Functional Outcome of Open Tibial Fracture Using Illizarov Apparatus

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Author’s contribution

The sole author designed, analyzed, interpreted and prepared the manuscript.

Article Information

DOI: 10.9734/JPRI/2021/v33i41A32302
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Complete Peer review History: https://www.sdiarticle4.com/review-history/72241

Received 10 June 2021
Accepted 13 August 2021
Published 14 August 2021

ABSTRACT

The better treatment for tibial fractures are very vague and difficult. Since the tibia is covered by soft tissue coverage fixing of plate becomes very difficult as it creates wound complications, mainly in case of severe fractures. In this study of 20 cases of open comminuted fractures of tibia with the Ilizarov ring fixator hybrid technique was used, it was found that this technique has a major advantages in treatment and management of the tibial fracture.

Keywords: Tibia; soft tissue; fractures.

1. INTRODUCTION

Tibia is the very common spot of an open fracture. Lower limbs are mostly the site of injury during accidents in particular tibia. These kind of fractures are at high risk for infection than closed fractures, altogether depending on the extent of soft tissue damage. Though many methods have its own merits and demerits still the management of tibial fractures exists and is successfully performed. Our study is to highlight the important role of ilizarovng fixator for compound grossly comminuted fracture tibia [1-5]. It is a method of minimally invasive external fixation using small diameter transosseous ‘K’ wires which are tensioned and fixed to circular rings.

2. METHODOLOGY

Study design: Study involves 20 cases of
compound communitied tibia involving Ilizarov technique.

Over the past 28 months we analyzed the treatment of 20 cases of open tibial communitied fracture using Ilizarov technique.

In this study 2-3 cm large two half rings were chosen which are larger in diameter when compared to the injured limbs. The rings are positioned in the same plane and a bolt and nut anchor together at both ends of the half nngs. Typically, a 4 nng assembly is required with 2 nngs proximal and distal to fracture site.

Ring and drop post along with rings were used for short sized fragments. The distal and proximal ends were connected through the rods of correct length. The distal nng was applied with two 'K' wires one by tibia nd other by fibula. Each week x ray analysis was performed and further review of angulations, callus amount and transport segments was done.

3. RESULTS

Analysis of pain and functional limitations were done on patinet5 and angular and rotational malalignment were examined. Discrepancies in leg lengths if any were clinically measured. Only 4 (20%) cases showed Pin tract infection and of this antibiotic were given and the infection was resolved. In 3 weeks. In another one, soft tissue release around the offending wire was done and in one the wires had to be exchanged (10%) patients had an angulation of 10° at the fracture site, and 4 (20%) had shortening between 1-2 ems of the fractured leg.

In addition of 3 to 4 weeks a patella - tendon bearing cast was given. After healing of fractures the union was observed and followed by discontinuing of support for immobilizations was done. 100% fractured union rate was observed in 20 cases and cases were able to walk after 36 weeks and the result was good.

When there was early evidence of callus formation in the follow up X-rays, union was clinically verified by the absence of pain and motion while fully weight bearing on the tibia with the frame still attached and destabilized. If pain or angulations occurred, the frame was restabilised and immobilization continued until the above criteria were met. A patella - tendon bearing cast was used for an additional 3 to 4 weeks. Union was determined to be the time when fracture healing occurred and all forms of immobilization or support were discontinued. Union occurred at an average of 28 to 32 weeks (30 weeks) Based on Johner and Wruhs criteria (24), the final resulu5 were rated as excellent (15), good (2) and fair (2). Poor results.

Table 1. Johner and Wruh's criteria for evaluation of final results after tibial fracture

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Excellent</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non union/infection</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Yes</td>
</tr>
<tr>
<td>Neurovascul ar Injury</td>
<td>None</td>
<td>Minimal</td>
<td>Mode rate</td>
<td>Severe</td>
</tr>
<tr>
<td>Deformity</td>
<td>Varus/valg us</td>
<td>None</td>
<td>2-5D</td>
<td>6-1 OD</td>
</tr>
<tr>
<td></td>
<td>Pro/re curvatium</td>
<td>0-5D</td>
<td>6-1 OD</td>
<td>11-20 D</td>
</tr>
<tr>
<td></td>
<td>Rotation</td>
<td>0-5D</td>
<td>6-1 OD</td>
<td>11-20 D</td>
</tr>
<tr>
<td></td>
<td>Shortening</td>
<td>0-5 mm</td>
<td>6-10 mm</td>
<td>11-20 mm</td>
</tr>
<tr>
<td>Mobility</td>
<td>Knee</td>
<td>Full</td>
<td>&gt;80%</td>
<td>&gt;75%</td>
</tr>
<tr>
<td></td>
<td>Ankle</td>
<td>Full</td>
<td>&gt;75%</td>
<td>&gt;50%</td>
</tr>
<tr>
<td></td>
<td>Subtalar</td>
<td>&gt;75%</td>
<td>&gt;50%</td>
<td>&lt;50%</td>
</tr>
<tr>
<td></td>
<td>Pain</td>
<td>None</td>
<td>Occasional</td>
<td>Mode rate</td>
</tr>
<tr>
<td></td>
<td>1 Gait</td>
<td>Normal</td>
<td>Normal</td>
<td>Mild limp</td>
</tr>
<tr>
<td></td>
<td>Activities</td>
<td>Strenuous</td>
<td>Possible</td>
<td>Limited</td>
</tr>
<tr>
<td>Study results</td>
<td>34</td>
<td>6</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>
4. CASE NO.1

Mr. Raja agriculturist, 27 yrs. Male had sustained grade III B compound segmental fracture both bone right leg due to RTA. He had minor soft tissue injuries with no bony involvement on the other leg, which was treated with cleaning and dressing. He was treated with wound debridement. 11th day after injury ilizarov’s ring external fixator was applied. Compression was done for 5 days from 3rd P.O. day. Patient had good union by 30 weeks. Patient had no pin tract infection. He was put on PTB cast and mobilized to bear weight as able at 26 weeks after removal of ilizarov fixator. Follow up was available up to 8 months.

ROM (Range of Movements) Knee: Flexion 0-130°

Ankle: Dorsi flexion 0-15°

Plantar flexion 0-40°

Patient was able to walk after 32 weeks. Results were regarded as excellent.

5. DISCUSSION

After treating with 21 promimal tibial fractures with this ilizarov fixator only one patient had
malunion remaining were successful. With only one case of malunion. Intramedullary nail insertion is also shown to interfere with endosteal circulation in the diaphyseal cortex. As this type of fixator has high degree of complications this one was chosen for this study. The structure is very stable and helps patients to bear weight on the affected limb straight away even in very comm united fractures.

In our series by the 4th week soft tissue closures were achieved either by SSG or by rotational vascularised musculocutaneous flaps. Our protocol encouraged patient to partially weight bear within 48 /72 hours progressing to full weight bearing within the limits of pain (usually within the first week ). The same was reported by Tucker et a1C [6-8]. Even though the circumstances were antagonistic to the fracture pattern, the union time was not delayed. The main advantage of the technique is majorly preservation of vascularity, immediate joint mobilization and weight bearing, minimal operative risks and less blood los [9,10].

No significant complication with the Ilizarov method was observed in the study. Hence for open fractures of tibia with comminution and lack of soft tissue cover. Ilizarov as a primary and definitive treatment option gives reliable and satisfactory results.

6. CONCLUSION

From this study of Open communitied fractures of tibia with the Ilizarov ring fixator hybrid technique, we conclude that Ilizarov method has a major advantage to treat tibial fracture. This technique provides access for doing dressings of the open wounds. Hence we conclude that for open fractures of tibia with comminution and lack of soft tissue cover. Ilizarov as a primary and definitive treatment option gives reliable and satisfactory results.

CONSENT AND ETHICAL APPROVAL

As per international standard or university standard guideline patients consent and ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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