MANAGEMENT OF PAEDIATRIC LONG BONE FRACTURES WITH TITANIUM NAILS – A PROSPECTIVE STUDY

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Abstract:

Introduction: Several modalities of treatment options are available to treat long bone fractures in children. These methods are open reduction and internal fixation with plates and screws, external fixators and closed reduction with internal fixation with titanium nails. The aim of present study is to assess the outcome of management of long bone fractures in paediatric age group with elastic titanium nails.

Material and methods: 25 patients of age group 8 to 15 years were managed between 2016 and 2017 with elastic titanium nails. Out of them, there were 15 males and 10 females. Under GA, closed reduction and internal fixation of fractures was done with elastic titanium nails under control of image intensifier. Antero-posterior and lateral views were used to assess any angular deviations.

Results: There were 15 males and 10 females. The mean age was 12 years ranges between 8 to 15 years. Right side was involved in (n = 20) 80% of the subjects, while left side was involved in (n = 5) 20% of subjects. Majority of subjects met with an accident (n = 10) 40%. Subjects (n = 5) sustained injury due to collision and rest of subjects (n = 10) 40% sustained trauma due to fall. Shortening was noted in 16% (n = 4) cases.

Conclusion: Closed reduction and percutaneous fixation of long bone fractures in paediatric age group subjects with elastic titanium nails is viable option for fixation of paediatric long bone fractures.

Keywords: Elastic titanium nail, paediatric, long bone fractures.

Introduction:

There is revolutionary change in management of paediatric long bone fractures. Non-operative technique still remains the choice of treatment of long bone fractures as children have higher remodeling potential.¹ With the help of non-operative treatment, more than 95% union rates have been achieved and functional recovery has been 100%.² The use of plaster cast after reduction with traction and manipulation under guidance of image intensifier. Method of open reduction and internal fixation with plates and screws is indicated when there is male rotation, excessive shortening or angulations at the fracture site.³ Various intramedullary devices like Rush nail, Square nail, etc are available as an option to treat fractures of long bones in children, but all these provide poor stability against rotation and hence multiple pins needed to
be inserted for stabilization. In the recent time, there has been abundant use of elastic stable intramedullary nails.\textsuperscript{4} Titanium elastic nails are frequently used now a days for fixation of diaphyseal fracture. It has an advantage of being inserted into the medullary canal without disturbing the growth plate.

**Material and methods:**

25 subjects, 20 males and 5 females between the age group of 8 to 15 years having long bone fractures were managed with elastic titanium nails during the period of 2016 and 2017 in various orthopaedic centers. Closed reduction was done under GA, under control of image intensifier and elastic titanium nails were inserted sparing the growth plates of long bones. Subjects were administered appropriate antibiotic prophylaxis preoperatively and limb was protected in plaster slab. Antero-posterior and lateral radiographs were used to assess any angular deviations.

**Results:**

All the fractures in 25 subjects united well within average time of 10 weeks ranging from 6 weeks to 12 weeks. Gender distribution is shown in Table 1, site affected is shown in Table 2, mode of injury is shown in Table 3 and complications encountered during post-operative period are shown in Table 4.

**Table 1: Gender distribution of the study population**

<table>
<thead>
<tr>
<th>Sex</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>15</td>
</tr>
<tr>
<td>Female</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
</tr>
</tbody>
</table>

**Table 2: Patient distribution according to the side affected**

<table>
<thead>
<tr>
<th>Side affected</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right</td>
<td>20</td>
</tr>
<tr>
<td>Left</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
</tr>
</tbody>
</table>

**Table 3: Distribution of patient according to source of injury**

<table>
<thead>
<tr>
<th>Injury</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>10</td>
</tr>
<tr>
<td>Collision</td>
<td>5</td>
</tr>
<tr>
<td>Accident</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
</tr>
</tbody>
</table>

**Discussion:**

Fractures of long bones in paediatric age group are sustained due to high impact trauma. Elastic titanium nail fixation has recently gained popularity as treatment modality for management of paediatric bone fractures. Elastic stable intramedullary nails are being used now a days for long bone fractures in children, they cause minimal scarring.\textsuperscript{5} History of intramedullary pins dates back to mid 19\textsuperscript{th} century when ivory nails were used for purpose of fixation.\textsuperscript{6} Elastic titanium stable nails are safe and offer a minimally invasive alternative with lower complication rates.\textsuperscript{7} These are made up of titanium and offer high consolidation rates up to 97 – 100\textsuperscript{9}. The duration of hospital stay is also reduced. In our study, main complication was shortening in (n = 4) 16% of subjects. Hardware prominence was seen in (n = 3) 12% of subjects. There was (n = 1) 4% of subjects that showed presence of superficial infection and overgrowth. Shortening and angular deviation were seen in a study conducted by Sink during early post-operative period.\textsuperscript{10} Rathjen, et al\textsuperscript{11} encountered complications while treating unstable fractures with flexible femoral nails, which were similar to those while treating stable fractures. Atul Bhasker, et al\textsuperscript{12} conducted a study consisting of 60 patients with various long bone fractures using titanium elastic nails and he encountered wound infection in 2 cases and leg length discrepancy in 3 children. In a study conducted by Vrsansky, et al\textsuperscript{13}, this flexible nailing system was used in 308 fractures, all the cases showed stable union. The sample size of our study was small, a larger sample size could give better perspective of complication rates.

**Conclusion:**

Titanium intramedullary nails provide a safe and a viable alternative for the stabilization of paediatric long bone fractures. They have fewer complication rates. In our study, shortening had the highest percentage (16%) though various minor complications were seen along with it.
References:


