SECONDARY SUTURE IN COMPLICATION MANAGEMENT OF SUBCUTANEOUS SURGICAL SITE INFECTIONS AFTER COLORECTAL SURGERY: A PROSPECTIVE CASE SERIES USING NPWT WITH A PHMB GAUGE SYSTEM

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Introduction
In our prospective case series, subcutaneous infections after median laparotomy for colorectal surgeries were treated by NPWT with a PHMB gauge system (Easy Drain®) and finally closed by secondary suture. The hypothesis was that NPWT provides shorter treatment time, minimal pain and lowered overall treatment costs for the total treatment when compared to standard treatment (in this case 3 to 5) dressing with gauze plus 0.04% PHMB solution. The study was approved by the ethics committee of the medical board, federal state of Baden-Württemberg.

Study Protocol
- Diagnosis of subcutaneous wound infection and exclusion of fascia dehiscence
- Opening of wound, microbiological swab and debridement, photo documentation
- NPWT* was applied to wounds with PHMB gauze interface**, a round silicone drain and opening of wound, microbiological swab and debridement, photo documentation
- Diagnosis of subcutaneous wound infection and exclusion of fascia dehiscence
- Removal of stitches after 14 days and control of healing after 8 weeks.
- NPWT* was applied continuously and dressings were changed every 2 – 4 days.
- Secondary suture under local anesthesia plus subcutaneous drainage without suction.
- Removal of stitches after 14 days and control of healing after 8 weeks.
- None of the patients presented with complications such as:
  - Malalignment of the wound
  - Uninfected cellulitis or malformation
  - Non-sterile and unexplored fistula
  - Necrotic tissue with eschar present
- NPWT dressing was not placed over exposed blood vessels or organs.

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Results
19 patients in female, 12 male, age 46 – 93 years, ASA 1 – 6 after median laparotomy were included. All patients voluntarily participated and signed a consent form, no patient rejected, released or dropped out during therapy. Validating our patients data by comparison with the literature shows evidence of conformity. Our patients fit into the “normal” class of patients for colon surgery. The mean age of patients undergoing colon surgery in the literature is given as 66 years. In our study we calculated the mean ages as 68.4 years (standard deviation 12.5 years, range 47 – 83 years). The mean BMI was calculated as 26.3 (STD = 4.7).

Average wound volume was noted as 203 ml (STD = 174 ml, range 16 – 488 ml) and finally closed by sec. The wound healed without complications.

Table 1: Time intervals in days (d) and pain level (VAS)

<table>
<thead>
<tr>
<th>Time interval</th>
<th>VAS Pain Level</th>
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<tbody>
<tr>
<td>Secondary suture</td>
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<tr>
<td>Treatment time</td>
<td>43.9</td>
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<td>Changes of the dressings</td>
<td>26</td>
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<tr>
<td>Primary suture</td>
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<tr>
<td>Treatment time</td>
<td>14.0</td>
</tr>
<tr>
<td>Changes of the dressings</td>
<td>12</td>
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<tr>
<td>Total treatment time</td>
<td>58.0</td>
</tr>
<tr>
<td>Secondary suture</td>
<td></td>
</tr>
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<td>12</td>
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Table 2: Cost calculation NPWT

<table>
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<tr>
<th>Product notation:</th>
<th>NPWT</th>
<th>Priced at</th>
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<tr>
<td>1st NPWT (d)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd NPWT (d)</td>
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<td>3rd NPWT (d)</td>
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<tr>
<td>3rd NPWT (d)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total cost</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cost calculation NPWT

- 1st NPWT (d): 3 dressing + $101.26 US = $15.40 US
- 2nd NPWT (d): 3 dressing + $101.26 US = $15.40 US
- 3rd NPWT (d): 3 dressing + $101.26 US = $15.40 US
- Total cost: $455.30 US

In our patients with complications, additional wound therapy was necessary on an average of 3.3 dressings per extra wound therapy. This would lead to lower total treatment costs.

The low benefits of NPWT was worked on and especially used in the treatment of complex and infected wounds.

Conclusions
All patients were satisfied with the treatment and NPWT results. In the second group, a healing rate of almost 90% could be achieved using subcutaneous drainage with a suction protocol 3 days after secondary suture.

Compared to standard wet-to-dry dressing techniques, NPWT treatment provides an inappropriate method for treating total treatment costs. PHMB gauze under NPWT proved to be a powerful system for treating SSI, providing a comfortable dressing that was not to be in a "minimal pain level range" during dressing changes, and lowered total treatment time and costs. Finally, our NPWT 3 x 3 day protocol is recommended for subcutaneous infections of median laparotomies after abdominal surgery and has since become a standard treatment for SIS in our hospital.

Acknowledgements
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