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# Inguinal lymph node dissection: Epidermal vacuum therapy for prevention of wound complications

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Received 21 June 2012; accepted 27 September 2012

## KEYWORDS

Inguinal lymph node dissection;  
Penile cancer;  
Prevention;  
Vacuum therapy;  
Wound complication

**Summary** *Background:* Inguinal lymph node dissection (LND) is often associated with wound complications. The aim of this study was to evaluate epidermal vacuum therapy for the prevention of wound complications following inguinal LND.

*Methods:* From January 2009 to March 2012, a total of 24 patients with penile cancer or cancer of the urethra received uni- or bilateral inguinal lymphadenectomy in our institution. Postoperative wound care consisted of conventional wound care (CWC) in 16 patients or epidermal vacuum dressings (VAC) in eight patients. Maximum drained fluid per day, duration of drainage, duration of hospitalisation and inguinal complications (formation of lymphocele, persistent lymphorrhoea or lymphoedema of the lower extremity) as well as rate of reinterventions were evaluated retrospectively. Mann–Whitney *U*-tests were performed to compare treatment groups for maximal drained fluid per day, duration of drainage and duration of hospitalisation. Binary data were compared with Fisher's exact test. Statistical calculations were performed on a patient level.

*Results:* Patients treated with CWC showed a slight tendency to higher values of maximum drained fluid per day ( $p = 0.632$ ), duration of drainage ( $p = 0.496$ ) and a significantly longer time of hospitalisation ( $p = 0.049$ ). Epidermal VAC treatment resulted in significantly fewer complications such as formation of lymphoceles (62% vs. 20%), persistent lymphorrhoea (45% vs. 7%) or lymphoedema of the lower extremity (46% vs. 0%) ( $p = 0.032$ ). Reinterventions had to be performed in 23% of inguinal wounds (four patients) treated with CWC and for 7% of inguinal wounds (one patient) treated with epidermal VAC ( $p = 0.631$ ).

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**Conclusions:** Epidermal VAC following inguinal LND might be advantageous for the prevention of postoperative wound complications. Prospective, controlled studies are warranted to further evaluate efficacy and cost-effectiveness.

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Penile cancer represents a rare disease with an incidence rate of 0.5–1.6 per 100,000 males in Europe and the United States.<sup>1</sup> In the treatment of patients with penile cancer inguinal lymph node dissection (LND) is indicated for pathological stages pT1 G3 or higher or when palpable lymph nodes are present. However, surgery in the inguinal region is often associated with significant morbidity for the patients. Breakdown of inguinal wounds with protracted secondary healing, prolonged lymph leakage or formation of lymphocele can occur in up to 30–70% of patients.<sup>2–7</sup> These complications can further lead to secondary infections with skin-flap necrosis, leg and scrotal oedema, compression of blood vessels with thrombosis and pain.<sup>6,8–11</sup> Aetiology for inguinal wound breakdown is fostered by anatomical stress on connective tissue, poor nutritional status in adipose tissue and persistent lymphorrhoea or seroma formation. Risk factors for lymphorrhoea and seroma formation are multifactorial and triggered by impaired drainage of lymphatic fluid or lymphorrhoea from severed lymphatic vessels, local inflammatory processes, surgically created dead space and the use of electrocautery providing an ideal basis for infection.<sup>3,12</sup> Additional risk factors include previous surgery to the groin, the presence of foreign material or co-morbidities such as hypertension, nicotine abuse or diabetes.<sup>8</sup>

Different treatment modalities for persistent lymphorrhoea have been proposed. Basic recommendations include bed rest, prophylactic antibiotic treatment and pressure dressings. Therapeutic options include non-operative measures such as needle aspiration or external drainage, instillation of different sclerosing agents such as povidone iodine,<sup>13</sup> bleomycin,<sup>14</sup> doxycycline,<sup>6</sup> alcohol,<sup>9,15</sup> polidocanol,<sup>8</sup> fibrin sealant,<sup>16,17</sup> subcutaneous injection of the somatostatin-analogue octreotide<sup>18</sup> or radiotherapy.<sup>10,19</sup> Surgical reinterventions include subtle wound revision, debridement and selective ligation of leaking lymphatics – in some cases with the assistance of intra-operative lymphatic mapping<sup>20–22</sup> or microsurgical lymphaticovenous anastomosis.<sup>23</sup> In addition, the use of muscle flaps (e.g., sartorius muscle flap) has been described.<sup>24</sup> Furthermore, the use of subatmospheric or negative pressure therapy in inguinal wound failures with persistent lymphorrhoea has been suggested.<sup>17,25–28</sup> Despite this multitude of treatment options so far there has been no consensus on the most effective treatment.

However, even more desirable is the prevention of inguinal complications to decrease morbidity and enhance the patients' quality of life. Furthermore, potentially necessary oncological treatments can be administered without delay, thus improving oncological outcomes. Careful dissection, preservation of the saphenous vein when possible, and subtle preparation and ligation of lymphatic vessels form the basis to prevent inguinal complications.<sup>29</sup> In addition, transposition of a sartorius muscle flap or even

pedicled omentoplasty has been proposed.<sup>24,30</sup> Furthermore, prophylactic use of fibrin glue,<sup>31,32</sup> collagen powder<sup>33</sup> or subcutaneous application of octreotide has been evaluated in preventing lymphorrhoea after axillary LND.<sup>12</sup> Recently, subatmospheric pressure or vacuum therapy has been examined on closed surgical wounds as postoperative dressing to provide a clean, dry wound environment and to decrease the development of postoperative seromas in the wound and improve wound healing.<sup>34–36</sup>

Therefore, the goal of our retrospective study was to evaluate epidermal vacuum therapy for the prevention of wound complications following inguinal LND.

## Materials and methods

### Patients

From January 2009 to March 2012, a total of 24 patients with penile cancer or cancer of the urethra received uni- or bilateral inguinal LND in our institution (Table 1). In these patients, a total of 45 inguinal LNDs were performed in a modified (according to the medial and central zones I, IV and V of the inguinal LND template defined by Daseler et al.<sup>37</sup>) or radical fashion (medial, central and lateral zones I–V) depending on the pT-stage of primary tumour or the presence of metastatic spread to LN on frozen sections. Clinical charts were reviewed and patients were contacted in order to determine the rate of wound complications.

### Postoperative wound care

After inguinal LND all patients received a closed suction vacuum drain through a separate incision (High-VAC 400 ml Ward-System, Dahlhausen, Köln, Germany). Drains remained in place for at least 4 days and were removed upon cessation of drained fluid. Drained fluid was measured daily, and post-surgical complications were recorded. In the group treated with conventional wound care (CWC) compression dressings were placed on the wound for 24 h following subcutaneous and intracutaneous wound closure (16 patients). In the group treated with epidermal vacuum dressings (VAC) a polyvinyl alcohol dressing (V.A.C.® White Foam Dressing, KCI Medizinprodukte GmbH, Wiesbaden, Germany) was applied on the closed wound, sealed with adhesive drape and connected to a vacuum therapy unit (ActiVAC, KCI Medizinprodukte GmbH, Wiesbaden, Germany) following subcutaneous suturing and wound closure with a stapler device (eight patients) (Figure 1). Pressure settings were –100 mmHg, continuous, intensity ++++. In the case of bilateral inguinal LND, one vacuum therapy unit was connected to both epidermal vacuum dressings. Epidermal vacuum dressings were kept for up to

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