

OSTOMIES

¹GORDAN TOMETIĆ, ²LORIS ĆURT, ¹MARIJA BAČA,
¹MATEJA TRIVIĆ and ¹DANKO VELIMIR VRDOLJAK

¹Department of Surgical Oncology, University Hospital for Tumors,
Sestre milosrdnice University Hospital Center, Zagreb, Croatia

²School of Medicine, University of Zagreb, Croatia

Summary

Ostomies are relatively frequent in emergent and elective abdominal surgery but often neglected and relegated to the junior or less experienced members of the operating team. In Croatia there are about 5000 patients with either ileostomy or colostomy. Patients do receive preoperative and postoperative counseling about living with a stoma. Most patients can be reassured and made more comfortable with the concept. It is important to stress the necessity of stoma formation: sometimes it is the only option after intestinal resection or in emergency setting surgery, protection from severe abdominal infection or improvement quality of life in most patients with disordered bowel function (colitis, incontinence). There are also patient groups dealing with the issue. However, concept and stigma of ostomies should be dealt with in a more general fashion and the entire multidisciplinary team and people dealing with these patients on primary care level should be aware of it. Finally, development of concept of enterostomal therapist- specialist available to aid the patient well after the surgery is crucial. In this paper we discussed ostomy formation, possible complications and members of the team dealing with ostomies.

KEYWORDS: *ostomy, technique, complications, enterostomal therapist*

STOME

Sažetak

Kreiranje stoma je relativno čest problem u hitnoj i elektivnoj abdominalnoj kirurgiji no često zanemaren i prepušten mlađim ili manje iskusnim članovima operativnog tima. U Hrvatskoj postoji oko 5000 bolesnika koji žive sa ileostomom ili kolostomom. Bolesnici se preoperativno i postoperativno savjetuju kako živjeti sa stomom. Većini bolesnika se može osigurati potrebna skrb odnosno olakšati svakodnevno funkcioniranje sa stomom i komplikacijama koje se mogu pojaviti vezano uz stomu. Važno je naglasiti da je stoma ponekad neophodna: kao jedina opcija nakon resekcije crijeva ili u stanjima hitnosti, kao zaštita zbog teških abdominalnih infekcija ili poboljšanje kvalitete života u nekim stanjima (crijevne upalne bolesti, inkontinencija). Postoje radne grupe bolesnika koji žive sa stomom. Međutim, koncept života sa stomom i stigma koju ona nosi bolesniku mora se olakšati bolesniku i putem multidisciplinarnog medicinskog tima uključujući i liječnike obiteljske medicine. Na koncu ključno je razvijati koncept enterostomalnog terapeuta-specijalista koji će pomoći bolesniku po završetku kirurškog liječenja i otpuštanja iz bolnice. U ovome članku nastojali smo objasniti kirurške principe formiranja stome, moguće komplikacije i tim koji bi trebao biti na raspolaganju bolesniku kojem je kreirana stoma.

KLJUČNE RIJEČI: *stoma, kreiranje stome, komplikacije, enterostomalni terapeut*

INTRODUCTION

Stoma (from Greek στόμα 'mouth') is a surgical bypass of natural conduit which allows diver-

sion of the fecal or urinary stream to the anterior abdominal wall and then to the plastic bag attached to the skin. Preoperative planning of stoma site, consideration of all alternatives and counsel-

ing with patient are extremely important in the creation of an acceptable and functional ostomy. Unfortunately, stoma formation is often regarded as the least important part of operation and often relegated to the junior members of the operating team which underscores its importance to the patient considering complications and then disturbing his quality of life.

STOMA TYPES

Stoma may be temporary or permanent and are classified according to the part of bowel that opens to the anterior abdominal wall.

Temporary stomas are usually loop stomas (loop ileostomy or loop colostomy). A loop of bowel is exteriorised to the abdominal wall through a skin incision. The loop of bowel is supported by a rod beneath it to prevent it from slipping back into the abdomen. The rod is usually removed after a couple of days when the wound has healed enough to prevent retraction. The loop stoma has an afferent limb and an efferent limb. The afferent limb leads to the functioning part of the bowel and allows stool and gas to pass out. The efferent limb leads into the non-functioning part of bowel and secretes mucous so it is called mucous stoma. There is also a double barrelled (bitubular) stoma, which also has an afferent and efferent limb but there is no continuity of bowel wall (two limbs are separated).

Permanent stomas are usually end stomas which have one opening (end ileostomy or end colostomy).

INDICATIONS FOR STOMA CREATION

Emergency colostomy

The major indication for emergency colostomy creation are due to colonic obstruction or colonic perforation with peritonitis. Colonic obstruction is most often due to primary cancer of the distal colon or rectum, complicated diverticular disease (stricture, abscess or fistula) or trauma of the distal colon with perforation. The aim in such circumstances is to ensure safe evacuation of stool from the body by preventing the consequences of an anastomotic leak from a high risk primary anastomosis. Emergent colostomies are also used

in newborn infants with distal obstruction, often due to Hirschsprung's disease, imperforate anus or rectal atresia.

Elective colostomy

Most commonly elective indications for colostomy are due to low rectal tumors which require an abdominoperineal resection to remove the tumor. The entire anal sphincter, rectum and the sigmoid colon are removed with the creation of a permanent end colostomy. Other indications include protection of a low colorectal or coloanal anastomosis, rectovaginal fistula, incontinence, radiation proctitis and perianal sepsis.

Emergent ileostomy

Indication for emergent ileostomy are generally due to conditions requiring small bowel or proximal colon resection, in which the integrity of a primary anastomosis would be compromised. This may be due to a diffuse bowel injury (long-standing peritonitis or obstruction, radiation, Chron's disease) creating friable tissues that cannot hold a suture. Other emergent indications for an ileostomy due to hemorrhage, ischemia, perforation, or sepsis.

Elective ileostomy

Ileostomy is commonly used for patients undergoing surgery for rectal cancer, inflammatory bowel disease, or familial polyposis. These patients require the removal of the rectum and possibly entire colon as well. The ileostomy may be protective in conditions where is created low colorectal or coloanal anastomosis, or as for fecal diversion proximal to an ileal pouch anal anastomosis. In such circumstances ileostomy ensures safe evacuation of stool from the body because there is reasonably high risk of anastomotic leakage. In cases where total proctocolectomy (severe Chron's colitis, severe ulcerative colitis) is necessary, and the anal sphincter cannot be salvaged, an ileostomy is the only option for fecal diversion.

Cecostomy

Cecostomy is only created as an emergent measure to decompress the distal colon for a critically ill patient with massive colonic dilatation and impending perforation. It may be due to an

obstructing cancer or pseudo-obstruction seen in elderly and immunocompromised patients, or for cecal and right-sided colon injuries.

PREOPERATIVE STOMA SITE MARKING

Most difficulties with stomas occur due to incorrect placement. This can be eliminated with preoperative planning, which includes the surgeon, enterostomal therapist, and patient. Improperly located stomas lead to leakage of stool, peristomal skin inflammation and excoriation, emotional stress, and increased cost (1). For temporary stomas these problems may be managed by early closure. On the other hand, permanent stomas may need to be revised or relocated.

Stoma site marking should be done prior to the patient reaching the operating room for all elective procedures. The goals are to place the stoma within the rectus abdominis muscle, below the belt line, on a flat surface, and easily visualized by the patient.

In routine situations, **colostomy** site marking in the left lower quadrant of abdomen begins with identifying the *osteomy triangle* bounded by the anterior superior iliac spine, the pubic tubercle and the umbilicus and ideally it would be to place stoma in the middle of triangle through the rectus abdominal muscle to reduce the likelihood of parastomal hernia or stomal prolapse. **Ileostomy** site would ideally be in the middle of the imaginary line which connects umbilicus and anterior superior iliac spine in the right lower quadrant of abdomen, also through the rectus abdominal muscle. Care should be taken to avoid skin creases, bony prominences, scars, drain sites, and belt lines. Ideally, a 5-6cm of flat surface should surround the stoma site.

Nevertheless, stoma placement should be individualized for each patient. The stoma should be placed at the superior apex of the infra-umbilical fat fold in the lower quadrant to improve the visibility of the stoma to the patient. In obese individuals, the stoma may be better located in the upper abdomen to allow the proper visualization and care.

To optimally assess location, the patient should be evaluated supine, sitting, standing, and banding forward. The patient should confirm that stoma site is indeed visible which permits proper self-care of the stoma. The patient belt-line should

be avoided because this can cause direct trauma to the stoma and it is better to form stoma below the belt-line because the stoma and appliance can be better concealed under the patient's garments. As mentioned above obese patients may not be able to see stoma below the umbilicus, so therefore stoma sites above the umbilicus are better in morbidly obese patients.

Stoma site can be marked with various techniques, with marker, by tattooing skin using methylene blue or the skin site can be lacerated using a needle. Although, this can be painful and cause an infection.

SURGERY PRINCIPLES OF STOMA CREATION

A postulate for stoma creation is healthy, vital and well-vascularized segment of bowel which should be also adequately mobilized to ensure a tension free approximation to the abdominal wall (2).

A 2cm circular skin incision is made with preservation of subcutaneous fat, which provides support for the stoma and can reduce an incidence of parastomal hernia. A cruciate incision (also 2 cm) is formed in the anterior rectus sheath, with subsequent spreading of the rectus muscle and incision of the peritoneum. The surgeon should easily be able to pass two fingers through the stoma aperture and must take care to avoid damage of bowel or mesenteric vessels (3).

Stomal fixation - the seromuscular layer of bowel fixation with absorbable sutures to the posterior fascia or peritoneum is optional but do not reduce the risk of stomal herniation (4) or prolapse (5). Closure of lateral space with fixation of mesentery to the abdominal lateral sidewall in order to close lateral sulcus and therefore prevent volvulus around the stoma limb (rare) is also optional.

End ostomy

An ileostomy should protrude 2-3 cm above the abdominal wall after eversion to allow adequate output. On the other hand colostomy require only 1-2 cm protrusion above the abdominal wall. Place four absorbable sutures equidistant at 12, 3, 6 and 9 o'clock to evert the intestine and then few additional sutures in between. When creating an ileostomy, the suture include seromuscular

layer 3 cm proximal to the end, full thickness end of bowel, and the dermis of abdominal wall. Including seromuscular layer in suture can facilitate everting of the intestine. When constructing a colostomy you don't have to include seromuscular layer (2).

Loop ostomy

The segment of intestine is advanced through the abdominal wall using a penrose drain which is got through a small opening in the mesentery under the bowel loop. On abdominal wall replace penrose drain with a plastic rod or with catheter making a loop around the stoma. It is optional to secure the catheter or rod with silk ties. Transect 80% of the circumference of the bowel (vertically to the axis of the bowel) with electrocautery beginning on the anti-mesenteric wall of the distal, nonfunctional limb. Secure the distal descending limb to the abdominal wall with adsorbable sutures without everting. Then secure proximal functional limb by suturing the full thickness bowel wall to the seromuscular layer 3 cm proximal to the transected end and with dermis of the abdominal wall (2).

Double barrel ostomy

A double barrel ileostomy or colostomy can be constructed as a loop ostomy with both limbs everted and the back wall intact, or as completely divided proximal and distal limbs that brought together through the abdominal wall. The resulting ostomies are larger and more demanding to manage (leakage) but may be preferable in emergent settings (after resection of segment of the bowel) (2).

Technical challenges in obese patients

Obesity is an independent risk factor for stoma complications, including retraction, skin excoriation, and parastomal hernia (2). The following maneuvers will help minimize the risk:

- the ileostomy or colostomy is placed in the upper abdomen, above the umbilicus, where the abdominal wall is less thick
- peritoneal attachments should be adequately mobilized including splenic flexure when creating a descending colostomy, transecting medial peritoneal attachments at the base of the colon mesentery and create peritoneal windows over the colonic mesentery just below the stoma

- trim the thickened colonis mesentery to ease the passage of the intestine through the abdominal wall, while preserving the marginal artery
- enlarge the aperture in the abdominal wall to ease passage of intestine, decrease tension and minimize venous congestion

Laparoscopic approach

Laparoscopic approach is safe and effective alternative to a laparotomy in the absence of multiple previous surgeries. Advantages are the better anatomic visualization of the abdominal cavity and minimizing the risk and complications of an open procedure. The laparoscopic approach is associated with significantly lower postoperative analgetic requirements, earlier time for return of bowel function, earlier tolerance of solid diet, and fewer postoperative complications. Techniques are varying in location and number of port sites. Creation of loop ileostomy or loop sigmoid colostomy are preferred since they do not routinely require significant mobilization (2).

Following principles are used in the laproscopic approach:

- initial access to the peritoneal cavity is achieved via a 12 mm port placed at the pre-selected stoma site
- the entire abdominal cavity is examined visually and if it is limited by adhesions, the procedure is converted to a laparotomy
- two additional 5 mm ports are placed in the suprapubic and left iliac fossa, two fingerbreadths above and two fingerbreadths medial to the anterior superior iliac spine
- while creating an end or loop sigmoid ostomy, the bowel is mobilized in the lateral to medial direction and while creating a loop or end ileostomy mobilizing is needed only if adhesions are present
- the surgeon must verify the correct orientation of the proximal and distal limb by re-establishing the pneumoperitoneum
- stoma is matured using the same approaches as previously described.

COMPLICATIONS

Factors affecting type and frequency of complications include surgical specialty and experience, emergency versus elective creation, appro-

appropriate preoperative marking and patient related conditions such as age, obesity or malnutrition, diabetes and ability of care for stoma (3).

In one UK study, Harris et al. reviewed outcomes in 345 patients with stomas, created electively in 70%. The overall complication rate was 25, the most common complication after *colostomy* were parastomal hernia (7.5%) and retraction (6.8%). *Loop colostomies* had the highest complication rate at 38%, with prolapse (13%). The most common complication for *ileostomies* were parastomal hernia (6.7%), retraction (4.5%) and small bowel obstruction (4.5%). Inappropriate stoma site increases the risk of complications as well as neglecting other surgical principles in stoma creation (6).

Stoma-related complications may be divided in early (defined as those occurring within three months of stoma creation) or late complications.

Early complications:

Skin irritation

Peristomal skin irritation is more common with an ileostomy because of the acidic content of the small bowel. Skin irritation may range from dermatitis to full thickness necrosis and ulceration. The incidence varies from 5 to 25 % (7). Management is local wound care. Fungal irritation of the peristomal skin (*Candida albicans*) is also commonly seen. Antifungal powders are helpful in such conditions. Persson et al. prospectively evaluated 180 patients for skin problems secondary to leakage. Diameter and height were measured for all stomas. They encountered leakage/skin problems in nearly all patients with an ileostomy height less than 2cm and in almost half of patients with a colostomy height less than 5mm (8).

Necrosis

Ischemia or necrosis of the stoma typically results from either venous congestion from excessive tension, arterial insufficiency from aggressive mesenteric dissection or a tight fascial aperture. The incidence is 14% in the immediate post-operative period. Emergency surgery, obesity, Chron's disease are independent risk factors for stomal necrosis (9, 10). Adequate mobilization, preservation of the blood supply and an adequate fascial aperture are vital to avoid this complication.

Late stomal complications:

Stenosis

The stenotic stoma usually occurs secondary to ischemia, infection or retraction. The incidence

is 2-14% (11) and is more common with an end colostomy. To reduce the risk of stenosis, adequate skin and anterior rectus sheath incision should be made to accommodate the bowel, proper surgical technique to assure adequate mobilization and blood supply and avoid local infections.

Retraction

Stomal retraction is defined as a stoma that is 0.5cm or more below skin surface within six weeks of creation. The most common reasons of stoma retraction are weight gain after stoma creation and short length of exteriorized segment (11). The incidence varies between 1 and 40%. The risk is higher in obese patients (thickness of abdominal wall and in circumstances of intra-abdominal infections, where the mesentery is thickened or shortened). Retraction leads to leakage and difficulties with pouch adherence, resulting in peristomal skin irritation. The best method to prevent stomal retraction is to construct a stoma at least 10mm high for colostomies and 2-3 cm high for ileostomies. The large bowel must be sufficiently mobilized to avoid tension of the stoma while preserving distal blood supply. Another technique used to prevent retraction is the use of supporting rod. However Speirs et al. randomized 60 patients in prospective study which found no difference in retraction rate for loop ileostomies supported by an ileostomy rod compared with those constructed without a rod (12). Non-operative management of the retracted stoma should involve the use of a convex stoma appliance with belt but often surgical revision is required.

Prolaps

Stomal prolapse is most commonly seen with transverse loop colostomies -30%, but the overall rate is much lower 7-11% (10). Postulated risk factors for prolapse include large abdominal trephine, increased intra-abdominal pressure, and a redundant loop of bowel proximal to the stoma. Prolonged prolapse results in edema, and swelling that can lead to incarceration or strangulation. There have been conflicting reports whether fixation of the mesentery or bowel wall to fascia is helpful. Opponents warn that this practice complicates repeat laparotomy or revision. The initial management is nonoperative, sugar has been successfully used as a desiccant (13). When skin excoriation, bleeding or incarceration persists, surgical correction is necessary and there are many surgi-

cal techniques that could be useful (Altmeier, De-lorme, several stapling technique).

Parastomal hernia

They often occur after formation of sigmoid colostomy than ileostomy and overall rates range from 16-50% (14). Risk factors are divided in three main groups: patient variables (smoking, malnutrition, age, waist circumference), disease processes (diabetes, obesity, ulcerative colitis, chronic obstructive airway disease, raised intra-abdominal pressure, postoperative sepsis, preoperative steroid use, malignancy) and technical aspects (emergency, siting stoma on the rectus abdominal muscle, aperture size) (14).

Prevention is creating well vascularized, non-traumatized, tension free anastomosis between skin and intestine. Aperture size should be limited to 2-3 surgeon's finger. Laparoscopic techniques have not proven effective to hernia prevention (15). Also, fascial fixation may decrease risk but do not have statistically significant advantage. Some state parastomal hernia is inevitable consequence in stoma creation (16).

The only method that has reduced the rate of parastomal hernia in a randomized trial is the use of a prophylactic mesh. The approaches for placement of abdominal wall mesh includes the *sublay* techniques (below rectus abdominal muscle), *onlay* technique (above the fascia) and the *intra-peritoneal* technique (directly beneath the peritoneum). Recurrent hernia after prophylactic mesh placement was less than 15% (16). These results have raised questions regarding advantages of placing mesh at the primary operation.

Asymptomatic parastomal hernia does not mandate repair. Definitive repair is indicated for incarceration, obstruction, strangulation, chronic pain or leakage. Despite the fact that local procedures obviate the need for laparotomy and stoma relocation, recurrence rates remain high. Direct repair of the fascial defect with suture alone is associated with recurrence rate 50-100% and repair with prosthetic or biosynthetic material up to 88% (17-19).

CONCLUSION

When discussing the operation with the patient, the need for an ostomy should be emphasized. Patient should receive preoperative and

postoperative counseling about living with a stoma. Most patients can be reassured and made more comfortable with the concept of living with the stoma if the surgeon spends extra time discussing this, so this is one more point where we have to work on in our country. It is important to relate to the patient the benefit of a stoma. It may be life-saving, protective from severe infection, or significantly improve quality of life in most patients with disordered bowel function (colitis, incontinence). The patient should receive a pamphlet regarding ostomies and see a picture of stoma to clarify expectations. This should include stoma therapist or stoma nurse specialist. This will help prepare patient psychologically and emotionally, as well as taking proper care about stoma. Most patients are anxious about obtaining a stoma because it is unnatural to them and it affects their self-image. Patient groups and stoma products suppliers organize workgroups for patients in which they get real-life experiences from other patients with stoma in terms of hygiene, limitation in social or athletic activities and intimate relationships. Patient should be able to ask questions from an individual who is already living with the stoma in issues such as odor, leakage, diet, clothing, and sexuality. While discharging from hospital, patients get contacts of stoma nurses who can help them and provide further education in the terms of stoma care. Finally, development of concept of enterostomal therapist and meeting with them will assure the patient that specialists are available to aid the patient with his or her needs well after the surgery is completed.

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Author's address: Gordana Tometić, Department of Surgical Oncology, University Hospital for Tumors, Sestre milosrdnice University Hospital Center, Ilica 197, Zagreb, Croatia. E-mail: gtometric@gmail.com