“Uro-Abdominoplasty”
A Novel Adaptation of Abdominal Contouring for Revision of Complicated Urostomies

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Background: To describe the indications, surgical technique and outcomes of abdominoplasty as a novel tool for revising complicated urostomies.

Patients and Methods: Four patients (3 females, 1 male; mean body mass index = 32 kg/m²; mean age = 56 years) who underwent abdominoplasty for urostomy revision 2007–2009 were identified. Ideal conduits had been performed following ablative or diversion surgery for cervical carcinoma, bladder carcinoma, interstitial cystitis, and neuropathic bladder. A postal questionnaire was used to establish pre- and postabdominoplasty stoma function.

Results: Patients were referred to the reconstructive team with problems fitting their urostomy-appliance leading to urinary leakage, skin irritation, and social embarrassment. Uro-abdominoplasty indications included multiple abdominal scars (n = 2), large abdominal apron (n = 4), and deep skin creases (n = 2). Three patients had undergone previous failed urostomy repositioning or peritomatal liposuction. The joint plastic surgical-urological operations lasted a mean of 3 hours, with no major postoperative complications. Patients were discharged 8 days later. Of 4 patients, 3 reported improved appliance fitting and reduced urinary leakage (>50%) and the remaining patient had intermittent leakage due to a persistent abdominal fold superiorly, and has since undergone reverse abdominoplasty. Two patients complained of long-term lower abdominal numbness, but all 4 were satisfied with the aesthetic improvement.

Conclusions: Abdominoplasty has been successfully used in our center for the purpose of improving urostomy dysfunction of intractable mechanical leakage by creating a flatter surface for appliance fitting. Uro-abdominoplasty widens the reconstructive repertoire of plastic surgeons and can be considered in those who have exhausted conservative or simpler surgical solutions.

Key Words: urostomy revision, abdominoplasty, urostomy resiting, abdominal contouring, stoma, ileal conduit, urostomy complications, functional abdominoplasty, stoma relocation

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Stomas are widely used in colorectal and urological surgery for fecal or urinary diversion. Although successful in the majority of cases, stomas may be associated with complications in as many as 18% to 55% of cases.1,2 Reported complications among individuals with colostomy, ileostomy, and urostomy comprise of retraction, herniation, prolapse, peristomal skin problems, and necrosis. Socially embarrassing problems include frequent “bag” leakage, noticeable odor, and lack of compatible clothing.3 One study found that the frequency of peristomal complications was highest in people with urostomies compared with ileostomies and colostomies.4 Specific to urostomy surgery, Nordstrom et al identified reduced social activity in 20% of patients in their case series, with half of them attributing this to poor appliance fitting and consequent urinary leakage.5

Leakage can be caused by anatomic problems such as stomal retraction, skin folds, a soft abdomen or deforming scars. Obesity has been identified as a contributing factor in the development of urostomy complications.2 It can create problems preoperatively when determining the site of the stoma, intraoperatively when trying to bring out a tension-free stoma and postoperatively when weight gain alters abdominal contour.

The problem of leakage is best prevented by careful planning of the ostomy site and meticulous creation of the ileal conduit. Once it occurs, leakage can often be successfully managed using conservative measures, with the help of a stoma nurse. If these fail, a number of minimally invasive techniques can be attempted, such as collagen injections6 or suction-assisted lpectomy.7,8 However, these can only correct small defects and often need repeat procedures.

A small number of patients continue to experience problems due to the lack of suitable flat areas on the abdomen to allow resiting of the stoma by urologists. The senior author (C.M.M.) therefore decided to use abdominoplasty to treat patients with persistent urostomy dysfunction by modifying the technique described previously for revision of colostomies.9–11 The purpose of this study is to report the indications, surgical technique, and outcomes of abdominoplasty as a novel tool for revision of complicated urostomies; what we have termed the “uro-abdominoplasty.”

METHODS

All patients who had undergone abdominoplasty to revise their complicated urostomies by a single plastic surgeon (C.M.M.) between December 2007 and December 2009 at a tertiary referral center were identified. Their notes were retrospectively reviewed with respect to diagnosis, primary surgery, previous urostomy revisions, indications for abdominoplasty, and surgical technique. At the end of this study, patients were sent a postal questionnaire used to establish pre- and postabdominoplasty stoma function.

Preoperative Assessment

Following referral from the urologists, patients were assessed preoperatively in the plastic surgery outpatient clinic to determine the exact anatomic cause of urostomy dysfunction with specific emphasis on evaluating body mass index (BMI), presence and location of skin folds and scars, position of urostomy, and size of abdominal pannus. The amount of excess abdominal tissue that could be removed while allowing tension-free closure of the wound

References

1. Malata CM. Personal communication, 2011.
5. Malata CM. Personal communication, 2011.
7. Malata CM. Personal communication, 2011.
was determined, together with the possible new umbilical and urostomy sites.

Surgical Technique of Uro-Abdominoplasty

Surgery is performed jointly with the urological surgeons. Initially, the ileal conduit is mobilized down to the rectus sheath using a 1-cm margin to avoid damage to the bowel segment (Fig. 1A). If the stump is not mobile enough, it can be released together with its mesentery through the anterior abdominal wall up to the peritoneum, carefully avoiding damage to its blood supply as well as intraperitoneal contents. This manoeuvre is usually sufficient in providing a long enough ileal conduit for repositioning while allowing it to sit proud of the skin at the new site (Fig. 1A). To enable this to happen, it is important to assess the thickness of the abdominal pannus (both subcutaneous and subscarpal fat) through which the conduit traverses to reach the skin.

Once the umbilicus has been mobilized, a standard (low curvilinear transverse) abdominoplasty incision is made and then, using coagulation diathermy, the skin-fat abdominoplasty flap is raised (off the rectus sheath and external oblique aponeurosis) up to the xiphisternum and costal margin (Fig. 1B), carefully skirting around the ileal conduit and umbilical stalk. The infraumbilical pannus which includes the old urostomy site, any abdominal scars and excess skin and fat are conservatively resected (with the patient’s hips gently flexed) (Fig. 1C). The supraumbilical tissue is then pulled down and tacked to the suprapubic skin using staples (Fig. 1D). An appropriately sized cylinder of skin and fat is then excised at the proposed new urostomy site and the ileal conduit is brought out through it (Fig. 1E). The skin site is determined by feeling for the stoma underneath the mobilized anterior abdominal wall. Umbilicoplasty is performed in the standard manner and 2 closed suction-drains are routinely inserted (one above and one below the umbilicus).12 Wound closure is achieved with 2/0 PDS to Scarpa fascia, 3/0 monocryl for deep dermal and subcuticular sutures. Postoperatively, patients were nursed on the plastic surgery ward and received postoperative chest physiotherapy, tinzaparin 20 mg, TED stockings, and advised not to lie prone. They were discharged home when the drain output was less than 30 mL per day, patients were comfortable (pain wise), and were managing their stoma bags satisfactorily (up to the preoperative standard).

RESULTS

Four patients (3 females, 1 male) with an average BMI of 32 kg/m2 and a mean age of 56 years underwent abdominoplasty for urostomy revision over the 2-year period. Ileal conduits had been performed following ablative or diversion surgery for cervical carcinoma, bladder carcinoma, interstitial cystitis, and neuropathic bladder. The clinical details are summarized in Table 1.

Pre-Uro-Abdominoplasty Symptoms

The feedback from the questionnaire was that all patients experienced problems with urostomy appliance fitting, leading to urinary leakage of at least once a day (mean of 9 times a week; range 6–14/wk). Two patients reported skin irritation and 3 admitted that their urostomy problems caused social embarrassment. On average, all 4 patients needed to change their appliance more than once a day. One patient needed to use a belt to keep the appliance in place (Figs. 2A, C) and another required extensive application of adhesive tape to help prevent leakage.
Indications for Uro-Abdominoplasty

Specific indications for plastic surgical intervention, which were contributing to poor appliance fitting, included abdominal scars (n = 4), raised BMI leading to large abdominal apron (redundant skin and pannus) (n = 4), and deep skin folds (n = 2), as well as urostomy retraction (n = 2) (Table 1). The types of scars included lower midline (Fig. 2), midline laparotomy (Fig. 3) as well as pannenstiel, and right paramedian.

Three patients had undergone previously failed urostomy revision surgery comprising stoma repositioning and/or liposuction.

**TABLE 1. Patient Demographics, Indications for Uro-Abdominoplasty, and Postoperative Outcomes**

<table>
<thead>
<tr>
<th>Sex</th>
<th>BMI</th>
<th>Diagnosis</th>
<th>Initial Surgery</th>
<th>No. Previous Revisions</th>
<th>No. Scars</th>
<th>Abdominal Pannus</th>
<th>Skin Folds</th>
<th>Urostomy Retraction</th>
<th>Length of Operation (min)</th>
<th>Early Complications</th>
<th>Late Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>41</td>
<td>Neuropathic bladder</td>
<td>Ileal conduit for urinary diversion</td>
<td>0</td>
<td>1</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>225</td>
<td>None</td>
<td>Pain around wound</td>
</tr>
<tr>
<td>F</td>
<td>29</td>
<td>Interstitial cystitis</td>
<td>Cystectomy and ileal conduit</td>
<td>2</td>
<td>1</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>165</td>
<td>None</td>
<td>Numbness</td>
</tr>
<tr>
<td>F</td>
<td>29</td>
<td>Cervical carcinoma</td>
<td>Hysterectomy, cystectomy and ileal conduit</td>
<td>1</td>
<td>3</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>150</td>
<td>Superficial slough</td>
<td>Numbness</td>
</tr>
<tr>
<td>F</td>
<td>28</td>
<td>Bladder carcinoma</td>
<td>Cystectomy and ileal conduit</td>
<td>2</td>
<td>2</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>210</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

BMI indicates body mass index.

**FIGURE 2.** This 58-year-old man had a very large pannus and multiple skin folds that necessitated the use of a belt to keep the appliance in place preoperatively (A and C). One year after “uro-abdominoplasty,” his abdominal contour was much improved. The postoperative images show that the belt is no longer required because the stoma bag is able to fit on to a flatter surface.
of the surrounding area. The stoma problems in the patient without previous revision were caused by a large lower abdominal apron due to extreme obesity (BMI 41; Figs. 2A, C). In this patient, urologists did not attempt simple revision as it was deemed futile in the face of the large overhanging pannus. None of the patients had hernias (parastomal or incisional), and no other urological surgery was performed at the same time.

**Abdominoplasty Outcomes**

The joint plastic-urological operations lasted a mean of 3 hours and patients were discharged from hospital a median of 8 days postoperatively (Table 1). There were no major early postoperative complications, but 2 patients complained of long-term numbness across the lower abdomen. All 4 patients were satisfied with their aesthetic improvement (Figs. 2, 3).

**Post Uro-Abdominoplasty Stoma Symptoms**

Three patients noticed improved appliance fitting and reduced urinary leakage from a mean of 8 to 3 times per week, which resulted in a subjective overall improvement in quality of life (n = 3). One patient, with a persistent abdominal fold superiorly who reported intermittent leakage, has consequently undergone a reverse abdominoplasty. The frequency in change of appliance was also reduced from a mean of more than once a day to once every 2 days.

**FIGURE 3.** Preoperative (A and C) photographs of a 56-year-old diabetic female with a troublesome urostomy, flush with the abdominal wall, exacerbated by abdominal folds, and midline laparotomy scar. She had received previous liposuction around the stoma site, but this had not been successful. Postoperative (B and D) photographs showing a smoother abdominal contour, which improved appliance fitting and reduced urinary leakage (from 5–6 to 4–5 times per week).
DISCUSSION

Attempts to minimize urostomy complications rely largely on the initial preoperative siting of the stoma, avoiding abdominal folds and creases as well as ensuring stomas are of adequate length. Only a minority of patients continue to experience problems with appliance fitting despite maximal conservative measures and minor revision surgeries, usually due to the lack of flat surface on the abdomen. It is this challenging group of patients that may benefit from referral to the Plastic Surgery Service.

Abdominoplasty has been previously implemented as a tool for revision of difficult ileostomies and colostomies.3–11 Evans et al outlined the technique and results of combined stoma revision and abdominal wall contouring in 8 such patients gathered from 2 tertiary referral centers.10 Beck used a case report to illustrate the use of abdominoplasty to revise a complicated ileostomy following panproctocolectomy for ulcerative colitis.11 Our study is the first to describe the successful use of abdominoplasty to revise complicated urostomies, providing both functional and aesthetic benefits. The uro-abdominoplasty technique reduced the frequency of urinary leakage by over 50% and increased the length of time patients were able to maintain the urostomy appliance before needing to change it. However, leakage was not entirely eliminated unlike for colostomies and ileostomies,12 perhaps because of the thin fluid nature of the effluent in our cases of urostomy and residual lower abdominal numbness. All the patients in our study reported that they were pleased with the aesthetic improvement in their abdominal contour. Although abdominoplasty leaves a long transverse scar across the lower abdomen, the scar is usually low enough to be hidden by underwear.12

These uro-abdominoplasty operations were performed jointly with the urological surgeons on patients whose urostomy dysfunction was deemed to have a correctable anatomic cause, such as irregularities, scars, or pannus on the lower abdomen. Abdominoplasty removes the abnormal or excess skin and subcutaneous tissue, leaving a flatter surface around the stoma, thus making fitting of appliances more effective. Scarred tissues with relatively poor vascularity can make simple resiting of the stoma challenging and lead to poor peristomal healing. Abdominoplasty is especially effective in patients who have a relatively normal upper abdomen, thus allowing the stoma to be resited in more pliable tissue. None of our patients had peristomal hernias as a cause of their urostomy dysfunction, but if present, these can be easily repaired via the wide access provided by the suprafascial elevation of the abdominoplasty flap.10,11

In our series, there were no major complications experienced despite the high BMI of most of our patients. Two patients complained of mild numbness across the lower abdomen, and this is a common problem with our other abdominoplasties, be they aesthetic or functional.12,13

Through careful technique, we were able to avoid postoperative morbidity of the abdominoplasty, which reinforces the need for this type of surgery to be performed with plastic surgeons as part of the multidisciplinary team.

Our work with urostomies builds on that of Evans et al on colostomies and ileostomies and increases the functional applications of abdominoplasty, which range from access apronecrotomies for gynecological operations to use of abdominoplasty for abdominal reconstruction.14 Such involvement in the treatment of difficult urostomies widens the reconstructive service repertoire of plastic surgeons in tertiary referral centers.

CONCLUSION

Abdominoplasty has been used successfully used in our center for the purpose of improving urostomy dysfunction of intractable mechanical leakage by creating a flat surface for appliance fitting. However, this technique should be considered as a last resort, mainly in those who have exhausted conservative or simpler surgical solutions such as liposuction, stoma revision, and relocation.

REFERENCES

AUTHOR PLEASE ANSWER ALL QUERIES

AQ1—Please check whether the short title is OK as given.
AQ2—Please check whether the order of name and surname for all 3 authors is OK as given.
AQ3—Please check whether the phrase “it to sit proud of the skin” is okay as given; if not, make the necessary changes.
AQ4—Please expand PDS.
AQ5—Please expand TED.
AQ6—Please check whether the term “apronecrotomies” is okay as given.
AQ7—Please note that Refs. have been renumbered from Ref. 6 to 15 as Ref. 2 was repeated as Ref. 6.
AQ8—Please number the figures corresponding to their figure legends.
AQ9—Please provide description for figure subparts B and D.