an important step. Adequate reaming is done to accommodate a larger diameter nail which ensures more stability. Thorough saline lavage of the medullary canal and the wound is done. The surgical team then change their gowns and gloves. The limb is prepared again and re-draped before antibiotic cement impregnated nail is prepared. The third step is the preparation of antibiotic cement impregnated nail under sterile conditions in the operating room. Nail length is measured with a guide wire per-operatively. Nail diameter is determined by the per-operative reaming diameter. Interlocking nail is coated with bone cement up to 1 mm less than the diameter of the last reamer used. Standard viscosity gentamicin bone cement was used. 40 gm cement was thoroughly mixed with 2 gm Vancomycin, following which the polyethyleneimethylene was added. When the cement reaches doughy consistency, interlocking nail is coated with bone cement using an endotracheal or chest tube to make the diameter uniform. Nail is inspected for spotty coverage and smoothed.

The diameter is checked with Kuntscher diameter measuring gauge, excess cement is shaved off and the nail rerolled before the cement sets. The diameter is rechecked. Bone cement is allowed to set for 15 minutes before insertion. Bone loss of up to 2 cm due to primary bone defect following fracture, sequestrectomy or freshening of bone ends were docked primarily. Bone ends aligned and nail is placed antegrade in the tibia. Nail-cement debonding during insertion is avoided by allowing adequate time for cement to set and bond with nail. Wound is inspected at intervals of 48-72 hour. A repeat debridement was done whenever required. The systemic antibiotics are given based on culture and sensitivity results. Further treatment was with oral antibiotics for 6 weeks depending on individual patient characteristic and the organisms involved. A complete blood count (CBC), Erythrocyte Sedimentation Rate (ESR) and C-reactive protein (CRP) levels were performed at regular biweekly intervals to record rising or falling trends. Clinical and radiological features were used to assess the progress of bony union at 4 weeks interval till union was sound. As soon as the wound healed, a patellar tendon-bearing cast was applied in case of tibia and gradual full weight-bearing was permitted. The cast was changed every 6 weeks and continued till union was confirmed with clinico-radiological assessment.

Active physiotherapy for regaining ankle and knee mobility were instituted until the range of movement was satisfactory.
RESULTS

1. CONTROL OF INFECTION

<table>
<thead>
<tr>
<th>No. of Cases</th>
<th>Infection Controlled</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>18</td>
<td>94%</td>
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</tbody>
</table>

FOLLOW UP PERIOD:

<table>
<thead>
<tr>
<th>Bone treated</th>
<th>Minimum duration</th>
<th>Maximum duration</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tibia</td>
<td>20 weeks</td>
<td>32 weeks</td>
<td>26</td>
</tr>
</tbody>
</table>

2. BONY UNION

<table>
<thead>
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<th>No. of Cases</th>
<th>Union</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
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3. RATE OF UNION

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PALEY’S BONY CRITERIA:

- Excellent: Nil, Deformity <7°, Limb length discrepancy <2.5 cm
- Good: With any two criteria
- Fair: With any one criteria
- Poor: Non Union

According to these criteria, there were 16 excellent results, 2 good results, 0 fair and 1 poor result respectively.

DISCUSSION:

Osteomyelitis is commonly polymicrobial in 70% of patients. The most common infecting organism in the literature and in our study was Staphylococcus aureus. Gentamycin and Vancomycin are common choices for local delivery of antibiotics because of their broad spectrum of activity, heat stability and low allergenicity. Clinical and experimental studies show them to have good elution properties from bone cement and have no deleterious effects on bone healing. Infection was controlled in 18 out of 19 cases in our study and union in 18 cases. Exchange nailing was done for only 1 case to achieve bony union. Paley et al. have shown that control of infection was about 85% and bony union achieved in about 80% of cases by Ilizarov method in infected nonunion of long bones. Zhang Qiang et al. have shown bony union in only 11(58%) out of 19 cases, and infection controlled in 18 cases. Thonse et al. have shown bony union in 17(85%) out of 20 cases, and infection controlled in 19 (95%) cases. Rate of bony union average of 26 weeks for tibia and is comparable with results shown by Han SK et al. of 26.4 weeks for tibia and Use of external fixators is associated with poor compliance and pin site complications. They are difficult to apply and maintain in obese patients. Such patients benefit from the antibiotic cement impregnated nailing.

CONCLUSION:

1. Antibiotic cement impregnated nailing provides effective infection control and good stability to promote union and has good patient compliance.

REFERENCES