Comparison Efficacy of Onion Extract plus Heparin with Flucinolone Acetonide on Midsternotomy Hypertrophic Scars Following Open Heart Surgery

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Abstract: Background. Post-midsternotomy hypertrophic scars can lead to remarkable morbidities such as pigment alteration, pain, tenderness, induration, itching, and erythema so that they may be cosmetically and emotionally unacceptable to the patient undergoing midsternotomy. Initially, wound healing is induced rapidly with re-epithelialization, whereas tissue remodeling occurs several months later to create a regular scar. This study was undertaken to evaluate the efficacy of onion extract plus heparin versus Flucinolone acetonide on scar formation after midsternotomy in patients who are candidates for coronary bypass graft (CABG) surgery. Materials and Methods. One hundred patients undergoing off-pump coronary artery bypass graft (CABG) surgery were randomly assigned into two groups, group A, onion extract plus heparin (n=50), and group B, flucinolone acetonide (n=50). After performing midsternotomy for accessing to intra-chest cavity, the target vessel was exposed and snared above the anastomosis site with zero to four sutures and a soft plastic snugger was applied to prevent coronary injury. A skilled surgeon sutured incisions of the midsternotomy. The topical treatments (gel) were started one week post operation. Subjects were then asked to return to cardiovascular center three months after the surgery for evaluation of their wounds and condition of their scars. The postoperative parameters such as indurations, erythema, pigment alteration, itching, cosmetic appearance, raised area of the incision, tenderness, sternal wound infection, and duration of incision improvement were evaluated by method of Vancouver scar scale. Results. The average age of all the patients was 63.8±11, 63±11.5 was related to flucinolone acetonide group (FA) and 64±10 related to onion extract plus heparin group (OEH). Postoperative rise in scar area was observed in 63 cases, 28 cases (56%) in OEH and 35 cases (70%) in FA (p=0.14). Postoperative erythema and itching had not significant differences in both groups, therefore, onion extract plus heparin could not diminish these complications after open heart surgery (p>0.05). Conclusion. Onion extract plus heparin significantly decreased pigmentation alteration, duration of incision improvement, and tenderness after midsternotomy.

Keywords: Onion Extract, Heparin, Hypertrophic Scars, Midsternotomy, Off-Pump CABG

1. Introduction

Midsternotomy hypertrophic scars are characterized by abnormal, exaggerated healing response after skin injury during open heart surgery that protect the body surface against water loss and infection. Hypertrophic scars can lead to several morbidities such as pigment alteration, pain, tenderness, induration, itching and erythema, therefore, they may be cosmetically and emotionally unacceptable to the patient undergoing midsternotomy.¹, ³
Current therapeutic methods for the prevention and management of scars are included systemic pharmaceutical treatment such as intralausal steroids and hyaluronidase, topical treatments such as silicone gel sheeting, cryotherapy, laser therapy and pressure dressings. The exact therapeutic pathway of scar formation is still unknown. Topical therapies are increasingly utilized for the patients for their ease of local consumption, non-invasiveness, comfort and relatively low costs.1-5

Onion extract (Allium cepa) can play the role of anti-scar on skin through up-regulation of Matrix Metallo Proteinase-1 (MMP-1) expression and can induce collagen down-regulatory properties.6 Heparin possesses the ability of interacting with collagens strongly, therefore, heparin and onion extract may affect scar development through inhibition of inflammatory reaction and rate of proliferation of fibroblast.6-8 Fluocinolone acetonide is utilized by the surgeons worldwide to improve post-surgical scars in patients undergoing midsternotomy or thoracotomy. This study was undertaken to evaluate the efficacy of onion extract plus heparin versus Fluocinolone acetonide on scar formation after midsternotomy in patients as candidates for coronary artery bypass graft (CABG) surgery.

2. Methods and Materials

This is a double-blind randomized clinical trial study approved by the regional committee of our university. After receiving the written consent from patients, they participated voluntarily in off-pump CABG surgery in the Afshar cardiovascular center of Yazd, Iran from February 2010 to August 2011. All the operations were performed by a skilled surgeon. The patients with a history of midsternotomy burns and trauma in the chest area, sensitivity to corticosteroids, who were pregnant or lactating females were excluded from the study. The patients were randomly assigned into two groups, group A, onion extract plus heparin (OEH) (n=50), and group B, fluocinolone acetonide (FA) (n=50). Onions were gained from a local market in Yazd, Iran. The onions had been cultivated and harvested in Yazd, Iran. The onions were peeled, washed three times in tap water and were dried, chopped, mixed, and then extracted. The dried onions were mechanically crushed with a food crusher (Kenwood Co, UK). The crushed onions were blended with distilled water at a concentration of 20 mg/ml, the pH was adjusted to 6.5 with phosphate buffer, and extraction was done by using the Soxhlet method. The topical gel (OEH) preparation was included 10% aqueous onion extract and 50 IU/gr heparin. The form of fluocinolone acetonide (FA) was also topical gel. After performing midsternotomy to access to intra-chest cavity, the target vessel was exposed and snared above the anastomosis site with zero to four sutures and a soft plastic snagger was applied to prevent coronary injury. Finally, only a skilled surgeon sutured incisions of midsternotomy. The topical treatments (gel) were started one week post operation. The cases were then asked to return to the cardiovascular center 3 months following surgery for evaluation of their wound and condition of their scars. The postoperative parameters such as indurations, erythema, pigmentation alteration, itching, cosmetic appearance, raised area of the incision, tenderness, sternal wound infection, and duration of incision improvement were collected according to the Vancouver scar scale. The groups were balanced in terms of age and sex. The individual who recorded the data was not aware of the patients’ group categorization. The data collected were then analyzed by SPSS 15. We used ANOVA, Chi-Square and Fisher exact test for quantitative and qualitative variables.

3. Results

One hundred patients (n=100) as candidates of off-pump CABG undergoing midsternotomy enrolled in this study. The average age of all the patients was 63.8±11, 63±11.5 was related to fluocinolone acetonide group (FA), and 64±10 to onion extract group (OEH). Of all the patients, induration of scars was observed in 71 cases, 35 cases in onion extract plus heparin group and 36 cases in fluocinolone acetonide group (p=0.82).

Table 1. Demographic characteristics of both groups.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Onion extract plus heparin group (n = 50)</th>
<th>Fluocinolone acetonide group (n = 50)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (year)</td>
<td>64±10</td>
<td>63±11.5</td>
</tr>
<tr>
<td>Sex (M/F) (n)</td>
<td>37/13</td>
<td>34/16</td>
</tr>
</tbody>
</table>

Table 2. Postoperative outcomes in both groups.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Onion extract plus heparin group (n = 50)</th>
<th>Fluocinolone acetonide group (n = 50)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Induration of scars (n)</td>
<td>35</td>
<td>36</td>
<td>0.82</td>
</tr>
<tr>
<td>Sternal wound infection [n (%)]</td>
<td>8 (16%)</td>
<td>14 (28%)</td>
<td>0.14</td>
</tr>
<tr>
<td>Tenderness of scars [n(%)]</td>
<td>11 (22%)</td>
<td>31 (62%)</td>
<td>0.000</td>
</tr>
<tr>
<td>Raised scars [n (%)]</td>
<td>28 (56%)</td>
<td>35 (70%)</td>
<td>0.14</td>
</tr>
<tr>
<td>Pigmentation alteration [n (%)]</td>
<td>23 (46%)</td>
<td>35 (70%)</td>
<td>0.015</td>
</tr>
<tr>
<td>Cosmetic appearance [n(%)]</td>
<td>35 (70%)</td>
<td>19 (38%)</td>
<td>0.001</td>
</tr>
<tr>
<td>Duration of incision improvement (day)</td>
<td>12.38±2.8</td>
<td>15.08±3.16</td>
<td>0.000</td>
</tr>
</tbody>
</table>

The postoperative sternal wound infection had not significant difference between the groups, 8 cases (16%) in...
of our study. According to our findings, cosmetic appearance alterations following midsternotomy were observed in 54 cases (54%), 35 cases (70%) in OEH and 19 cases (38%) in FA, proving that FA has more capacity in inducing cosmetic deformity compared with OEH. Jenwitheesuk et al. in their study reported that the combination of administration of silicone and onion extract is safe and effective in decreasing pigmentation following median sternotomy. In addition, in a review article by Shckman et al. was reported that 5-fluorouracil, Allium cepa (onion extract), intraläsionale corticosteroid injection and intraläsionale verapamil are medical management of keloids. Aysan et al. reported that single dose of contractubex (Allium cepa plus heparin sodium plus allantoin) could not prevent postoperative peritoneal adhesions formation. A comparative study conducted by Perez et al. showed that Hydrocortisone, Silicone, vitamin E (HSE) and onion extract could significantly improve erythema and pigmentation compared with placebo, therefore, HSE and onion extract turned out to be more effective in the improvement of scars than placebo in their study. Altogether it can be concluded that the topical treatment, which is consist of onion extract plus heparin (OEH) significantly decreases pigmentation alteration, duration of incision improvement, and tenderness after midsternotomy.

Conflict of Interest
None Declared

References


