Chapter 2

Stomal Incontinence: Treatment Options
Introduction

An intestinal stoma or ostomy is a surgically created opening in the anterior abdominal wall that allows the passage of fecal material or urine from the intestines. There are two types of intestinal stomas. A colostomy is a connection of the colon to the skin of the abdominal wall. An ileostomy involves exteriorization of the ileum on the abdominal skin. A variety of clinical situations (neoplastic, congenital, traumatic, inflammatory and ischemic disorders of the intestinal tract) necessitate the surgical formation of an intestinal stoma. The most common indication for a colostomy is colorectal cancer. The indication for ileostomy construction is for patients who require removal of the entire colon, and usually the rectum, for inflammatory bowel disease either Crohn's disease or ulcerative colitis. There are an estimated 750 thousand persons with ostomies in the United States and 100 thousand ostomy operations are performed annually in the United States.\(^1\) Worldwide the numbers are not insignificant either. For example in The Netherlands the prevalence of patients with a stoma is approximately 20 thousand and in the United Kingdom the prevalence of colostomy patients is 100 thousand.

The type and anatomical location of the stoma determines the frequency of effluent, nature of the effluent (the consistency, the odor, the presence of corrosive enzymes), and the care required in terms of pouching, or application of an external collection device. The physiology of the colon should be taken into account when considering the construction of a colostomy. The right side of the colon absorbs water and has irregular peristaltic contractions. Stomas made from the proximal half of the colon usually expel a liquid content. The left colon serves as a conduit and reservoir and has a few mass peristaltic motions per day. The content is more solid. A colostomy is usually located in the left lower quadrant. An alternative location is through the midline fascia. The surgical construction of an ileostomy must be more precise than for a colostomy because the content is liquid, high volume, and corrosive to the peristomal skin. An ileostomy is most of the time located in the right lower quadrant.

Individuals with stomas often have poor psychosocial outcomes that range from failure to return to occupation, withdrawal from social and intimate contact, to depression and anxiety.\(^2\) Emotional and social withdrawal include feelings of degradation, damage, isolation, restriction, and mutilation. Embarrassment of the presence of an appliance or fear of leakage and odor may cause them to limit their social, sexual, recreational, and work activities. The lifelong stoma maintenance required by patients with permanent colostomies and ileostomies decreases the quality of life for many people.\(^3-7\)
Because the stoma lacks a sphincter, elimination is not under the voluntary control of the individual. The presence of stool or urine on a plane of the body that may be visible (or at least detectable) to others during social contact poses a major concern to the person with a stoma. Involuntary passage of flatus, and the sound created by the passage, is also a major concern to the person with an intestinal stoma. Many efforts have been done in the past to address the problem of stomal incontinence. Most current methods for stomal continence use an external pouching system (plastic bag reservoir) into which the fecal material or urine empties constantly and over which the patient has little or no control. These methods have many disadvantages such as a bulky, inconvenient external appliance filled with malodorous fluid that threatens to leak or cause odor and which may be associated with audible, embarrassing intestinal sounds. Through the years, multiple techniques have been proposed to improve the quality of life of these individuals by providing them with stomal continence. These include nonsurgical and surgical techniques.

**Nonsurgical Techniques**

Nonsurgical techniques consist mainly of an irrigation technique or the use of devices that occlude the stoma when desired. The most frequently used nonsurgical treatment option for patients with a distal colostomy is intermittent irrigation of the stoma to wash out formed stool. The technique of irrigation uses a cone tip that fits into the stoma only enough to provide a seal and to allow the instillation of 500 to 1000 ml of water. Once the water has been instilled, a drainage bag is applied, and the colostomy empties in response to this stimulation. Between irrigations the patient usually wears a security pouch, which permits passage of gas through a filter. This is only recommended for colostomies of the distal colon where stool is more solid and well formed, and for patients who are physically and mentally capable of performing self-care. Another non-surgical strategy for continence is a disposable colostomy plug. Success rates associated with the use of this plug have varied. Recently a colostomy tube was developed, consisting of a silicone funnel and tube. Using a canine model, the funnel and tube were inserted in the bowel lumen after colostomy creation. Although promising results were reported in these dog studies, clinical trials have not yet been published. Another option is behavior modification. This technique involves training patients to sense bowel evacuation and respond by contracting their abdominal muscles to close the stoma. Reboa et al. investigated biofeedback training to obtain continence in patients with a permanent colostomy. Results were considered good when patients attained at least 70% continence. Of 18 patients investigated, 15 achieved said levels.
Surgical Techniques

Numerous surgical techniques have been designed to obtain stomal continence. Ceulemans and Van Baden developed a technique that involved positioning a very small colostomy as high as possible along the left costal margin of the rectus abdominis muscle. This design was based on the idea that a stoma on the superior aspect of the abdominal wall would not drain stool in a dependent gravity-assisted fashion. Despite some reported success, this procedure has not gained widespread acceptance and is no longer performed.

Kock et al. developed an intestinal nipple valve by intussuscepting a segment of bowel that was interposed between a bowel reservoir and the stoma. This procedure is used most often with ileostomies and in a few clinical cases in colostomies. With this technique the patient no longer needs to wear an external appliance. However, intermittent intubation of the reservoir with a silicone catheter is still required to evacuate stool. Evacuation becomes difficult if the stool is allowed to become too thick. Complications of this latter technique are frequent and are due to dysfunction of the nipple valve. Nipple valve dysfunction is due to sliding or prolapse of the nipple valve, internal fistulae bypassing the valve or stomal strictures. Concurrently, complete replacement of the valve by various prosthetic mechanisms was under investigation. Beahrs et al. found that a cuffed Silastic catheter, similar to an endotracheal tube, restored continence in “failed” Kock ileostomies. Fendel and Fazio replaced the nipple valve by a porcine aortic valve in an experimental model. A mucosal “flap” valve was created in another experimental setting. Magnetic closing caps were implanted successfully in two patients. Although the devices subjected to clinical trials were able to maintain continence, various complications and limited patient acceptance prevented widespread adoption of their use. A different approach was taken by Fazio, Cohen, Barnett, and others. They found that the intussuscepted nipple valve was more stable when it was mechanically supported at its junction with the pouch and the outflow tract. A strip of fascia, Marlex or Prolene, and later, an ileal limb were used to buttress the valve. Short-term results were promising. A dramatic decrease in the rate of valve desusception was reported. However, an equally dramatic rise in the rate of late fistula formation was associated with the use of the various plastic materials. Another surgical technique designed to create a continent stoma involved construction of a sphincter using a smooth muscle graft of the large intestine. The transplanted smooth muscle was wrapped around the distal portion of the intestine and the intestine with its new smooth muscle coat was brought through the abdominal wall as a stoma. In a series of nearly 500 patients, almost 80% were able to go for a 24-hour period without the need...
for an appliance. Continence of liquid stools and gas, however, was not sustained and postoperative complications ultimately led to the abandonment of this procedure. Autotransplantation of the stomach pyloric sphincter muscle around the colon has been attempted in a canine model. However, narrowing of the neo-sphincter produced obstruction and fecal continence was not achieved. Artificial sphincters in the form of implanted devices are another surgical treatment option. A magnetic stoma mechanism was introduced by Feustel and Hennig and described by Kubchandani and coworkers. The system consisted of a magnetic ring implanted subcutaneously in the abdominal wall. The bowel was brought through the ring and a stoma was created. After a recovery period, the magnetic external cap was inserted into the stoma. Complete continence varied from 23% to 76% of the patients in different clinical trials. Complications with this procedure varied in terms of severity and included wound infections, necrosis of the stoma and peristomal area, development of fistulae, and incontinence due to suboptimal seating of the internal magnetic ring. A two-part silicone device was developed by Prager et al., but complications were similar to those encountered with the magnetic device. Last but not least dynamic myoplasty has been attempted as one of the surgical techniques to generate stomal continence. Dynamic myoplasty uses own skeletal muscle and therefore prevents foreign body related complications at the level of the stoma.
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References

Chapter 2


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