Application of Acellular Amniotic Scaffold Following Total Ankle Replacement: A Retrospective Comparison

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STATEMENT OF PURPOSE

The purpose of this study was to compare the incidence of surgical wound dehiscence in patients who underwent total ankle replacement with placement of an acellular, dehydrated human amniotic membrane with patients who did not receive an acellular dehydrated human amniotic membrane.

LITERATURE REVIEW

Breakdown of an operative incision resulting in a wound is one of the most devastating complications following total ankle replacement (TAR). The ankle joint is particularly prone to the increasing evidence, demonstrating their ability to promote epithelialization, decrease postoperative inflammation and scarring, and improve pain, while potentially preventing infection and interfering with wound healing. The ankle joint is particularly prone to infection and scarring, and improve pain, while potentially preventing infection and interfering with wound healing.

HYPOTHESIS

We hypothesized that patients who received a decellularized, dehydrated, human amniotic membrane graft would have less tissue contracture and loss of motion with physical therapy for a successful outcome and reduction of stiffness following TAR. Early mobilization is further supported due to the importance of early range of motion exercises to reduce the risk of dehiscence. There are no studies to date that have applied amniotic membranes following total ankle replacement (TAR) as a proactive means of reducing surgical incisional healing complications.

PURPOSE

The purpose of this study was to compare the incidence of surgical wound dehiscence in patients who underwent total ankle replacement with placement of an acellular, dehydrated human amniotic membrane with patients who did not receive an acellular dehydrated human amniotic membrane.

METHODOLOGY

Study Design: Chart Review

A retrospective chart review was performed to identify consecutive patients that underwent TAR with (treatment group) and without (control group) application of acellular, dehydrated, human amniotic membrane.

Inclusion Criteria

• ≥18 years of age
• Unilateral Total Ankle Arthroplasty
• Procedure performed by one surgeon (S.A.B.)

Exclusion Criteria

• Postoperative acute traumatic injury that could potentially interfere with wound healing
• Unaltered Total Ankle Arthroplasty

Surgical Technique

Classically anterior approach excluding the 2 Zimmer implants. A peri cutaneous amniotic scaffold (Figure 1) was placed at the level of the ankle and the extensile resection was closed with 0–0 monony.

OUTCOMES

• Breakdown Postoperative wound dehiscence
• Time to wound healing
• Time to initiation of physical therapy
• Duration of physical therapy

Statistical Analyses

• Outcomes were compared between the two groups using Chi-Square test
• Nominal variables were compared using Chi-Square test
• Statistical significance was set at the 5% level (p ≤ 0.05)
• Data presented as mean ± standard deviation or count (%)

RESULTS

Table 1: Patient Demographics

<table>
<thead>
<tr>
<th>Group</th>
<th>Patients</th>
<th>Age (years)</th>
<th>Gender</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>10</td>
<td>65 ± 10</td>
<td>5 males, 5 females</td>
<td>70 ± 15</td>
</tr>
<tr>
<td>Treatment</td>
<td>10</td>
<td>65 ± 10</td>
<td>5 males, 5 females</td>
<td>70 ± 15</td>
</tr>
</tbody>
</table>

Figure 1: Acellular amniotic scaffold with the foot

Figure 2: Mean duration of physical therapy for the treatment and control group. Data presented as mean ± standard deviation.

Figure 3: Time to physical therapy initiation.

DISCUSSION

While there is inherently some incidence of dehiscence related to surgical technique, we feel this is minimized within our study due to our surgeon's experience and the understanding of the importance of presentation of soft tissue envelopes. Previous studies reported by the author demonstrated a wound complication rate of 14% with focus on presentation of soft tissue envelope [10], as well as infection rate of 20% wound complication rate before the use of an acellular scaffold [11]. The use of an amniotic scaffold has improved wound healing with early return to activity compared to the use of a synthetic mesh [12]. It is important to note that our data included patients classified as having delayed skin closure, and we assess for the superficial dehiscence, patients could have been classified as delayed skin healing as we did not distinguish these patients separately.

While not statistically significant, this study also showed that patients treated with a dehydrated, acellular human amniotic membrane began to ambulate sooner than their counterparts. This is significant due to the importance of early range of motion with physical therapy for a successful outcome and reduction of stiffness following TAR. Early mobilization is further supported throughout literature with a notable benefit associated with early return to activity. Overuse of rest may lead to delayed wound closure, and we assess for the superficial dehiscence, patients could have been classified as delayed skin healing as we did not distinguish these patients separately.

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