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SHORT COMMUNICATION

Impact of incisional negative pressure wound therapy on perineal wound healing after abdominoperineal rectum extirpation

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Abstract
Introduction Perineal wound healing disorders are one of the major complications following abdominoperineal rectum extirpation.
Methods and results We evaluated the impact of an "incisional negative pressure wound therapy" (iNPWT) system after abdominoperineal rectum extirpation in six patients. All patients had a neoadjuvant radiochemotherapy with 50.4 Gy and 5-FU. Five of the six patients (83%) experienced complication-free healing of the perineal wound after 5 to 12 days of iNPWT. One patient developed a wound healing disorder 8 days after abdominoperineal rectum extirpation during current iNPWT.
Discussion Use of an iNPWT system can be of favor after abominoperineal rectum extirpation.

Keywords Negative pressure wound therapy · Colorectal cancer · Rectum extirpation

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Introduction

Abdominoperineal rectum extirpation is the sole curative surgery for patients with ultra-low rectal carcinomas or with recurrent or persistent anal canal carcinoma. Unfortunately, the postoperative course following extirpation is often prolonged by complications. Besides abscesses and secondary bleeding, perineal wound healing disorders are among the most serious complications. Due to their anatomical localization, perineal wounds are subjected to high shearing forces and continuous pressure when the patient is sitting or lying down. Moreover, patients who undergo abdominoperineal rectum extirpation have often received prior pelvic irradiation, which can compromise postoperative wound healing. In the literature, wound healing problems are reported in up to 40% of previously irradiated patients [1].

Perineal wound healing disorders can delay start of adjuvant chemotherapy, entail high costs, prolong hospital stays, and place great psychological stress on patients. For more than two decades, so-called incisional negative pressure wound therapy (iNPWT) systems have been commercially available. iNPWT involves the placing of a sterile foam dressing over the primary closed wound and application of continuous negative pressure. This achieves continuous removal of fluids and infectious materials from the wound site, reduces cutaneous edema, and stimulates angiogenesis [2].

First case control studies and prospective randomized studies of heart, thorax, accident, and vascular surgery show that prophylactic application of iNPWT can significantly reduce the incidence of postoperative wound healing disorders. This is especially true of wounds susceptible to complications such as herniotomy and sternotomy incisions as well as inguinal wounds [3, 4].

We present in the following our first experience with an iNPWT system in treating perineal wounds following abdominoperineal rectum extirpation.

Patients and methods

A total of six consecutive patients who had previously undergone abdominoperineal rectum extirpation were treated using an iNPWT system (Prevena™ Incision Management System, KCI, Wiesbaden, Germany) postoperative. Median age was 62.5 years at time of operation, four were male, two females. All patients had been treated with a neoadjuvant radiochemotherapy with 50.4 Gy and 5-FU for ultralow rectal adenocarcinoma or one for neuroendocrine carcinoma. One patient had undergone pelvic exenteration and wound closure using a vertical rectus abdominis myocutaneous (VRAM) flap.

After closure of the perineal wound using a Prolene™ 2/0 suture, prophylactic treatment began with the iNPWT system applying a continuous negative pressure of 100 mmHg. Vacuum-assisted closure (VAC) bandages were changed by a doctor and a specially trained wound manager every 3 days or if leakage occurred. Perifocal wound conditions were monitored daily.

Results

Five of the six patients (83%) experienced complication-free healing of the perineal wound after 5 to 12 days of iNPWT. Figure 1 shows the wound healing course in one of these patients as a representative example. In one patient (17%), wound dehiscence occurred after 8 days. The iNPWT system was removed in this patient, and conservative wound therapy with a classic VAC system initiated. Under this therapy, the perineal wound had completely healed after 3 months.

It is noteworthy that the only patient who experienced wound-healing problem had the recurrence of a rectal carcinoma with a previous cycle of radiation in his medical history.

Discussion

Superficial wound infections of the skin generally respond well to treatment. Infections of deep wounds with wound dehiscence in contrast are often recalcitrant to treatment, especially if they are located in body regions subjected to shearing forces or pressure. This applies especially to perineal wounds in patients following rectum extirpation.

The present study shows that prophylactic negative pressure therapy using a commercially available iNPWT system led to optimal wound healing in five of six patients (83%). Complications were encountered only in one patient who had received a high total radiation dose to the anoderm, which probably contributed to the poor wound healing. Use of the iNPWT system in our patients required close monitoring. In female patients in particular, effective sealing of the system against leakage in the introitus vaginae proved to be a major problem. Since a leak in the system with consequent accumulation of non-draining wound fluids over several hours can

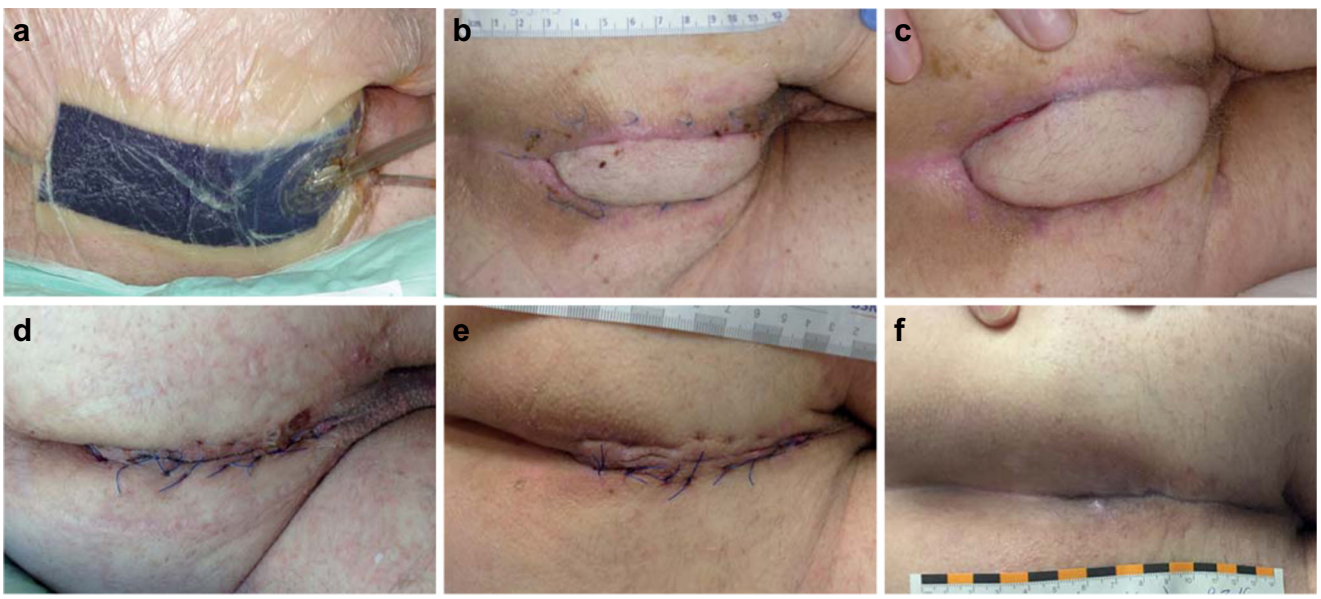

Fig. 1. Perineal site following rectum extirpation and closure of the defect with a vertical rectus abdominus myocutaneous (upper panel VRAM flap **a** 1st post-OP day, **b** 4th post-OP day, **c** 14th post-OP day; lower panel primary closure **d** 1st post-OP day, **e** 4th post-OP day, **f** 14th post-OP day)

drastically compromise the therapy, quick stoppage of the leak is essential. In the only patient, failure of the iNPWT was at least partially due to leakage. Still, we think the costs associated with iNPWT are entirely justified since only few patients undergo rectum extirpation and since the negative impact of perineal wound healing disorders is so great.

The effectiveness of prophylactic negative pressure therapy has been examined in studies from various surgical specialties including heart and thorax surgery, orthopedics and trauma surgery, vascular surgery, and plastic surgery. The results from all of these studies show that prophylactic use of epicutaneous negative pressure therapy facilitates healing of incisional wounds. Major complications are not described. It must be mentioned however, that to date, no randomized controlled studies have been published regarding the general effectiveness of this therapy in e.g., subgroups of adipose or immunosuppressed patients [3–6].

In our experience, the positive effect of iNPWT for perineal wounds can be attributed to the following factors: (a) The continuous removal of exudate keeps the wound dry, thus averting the common wound care problem of macerated wound edges; (b) the negative pressure reduces the wound edema with consequent improved physiologic adaptation of the wound; and (c) the foam dressing protects the wound from external mechanical stresses.

In summary, prophylactic application of epicutaneous iNPWT reduces the incidence of wound healing disorders following abdominoperineal rectum extirpation, but may be of less sufficient in patients who have previously received a high total radiation dose or undergo recurrence operations.

Compliance with ethical standards

Foundation There was no research foundation for this work.

Conflict of interest The authors declare that they have no conflict of interest.

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