Does the Use of Silicone Ring Tourniquet help reduce Bleeding in the Minimally Invasive Internal Fixation with Locking Plate for Distal Femoral Fractures?

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A tourniquet aids surgeons by providing a bloodless surgical field and thus facilitates identification of structures, thereby reducing operating time and surgical complications.

It is known that the use of tourniquet in orthopedic surgery depends on the personal preference of the surgeon.

But, recently various studies reported that analyze the clinical results of the use of tourniquet.
In the cases of distal femoral fracture, surgery may be performed using a routine pneumatic tourniquet (PT) or without the use of a tourniquet itself.

When PT is placed on the proximal thigh, surgical access is difficult due to the part of the tourniquet.

In the cases of surgery without using a tourniquet, there are disadvantages such as limiting the visibility of surgery and using time to control bleeding.
The disposable silicone ring tourniquet (SRT), which has a relatively small width in the proximal thigh, can roll up to the proximal thigh, providing a wider surgical area compared to the routine PT, while providing control of bleeding during surgery.
to evaluate the usefulness of SRT by analyzing the changes of perioperative hemoglobin (Hb) levels or amount of perioperative bleeding compared with the results of the use of PT or no usage during minimally invasive plate fixation for distal femoral fractures
January, 2017 ~ December, 2019

distal femoral fractures

minimally invasive plate fixation using locking compression plate

total 30 patients

Group I : silicone ring tourniquet (SRT)

Group II : pneumatic tourniquet (PT)

Group III : no tourniquet (NT)
Materials

- age
- gender
- operative time
- preoperative Hb (preHb)
- postoperative 72-hour Hb (postHb)
- differences between preHb and postHb (preHb-postHb)
- amount of intraoperative and overall transfusion
- amount of intraoperative and postoperative and total bleeding
Statistical Analysis

- IBM SPSS Statistics Program
- ANOVA used to identify differences between groups
- \( p < 0.05 \)
Results
### Demographic Information and Clinical Features

<table>
<thead>
<tr>
<th></th>
<th>SRT</th>
<th>PT</th>
<th>NT</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>age</td>
<td>74.9</td>
<td>71.4</td>
<td>70</td>
<td>0.68</td>
</tr>
<tr>
<td>gender (female : male)</td>
<td>9 : 1</td>
<td>7 : 3</td>
<td>7 : 3</td>
<td>0.50</td>
</tr>
<tr>
<td>operative time (minutes)</td>
<td>85.2</td>
<td>84.4</td>
<td>83.1</td>
<td>0.81</td>
</tr>
</tbody>
</table>

*SRT: silicone ring tourniquet, PT: pneumatic tourniquet, NT: no tourniquet*
**Volume of Hemoglobin**

<table>
<thead>
<tr>
<th>dl</th>
<th>Pre</th>
<th>72 h</th>
<th>Dif</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12.3</td>
<td>10.9</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>9.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12.2</td>
<td>10.4</td>
<td>1.7</td>
</tr>
</tbody>
</table>

- SRT
- PT
- NT

- $p=0.08$
- $p=0.02$
- $p=0.79$
Volume of Blood Loss

<table>
<thead>
<tr>
<th></th>
<th>IO</th>
<th>PO</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRT</td>
<td>365</td>
<td>174</td>
<td>539</td>
</tr>
<tr>
<td>PT</td>
<td>413</td>
<td>174</td>
<td>588</td>
</tr>
<tr>
<td>NT</td>
<td>508</td>
<td>111</td>
<td>619</td>
</tr>
</tbody>
</table>

- IO : intraoperative
- PO : postoperative

p-values:
- p=0.004
- p=0.56
- p=0.77

IO : intraoperative, PO : postoperative
<table>
<thead>
<tr>
<th></th>
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<th>Total</th>
</tr>
</thead>
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<tr>
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<td>0.3</td>
<td>0.4</td>
<td>0.7</td>
</tr>
<tr>
<td>PT</td>
<td>0.3</td>
<td>0.6</td>
<td>0.9</td>
</tr>
<tr>
<td>NT</td>
<td>0.3</td>
<td>0.8</td>
<td>1.1</td>
</tr>
</tbody>
</table>

**p-values:**
- IO: 0.98
- 72 h: 0.50
- Total: 0.82

*IO : intraoperative*
The use of SRT in the minimally invasive plate fixation for the distal femoral fractures decreased the amount of intraoperative bleeding compared to the no usage of tourniquet.

There were no statistically significant differences in preHb-postHb, amount of transfusion, and total bleeding between groups.
Thanks for Your Kind Attention!!

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