Post-surgical wound management of pilonidal cysts with a haemoglobin spray: a case series

Painful acute cysts in the natal cleft or lower back, known as pilonidal sinus disease, are a severe burden to many younger patients. Although surgical intervention is the preferred first line treatment, postsurgical wound healing disturbances are frequently reported due to infection or other complications. Different treatment options of pilonidal cysts have been discussed in the literature, however, no standardised guideline for the postsurgical wound treatment is available. After surgery, a common recommended treatment to patients is rinsing the wound with clean water and dressing with a sterile compress. We present a case series of seven patients with wounds healing by secondary intention after surgical intervention of a pilonidal cyst. The average age of the patients was 40 years old. Of the seven patients, three had developed a wound healing disturbance, one wound had started to develop a fibrin coating and three were in a good condition. The applied wound care regimens comprised appropriate mechanical or autolytic debridement, rinsing with an antimicrobial solution, haemoglobin application, and primary and secondary dressings. In all seven cases a complete wound closure was achieved within an average of 76 days with six out of seven wounds achieving wound closure within 23–98 days. Aesthetic appearance was deemed excellent in five out of seven cases excellent and acceptable in one. Treatment of one case with a sustained healing disturbance did result in wound closure but with a poor aesthetic outcome and an extensive cicatrisation of the new tissue. Based on these results we recommend that to avoid healing disturbances of wounds healing by secondary intention after surgical pilonidal cyst intervention, an adequate wound care regime comprising appropriate wound debridement, rinsing, topically applied haemoglobin and adequate wound dressing is recommendable as early as possible after surgery.

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Pilonidal sinus disease; haemoglobin; oxygen; secondary wound healing

Pilonidal sinus disease arises in the hair follicles of the natal cleft of the sacrococcygeal area, resulting in an acute or chronic inflammation of subcutaneous tissue. It affects approximately 0.7% of the population but is most frequent in young adult men who are affected at least twice as frequently (1.1%) as women (0.6%). The annual treatment rate for pilonidal cysts is approximately 0.03% in England, based on 17,425 finished consultant episodes within the NHS and a population in England of 54.3 million.

A number of conservative and surgical approaches have been described for the management of pilonidal sinus. Surgical intervention is a widely used treatment option, in particular for chronic pilonidal sinus. One strategy is to leave the wound open for granulation after excision. Obviously, this is associated with a longer time to wound closure and several dressing changes. In addition, healing disturbances (for example wound healing stagnation, increase of wound size, increase of pain) are frequently observed due to infection, fibrin layers or other complications resulting in a delayed wound closure or chronic wound. Dependent on the type of surgical procedure, recurrence rates of 7–56% have been reported.

Remarkably, there is a lack of appropriate guidelines for wound management after surgery of a pilonidal cyst, in particular for wounds healing by secondary intention (open wounds). Applying standard wound care to secondary healing wounds, the prevention of infection and moist wound care are two major parts of modern treatment protocols. Most recently, improved oxygen supply to the wound bed has been discussed as a new part of modern wound therapy, in particular for chronic wounds of the lower extremities or secondary healing wounds. Several approaches to deliver additional oxygen topically to the wound are described in the literature, including the topical application of haemoglobin to improve the oxygenation.
Clinical data of this adjunctive therapy support an enhancement of wound healing in different wound types and conditions. Here we describe the post-surgical wound management of seven pilonidal cysts after excision with secondary healing wounds using standard wound care protocols with the additional application of a haemoglobin spray. The main aim of the retrospective analysis was to assess the protocol with respect to fast wound closure, avoidance of healing disturbances or restarting wound healing of stagnating wounds. A second objective was to obtain the best possible aesthetic results of scar tissue.

Methods
Treatment was performed at the Centre of Wound Care at the Northwest Hospital Frankfurt am Main.

Ethics
The authors declare that the project was performed with the subjects’ signed written informed consent and approval to use any photographs taken. Ethical approval was not required, as it is a retrospective (non-interventional) review of clinical data obtained from therapies using the CE-marked product (Granulox) within the scope of product claims.

Cases 1–4
Dependent on the wound, the following treatment regime was applied:
- Mechanical debridement of fibrous coating and necrotic tissue, as required
- Rinsing with an antimicrobial irrigation solution, as required (Lavasept or Microdacyn)
- Application of the haemoglobin spray (Granulox)
- Application of a primary dressing (alginate/Supra-

Table 1. Summary of the patient data, wound status and healing time

<table>
<thead>
<tr>
<th>Case number</th>
<th>Age (years)</th>
<th>Gender</th>
<th>Wound condition</th>
<th>Time from surgery to first visit at wound care centre (days)</th>
<th>Treatment time at wound care centre (days)</th>
<th>No. of dressing changes</th>
<th>Wound healing (Closure)</th>
<th>Cosmetic quality of scar tissue</th>
<th>Recurrence</th>
</tr>
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<tr>
<td>1</td>
<td>24</td>
<td>Female</td>
<td>Fibrin No</td>
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<td>15</td>
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<tr>
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<td>97</td>
<td>26</td>
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<td>moderate</td>
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<tr>
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<td>98</td>
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<tr>
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<td>Yes</td>
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<td>152</td>
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<tr>
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<td>23</td>
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<td>2</td>
<td>32</td>
<td>9</td>
<td>Yes</td>
<td>excellent</td>
<td>No</td>
</tr>
</tbody>
</table>

n.d.–not determined; SD–standard deviation  *small fistula, closed within 3 weeks
sorb AG) if required during exudation phase and as long as cavities and wound pockets existed to prevent superficial wound closure
- Application of a secondary absorbent compress or hydropolymer (PU foam, Mepilex) dressing.

The treatment protocol and intervals of treatment were adapted during the according to need.

Cases 5–7
All three patients were treated as follows:
- In the first week, wound treatment with autolytic debridement, followed by hydrofiber foam (PolyMem) which was repeated every second day
- The wound was rinsed with an antimicrobial irrigation solution (Microdacyn) after wound debridement/cleansing at each dressing change
- Before the application of the haemoglobin spray (Granulox), a mild laser therapy was performed (Heltschl Laser FL) for 15 minutes
- A primary tamponade (absorbent foam, PolyMem-Wic) was applied as long as cavities and wound pockets existed to prevent superficial wound closure
- Wounds were covered by a foam dressing (PolyMem).

After week one, treatment frequency decreased to once a week, without autolytic debridement.

Additional care
Hair was removed at the wound border, if necessary, to avoid further inflammation by ingrowing. No other care or aftercare after wound closure was applied.

Results
The median age of the patients was 39 years and four patients were ≥39 years old. Infection was observed in five out of seven patients, and three out of seven had a wound healing disturbance of at least five weeks at the start of the new treatment protocol.

All seven patients exhibited successful wound closure with a median of 70 days (average 76 days, Table 1). No recurrence of healed wounds was reported by any of the patients three months after wound closure (phone interview or personal visit), and for six patients after six months, while one case of recurrence was reported after nine months (Table 1).

Scar assessment was performed by visual evaluation. We had a scoring from 1 to 3 (poor, moderate, and excellent wound tissue) based on the experience of the wound manager. In three of four cases treated with the haemoglobin spray within the first six days after excision, excellent scar tissue quality was observed, while one was classified as moderate. In two cases with mild to severe healing disturbances an excellent cosmetic tissue result was achieved. One case with a severe healing disturbance revealed an extended healing time (152 days) with a poor aesthetic result.

Case 1
A 24-year old female patient came to the medical consultation in the hospital with a painful abscessing pilonidal sinus in the sacrococcyx region. A surgical excision of the complete pilonidal cyst to the pre-sacral fascia without plastic covering was performed one day later. The wound was treated at the hospital once a day by rinsing with Ringer’s solution and covering with a sterile compress. After 5 days, the patient was discharged from the hospital and referred to the wound care centre of the hospital.

At the wound care centre, the wound was inspected (Fig 1a and b) and treatment changed. The wound was treated 3 times a week starting with a mechanical debridement of the fibrinous coating, rinsing with an antimicrobial irrigation solution, application of a haemoglobin spray and alginate tamponade as primary dressing and an absorbent secondary dressing. After one week, the frequency of wound treatment was reduced to twice a week (Fig 1c and d), with mechanical debridement no longer required. While a cavity was present, an alginate tamponade was applied to avoid superficial wound closure and infection. After four weeks, granulation tissue filled up the cavity. Subsequently treatment was changed to the application the haemoglobin spray and dressing with...
a hydropolymer (Mepilex) once a week (Fig 1f and g). Full closure of the wound with an excellent cosmetic skin quality was achieved after 70 days (Fig 1h). The patient reported no recurrence at 9 months after closure.

**Case 2**
A 51-year-old male presented with a swollen, infected, painful and abscessing pilonidal sinus in the sacral region. The swelling was at least 4 days old. The patient reported that he had already had several incisions in the past. Due to the existing infection, a deep surgical excision of the complete pilonidal cyst to the pre-sacral fascia without plastic covering was performed on the same day. After the complete excision, the wound was rinsed with an antimicrobial solution (Octenisept) and filled with a PVP-iodine soaked tamponade. The next day, the tamponade was removed and the wound covered with a sterile compress. The patient was discharged from the hospital two days after surgery with the recommendation to rinse the wound with (tap) water after each defecation. The patient returned after six days (Fig 2a), with the wound already having a fibrin coating and necrotic tissue indicating healing disturbances. To avoid the development of a severe healing disturbance the wound care treatment was changed. The wound was treated three times in the first week by mechanical debridement to remove the observed fibrin coating, rinsing with an antimicrobial irrigation solution, application of haemoglobin spray and alginate tamponade as primary dressing and an absorbent secondary dressing. After 1 week (Fig 2b), the frequency of wound treatment was reduced to twice a week. To avoid wound infection and superficial wound closure, the alginate tamponade was applied as long as the wound bed was not filled up with granulation tissue (Fig 2 c–e). After 11 weeks, granulation resulted in a nearly planar wound. Subsequently, the treatment was changed to cleansing without debridement, haemoglobin spray application and dressing with a hydrofoam dressing once a week. After 98 days, wound closure with an excellent cosmetic skin quality was achieved. No additional plastic coverage was necessary as originally planned at the surgical intervention.

**Case 3**
A 58-year-old female was hospitalised with an abscessing, infected and perforated pilonidal sinus in the sacral region. A surgical intervention of the complete pilonidal cyst was performed one day after hospitalisation. Initially it was planned to keep the wound under controlled secondary healing until the end of the inflammatory phase of wound healing, followed by a plastic covering. The day after the surgery, the patient was referred to the wound centre of the hospital (Fig 3a) and the wound treatment regime described below was adopted.

For the first week, the wound was treated every second day by mild debridement, and rinsed with an antimicrobial irrigation solution and application of the haemoglobin spray. The wound was then filled with an alginate tamponade and covered by an absorbent dressing. After 1 week, the frequency of wound treatment was reduced to twice a week. As long as the wound was not planar, an alginate tamponade was applied to avoid wound infection and superficial wound closure. After nine weeks, granulation resulted in a nearly planar wound. Subsequently, the treatment was changed to cleansing without debridement, haemoglobin spray application and dressing with a hydrofoam dressing once a week. After 98 days, wound closure with an excellent cosmetic skin quality was achieved. No additional plastic coverage was necessary as originally planned at the surgical intervention.

**Case 4**
A 49-year-old male presented with a stagnating wound to the hospital wound centre. He explained that the healing stagnation had persisted for more than six weeks. He reported that four weeks after the first surgical excision of the abscessing pilonidal sinus, a deep revision of the wound was conducted. The postsurgical wound treatment recommendation was rinsing with tap water and covering with a sterile compress at home. He pre-
presented at the wound centre two weeks after the revision, with a healing problem.

Immediately, the treatment regime was modified to pre-condition the wound for healing. At the first treatment, a thorough mechanical sharp debridement was conducted to remove the massive fibrin coating which had developed during the stagnation phase. In the first week, wound treatment with mechanical sharp debridement was repeated every second day. After each debridement, the wound was rinsed with an antimicrobial irrigation solution. Subsequently, haemoglobin spray was used on the entire wound area. Hydrofiber foam (Aquacel) served as an adsorbent tamponade which was covered by an additional absorbent dressing. Dependent on the exudate level, this absorbent dressing was changed more frequently. After 8 weeks, the frequency of wound treatment was reduced to twice a week. The foam tamponade was applied as long as a cavity was present in order to avoid wound infection or wound closure. After 13 weeks, treatment was changed to haemoglobin spray and a hydropolymer foam dressing as sufficient granulation tissue had developed. Treatment of the wound was conducted once a week. Full closure of the wound with very poor cosmetic skin quality was achieved after...
152 days. No recurrence of the wound was reported six months after wound closure. After eight months, the patient visited the wound centre with a small fistula at the distal end of the original wound area. Wound was cleansed and treated according to the above mentioned protocol. Wound closure was achieved within 3 weeks.

**Case 5**
A 30-year-old male presented with a wound with disturbed healing. He explained that the status of the wound had persisted for more than five weeks. During this period, the wound was rinsed with tap water and covered with a sterile compress at home on a daily basis. After changing the treatment regimen as described in the methods, wound closure with excellent cosmetic skin quality was achieved within 23 days (Fig 5a and b).

**Case 6**
A 39-year-old female exhibited a 6-week old secondary healing wound with disturbed healing. Over this period, the wound was rinsed with tap water and covered with a sterile compress at home at each dressing change. At the wound care centre, the treatment regimen was changed as described in the methods. Wound closure with excellent cosmetic skin quality was achieved within 59 days (Fig 5c and d).

**Case 7**
A 27-year-old male was hospitalised for surgical intervention of a pilonidal cyst. After the surgery (2 days) the patient was referred to the wound centre and treatment was performed according to the above described regimen. Wound closure was achieved within 32 days with excellent cosmetic skin quality (Fig 5e and f).

**Discussion**
Sinus pilonidalis disease is a painful burden to patients and often leads to complications. Primary closure of postsurgical wounds has the known advantage of reduced healing time and aesthetic comfort but is associated with extended hospitalisation, frequent re-opening of the wound, necrosis of flaps, and infection. Secondary healing of the wound is used mainly where a large excision is required. It is associated with a shorter hospitalisation but bears a higher risk of infection, tissue necrosis and subsequently a longer period of treatment.

For the secondary healing approach, a robust and easy-to-apply wound care protocol is required that accelerates healing, preventing superficial closure or infection and results in aesthetically good tissue as an important factor to prevent wound recurrence.

Supplementary to the current modern standard wound care (moist wound treatment and infection control), additional topical oxygen supply is discussed as an important part of modern wound care. Recently, it has been shown that topically applied purified haemoglobin as an adjunctive treatment to existing protocols is capable of providing oxygen locally to the wound and improving healing. Several case reports and clinical evaluations have demonstrated that haemoglobin spray can be successfully implemented in standard wound care protocols to attenuate healing of chronic non-healing wounds.

In the case series presented, the haemoglobin spray was as an integral part of the wound care protocols. Between 2011–2015 we identified seven cases with an average age of 40 years old, higher than typically reported in the literature. In five out of seven described cases, patients were significantly older than typically described in the literature. The average age of this subgroup of five patients was 49 (39–55 years), while the average healing time was 86 days. Age may have an impact on overall wound healing, as it is known that increased age is a major risk factor for impaired wound healing.

All seven cases resulted in successful wound closure (full epithelialisation) within the expected time frame (40–90 days) for open wound management described in the literature.

In three cases with healing disturbances resulting in stagnation, wound closure was achieved after pre-conditioning of wounds (debridement) in combination with the wound care protocol. Results suggest that under various wound conditions the...
described protocol is an effective and easy regimen for such types of wounds. Similar protocols using haemoglobin spray to improve the oxygenation situation at the wound bed have been described for other wound types with healing disturbances like sloughy wounds. In all such cases a positive impact on wound healing was reported.26-39 Beneficial results have also been seen with haemoglobin in various wound types including pressure ulcers, diabetic foot ulcers, and venous leg ulcers.22-24,39

While only a small number of cases are described, all achieved closure without any further healing disturbances or other complications. In addition, no recurrence of pilonidal disease was observed at least within the first 3 to 6 months. However, further studies should be conducted to elucidate the benefits of the described wound care protocols regarding their robustness for treatment of wounds after pilonidal cyst excision and open wound healing with respect to aesthetic outcome and recurrence rate.

Conclusion This case series of patients with excision of pilonidal cysts with secondary healing wounds described post-surgical wound treatment, which resulted in wound closure without any further disturbances. These cases highlight the importance of using state of the art products to improve the overall quality of resulting skin tissue. Additional application of haemoglobin solution as adjunctive therapy for the treatment of post-surgical pilonidal cyst wounds is likely to improve healing outcomes and the quality of the resulting skin tissue.