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SHORT COMMUNICATION

Skin-Tissue-sparing Excision with Electrosurgical Peeling: A Case Series in Hidradenitis Suppurativa

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Hidradenitis suppurativa (HS) is a chronic, debilitating, inflammatory skin condition that affects 1% of the general population (1). The disease predominantly affects inverse areas of the body like the axillae and the groins, and presents with painful, inflammatory nodules, abscesses, sinus tracts, pseudocomedones and scarring (1). HS is difficult to treat. In severe HS, sinus tracts, fibrotic tissue and architectural loss will remain after pharmacological therapy. Surgery is the only approach able to remove these lesions (1, 2). In Hurley stage I/II the de-roofing technique is widely used (3). Wide excision is often performed in Hurley stage II/III as it reaches deeper structures (4). We have previously described a new surgical technique for Hurley stage II/III: the Skin-Tissue-sparing Excision with Electrosurgical Peeling (STEEP) procedure. Briefly, during STEEP all affected tissue is removed by subsequent tangential transections, whilst saving as much healthy tissue as possible. In theory, this leads to rapid healing, satisfying cosmetic results and prevention of contractures (5, 6).

This prospective study aimed to investigate the short- and mid-term outcomes of the STEEP procedure.

MATERIALS AND METHODS

All patients who underwent the STEEP procedure for HS Hurley II/III in our tertiary centre in February and March 2014 were included. The University Medical Center Groningen (UMCG) ethics committee granted exemption for reviewing our study protocol. The STEEP procedure was performed as part of standard medical treatment (6). The surgery was conducted under general anaesthesia and performed by 2 surgeons (JBT and JRS). Short-term follow-up took place every 2 weeks until complete wound closure was achieved. Long-term follow-up was performed after at least 6 months. Primary outcomes were: (*i*) time to complete wound closure (TCWC), measured in days; (*ii*) wound healing, defined as progression of wound closure in cm^2 at the different time-points; (*iii*) influencing factors on wound healing; (*iv*) patients' satisfaction; and (*v*) recurrences. Wound closure was defined as complete epithelialization of the wound. Various variables were tested to determine whether they were predictive for the logarithmic TCWC, such as logarithmic size of the wound, operation location, age, body mass index (BMI), sex, smoking, Sartorius score and Hurley stage. Patient satisfaction was measured 8 weeks postoperatively with a questionnaire containing 3 questions: (*i*) satisfaction about the functional result on a scale of 1 to 10, where 1 corresponds to very dissatisfied and 10 to excellent; (*ii*) satisfaction about the cosmetic result on a scale of 1 to 10; and (*iii*) recommendation of the treatment to other people. Recurrences of HS activity after surgery were divided into 2 categories, as described previously: (*i*) relapse and (*ii*) natural progression (5). Relapse due to inadequate radical surgery was defined as inflammatory activity occurring within 0.5 cm of the surgical scar, and natural progression was defined as inflammation that developed outside this area in the same anatomical region (3, 5). Secondary outcomes were: (*i*) absence from work, measured in days; and (*ii*) complications (hypergranulation, nerve damage, infections, secondary bleeding and contractures). The imaging program Adobe Photoshop (version CS4, Adobe Systems) was used to measure the surface of the wounds in photographs. The photographs were taken under standardized conditions, using a calibration scale for each photograph. Relationships between possible risk factors and the TCWC are analysed with a mixed model (random intercept model) to accommodate the healing time for multiple wounds on the same patient. The logarithmic transformed TCWC was analysed. A p-value <0.05 is seen as significant. Statistical analysis was performed with IBM SPSS statistics version 20.0 or with SAS, SAS Institute, version 9.3.

RESULTS

A total of 16 patients with 27 operation sites were included. The median size of the wounds was 14.93 cm^2. Patient characteristics are shown in Table SI[1]; Fig. S1[1] shows the clinical course of wound healing in 3 patients. Long-term follow-up was completed in all patients after a mean of 8.26 months (SD 0.90). Eight patients were using anti-inflammatory agents (all second-line treatments) during the study period. Five patients were using infliximab, 5 mg/kg/day, once every 6–8 weeks. The mean duration of use of infliximab before STEEP was 29.8 months (range 11–57 months), all patients continued infliximab after STEEP. The mean TCWC was 53.1 days (SD 24.0). In 2 weeks there was a mean wound closure of 49.0%. Progressive wound healing was most marked in the first 4 weeks. The size of the wound and the Hurley stage were independent predictors of the TCWC ($p<0.001$ and $p=0.009$, respectively). The median score for patient satisfaction was 8.7 (3.5–10.0) for the functional outcome and 7.2 (2.5–10.0) for the cosmetic outcome. Furthermore, all 16 patients would recommend the procedure to other patients. In total, 8 of the 16 patients had a recurrence. In one of these patients the recurrence occurred after 274 days, while in 7 patients there was natural progression. The relapse occurred in

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a patient without anti-inflammatory medication. Four of the 8 patients without anti-inflammatory therapy had natural progression, while 3 of the 8 patients with anti-inflammatory therapy developed natural progression. After a mean of 28.1 days (SD 15.5) patients had returned to work full-time. The most common complication was hypergranulation (62.4% of patients) in which treatment with clobetasol 0.05% cream was applied with adequate response. No other complications were experienced.

DISCUSSION

The use of STEEP in HS has several advantages over other surgical procedures. Healing times are shorter and the risk of complications is lower compared with wide excision, probably due to tissue sparing. In both STEEP and carbon dioxide (CO_2) laser vaporization there is good visibility of the pathological tissues in the surgical field due to proper haemostasis. However, in STEEP the depth of the excision can be adjusted easily within a single transection, while the tissue that is removed by CO_2 laser has a single continuous fixed layer of thickness (6).

In our view, STEEP is indicated in HS Hurley II–III of the body folds, as these areas are prone to the formation of contractures after surgery (5). Because STEEP aims to save as much healthy tissue as possible, the formation of contractures is avoided and shorter healing times can be achieved (5, 6). However, different techniques can be combined in the same patient, in order to benefit from their individual advantages.

This case series is the first prospective study in STEEP. The TCWC is satisfactory, at 7.6 weeks. Three previous studies, investigating wide excision with secondary healing in Hurley II/III patients, showed a TCWC ranging between 11.3 and 12.2 weeks (7–9). Unfortunately, the mean size of the wounds was not mentioned in these studies. As healing times correspond to the size of the wounds and Hurley grade, the clinician can use this information to optimize the planning of surgery and follow-up. Our patient satisfaction is similar to the results of van der Zee et al. (3), who treated Hurley I/II HS patients with de-roofing. Because of the lack of uniform definitions of recurrences in the current literature, it is difficult to make firm statements about the efficacy of STEEP. Mikkelsen et al. (10) investigated the efficacy of CO_2 laser in HS; 29% of the patients had HS activity within the borders of the treated areas. In our study, only one patient (6.3%) showed a relapse. Ritz et al. (11) defined recurrences as persistent or newly developed signs of HS appearing in the same anatomical area. Recurrence was seen in 42.8% of patients after limited regional excision and 27.0% after radical wide excision. Our 50.0% recurrence rate is quite similar to the recurrence rate after limited regional excision. Thus, the advantage of the lower recurrence rates after radical wide excision should be weighed against the burden of larger surgical wounds. After treatment with a CO_2 laser, absence from work ranged between 3 days and 3 weeks (12). Compared with our data (4 weeks), this is a short period of time. The shorter absence from work can be explained by Hurley grade II and smaller wound sizes (5–50 cm^2) in the CO_2 laser study. The STEEP procedure appears safe, as none of our patients developed severe complications. The frequency of complications after wide excision are higher, with 10.9% infections, 7% postoperative bleeding and 7% contractures (13). The limitations of this study are the relatively small study size, a possible inter-operator variation, and the heterogeneity of the study population.

In conclusion, the STEEP procedure should be considered as surgical treatment for HS Hurley stage II/III patients.

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