The Use of the Bi-Component Carboxymethylcellulose-Polysaccarid B in the Knee Joint During ACL Reconstruction

Diego Costa Astur, Felipe Caravatto Baras, Renan Moukbel Chaim, Joseph J Krob, Gustavo Gonçalves Arliani, Gabriel Taniguti, Moisés Cohen
CONFLICT OF INTEREST

Diego Costa Astur, Felipe Caravatto Baras, Renan Moukbel Chaim, Joseph J Krob, Gustavo Gonçalves Arliani, Gabriel Taniguti, Moisés Cohen

The authors declare no financial conflicts to disclosure
The Use of the Bi-Component Carboxymethylcelulose-Polysaccarid B in the Knee Joint During ACL Reconstruction

INTRODUCTION

• Despite being a highly popular graft choice, the comorbidities resulting from the harvest of gracilis and semitendinosus muscle tendons to the anterior cruciate ligament (ACL) reconstruction are a substantial source of patient morbidity, delaying rehabilitation in the early postoperative period.

• Several complications are associated with hamstring tendon graft harvest:
  
  ➢ hypoesthesia to the leg due to iatrogenic injury of the infrapatellar branch of saphenous nerve
  
  ➢ subcutaneous residual hematoma in the place of the incision, causing pain, inflammation, wound dehiscence
  
  ➢ increased patient’s recovery and rehabilitation time
The bi-component carboxymethyl cellulose-polysaccharide B is a natural product that acts as a hemostatic and as an anti-adherent barrier (Adhesion®)
INTRODUCTION

The mechanism of action is two-fold:

1) Decreases the formation of subcutaneous adherence and fibrosis through the creation of a film that mechanically insulates underlying tissues.

2) Controls local bleeding through improving chemical integration between the hydrophilic particles of the polysaccharide and blood cells.
Evaluate and compare hemostatic and anti-adherent efficacy from the bi-component carboxymethylcellulose-polysaccharide B at the gracilis and semitendinosus harvest site in patients undergoing anterior cruciate ligament (ACL) reconstruction.
The Use of the Bi-Component Carboxymethylcellulose-Polysaccarid B in the Knee Joint During ACL Reconstruction

MATERIAL AND METHODS

POPULATION:

32 patients (18 to 45 years old) undergoing anatomic ACL reconstruction with hamstring tendon (autograft)

CONTROL: GROUP 1

Electrocoagulation around the hamstring tendon harvest approach and in the deep planes to control bleeding

INTERVENTION: GROUP 2

Application of the bi-component carboxymethyl cellulose-polysaccharide B (Adhesion®) at the harvest site

OUTCOME:

To evaluate and compare groups according to pain (VAS), edema, range of motion (°), and hypoesthesia
MATERIAL AND METHODS

Application: bi-component carboxymethylcellulose-polysaccharide B at the harvest site.
MATERIAL AND METHODS

- Visual analogue scale (VAS) to measure the patient's pain

- The local hematoma was evaluated according to the following criteria: presence of bulging (IV), large volume bulging without significant local pain (III), small volume bulging (II), and without bulging (I).

- The ROM examination was performed with the patient in the supine position using a goniometer fixed to the femoral lateral epicondyle.

- Neurological examination assessed sensitivity differences touching the anteromedial aspect of the tibia.
The Use of the Bi-Component Carboxymethylcelulose-Polysaccarid B in the Knee Joint During ACL Reconstruction

RESULTS

- Comparison between groups for incidence of harvest site hematoma in the immediate postoperative period.

<table>
<thead>
<tr>
<th>Hematoma</th>
<th>average</th>
<th>median</th>
<th>SD</th>
<th>min</th>
<th>max</th>
<th>N</th>
<th>CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>day 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>control</td>
<td>3.19</td>
<td>3</td>
<td>0.75</td>
<td>2</td>
<td>4</td>
<td>16</td>
<td>0.37</td>
<td>0.008</td>
</tr>
<tr>
<td>intervention</td>
<td>2.47</td>
<td>2</td>
<td>0.64</td>
<td>2</td>
<td>4</td>
<td>15</td>
<td>0.32</td>
<td></td>
</tr>
<tr>
<td>day 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>control</td>
<td>1.69</td>
<td>2</td>
<td>0.95</td>
<td>0</td>
<td>3</td>
<td>16</td>
<td>0.46</td>
<td>0.77</td>
</tr>
<tr>
<td>intervention</td>
<td>1.60</td>
<td>1</td>
<td>0.74</td>
<td>1</td>
<td>3</td>
<td>15</td>
<td>0.37</td>
<td></td>
</tr>
<tr>
<td>gain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>control</td>
<td>-1.50</td>
<td>-2</td>
<td>0.97</td>
<td>-3</td>
<td>0</td>
<td>16</td>
<td>0.47</td>
<td>0.05</td>
</tr>
<tr>
<td>intervention</td>
<td>-0.87</td>
<td>-1</td>
<td>0.74</td>
<td>-2</td>
<td>0</td>
<td>15</td>
<td>0.38</td>
<td></td>
</tr>
</tbody>
</table>

SD, standard deviation; CI = 95% confidence interval.

- Range of motion on physical exam in immediate postoperative period.

<table>
<thead>
<tr>
<th>ADM</th>
<th>average</th>
<th>median</th>
<th>SD</th>
<th>min</th>
<th>max</th>
<th>N</th>
<th>CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>day 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>control</td>
<td>55.3</td>
<td>47.5</td>
<td>33.8</td>
<td>0</td>
<td>115</td>
<td>16</td>
<td>16.6</td>
<td>0.673</td>
</tr>
<tr>
<td>intervention</td>
<td>59.7</td>
<td>60</td>
<td>21.2</td>
<td>25</td>
<td>90</td>
<td>15</td>
<td>10.7</td>
<td></td>
</tr>
<tr>
<td>day 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>control</td>
<td>73.1</td>
<td>77.5</td>
<td>28.1</td>
<td>15</td>
<td>110</td>
<td>16</td>
<td>13.8</td>
<td>0.013</td>
</tr>
<tr>
<td>intervention</td>
<td>93.7</td>
<td>90</td>
<td>10.4</td>
<td>70</td>
<td>110</td>
<td>15</td>
<td>5.3</td>
<td></td>
</tr>
<tr>
<td>gain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>control</td>
<td>17.8</td>
<td>15</td>
<td>17.0</td>
<td>-5</td>
<td>65</td>
<td>16</td>
<td>8.3</td>
<td>0.022</td>
</tr>
<tr>
<td>intervention</td>
<td>34.0</td>
<td>30</td>
<td>20.2</td>
<td>10</td>
<td>85</td>
<td>15</td>
<td>10.2</td>
<td></td>
</tr>
</tbody>
</table>

SD, standard deviation; CI = 95% confidence interval.
DISCUSSION

• This study partially supported the hypothesis that applying bi-component carboxymethylcellulose-polysaccharide B at the site of hamstring tendon harvest will result in lower incidence of postoperative hematoma and higher objective function although the incidence of hypoesthesia was not affected.

• The improvement in the gain of movement over the first 7 postoperative days also suggests that the secondary insulating film formed by the bi-component carboxymethylcellulose-polysaccharide B decreased the formation of fibroses and adhesions.

• However, when comparing the groups for the pain outcome, there was no significant difference (p > 0.05). Considering that pain symptoms at the site of graft removal is secondary to the local distension produced by the hematoma, we believe that the benefits of hemostasis may be more apparent at a later postoperative date, due to the decrease in the local fluid collection.
CONCLUSION

- The use of the bi-component carboxymethyl cellulose-polysaccharide B presented better results in hematoma control and increased range of motion in the immediate postoperative period following ACL reconstruction with hamstring autograft.

- Surgeons should consider its use in the appropriate patient population to achieve hemostasis and reduce patient morbidity.
REFERENCES


