

# Ileostomy and colostomy

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## Abstract

The formation of intestinal stomas, mainly ileostomy and colostomy, has become an integral approach to the surgical management of several pathologies of the gastrointestinal tract – in both the emergency and elective patient. The basic underlying principle is that faecal flow is diverted away from the site of the pathology, by bringing an end or a loop of bowel, through the anterior abdominal wall. Either in a temporary capacity or permanent role stomas can reduce morbidity and mortality associated with several conditions of the gastrointestinal tract such as perforated colon, inflammatory bowel disease, bowel obstruction and elective cancer operations, for example a low anastomosis in an anterior resection of rectum. It has to be appreciated though that stomas are not without their own set of complications, both in the early and late phases. Initial concerns can be due to ischaemia of the bowel forming the stoma, stomal retraction and obstruction through to later complications such as parastomal hernia formation, stomal prolapse and peristomal skin changes.

**Keywords** colostomy; end stoma; ileostomy; loop stoma; mucus fistula; parastomal hernia

## Introduction

The word stoma is derived from the Greek, meaning ‘mouth’. It is defined medically as a communication, natural or artificial, between the body cavity and the external environment. Surgical procedures in which stoma are created are given the suffix-ostomy. Artificial stomas are formed mainly from the gastrointestinal tract and intestinal stomas, such as ileostomies and colostomies, are the most common type.

## History of intestinal stomas

In the pre-anaesthetic era the formation of intestinal stomas was uncommon. There is a case report from 1710 of a patient who developed an intestinal stoma spontaneously secondary to a strangulated hernia.<sup>1</sup> The first demonstration of a surgically constructed stoma was performed by Littre who, in 1710, demonstrated the technique in a deceased child with imperforate anus,<sup>2</sup> but the first successful colostomy undertaken on a live patient was not performed until 1793.<sup>3</sup> The advent of anaesthetic techniques made intestinal stoma formation more common. The ileostomy was first advocated in ulcerative colitis in 1912 but

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only became widely used following the development of an everted ileostomy technique in 1952.<sup>4,5</sup>

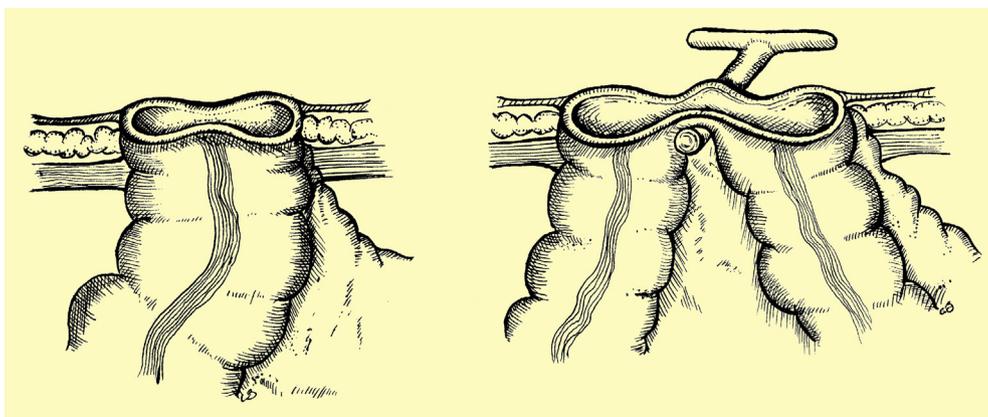
The formation of intestinal stomas has become an essential tool in the surgical management of several diseases of the gastrointestinal tract. They are used in both the emergency and elective settings and there is little doubt regarding their importance in preventing serious complications and reducing overall surgical morbidity and mortality.

## Types of intestinal stoma

Intestinal stomas can be temporary, diverting stomas designed to rest diseased distal bowel, protect distal anastomoses (following, for example, low anterior resection), or to relieve obstruction. Permanent stomas are indicated following the resection of distal bowel when a primary anastomosis is inadvisable, for example when gross faecal contamination or infected material is present, when there are doubts regarding the blood supply to the affected bowel, or if a primary anastomosis is not possible (e.g. when the distal bowel including anus has been excised as in an abdominoperineal resection (APER)).

There are two types of intestinal stoma: loop and end (Figure 1). A loop, or double-barrelled, stoma is formed by bringing a loop of bowel to the skin surface and creating a proximal and distal opening. The faecal flow is via the proximal opening into the stoma bag. The fact the distal end is exteriorized enables the stoma to be more easily reversed at a later date. This is achieved by mobilizing the bowel loop, re-anastomosing the two bowel ends, returning the bowel into the abdomen in continuity and closing the stomal defect. This is commonly performed at an optimum time between 3 and 6 months following the original operation. Types of loop stomas used include loop ileostomies, and transverse and sigmoid loop colostomies. Loop colostomies often require a plastic colostomy bridge to prevent early retraction. A loop stoma is commonly formed following distal colonic/rectal surgery in order to protect a distal anastomosis. This stoma can be a transverse loop colostomy but most surgeons favour a loop ileostomy formed from the terminal ileum. Williams et al. (1986) demonstrated that loop ileostomies produced fewer odours, required fewer appliance changes and were associated with a lower incidence of complications than a transverse loop colostomy.<sup>6</sup> There is also a potential risk of damaging the marginal artery when reversing a colostomy and therefore compromising the bowel distal to the stoma.<sup>7</sup>

End stomas are formed from the end of a proximal portion of divided bowel. An end colostomy usually involves sigmoid colon and is positioned in the left iliac fossa. An example of this in emergency surgery would be following a Hartmann's procedure. This is an operation performed following obstruction, perforation or ischaemia of the large bowel. The diseased segment of bowel is resected and a proximal end of healthy, well-perfused large bowel is used to form the end colostomy. The distal end of bowel is closed with a stapling device and/or sutures and is left in situ in the peritoneal cavity. Electively, end colostomies are utilized when restoration of intestinal continuity is impossible, usually following resection of the anus in an abdominoperineal resection of the rectum (APER). End ileostomies are usually positioned in the right iliac fossa. They are formed from the most distal section of healthy ileum possible in order to maximize fluid and nutrient absorption.



**Figure 1** End colostomy (left) and loop colostomy (right)

This minimizes the incidence of dehydration and nutritional deficiencies and produces a thicker faecal consistency allowing easier management of the ileostomy. End ileostomies are typically used following subtotal/total colectomy for fulminant colitis in both elective and most emergency settings.

Reversal of end stomas is possible 3–4 months after the original procedure. It is, however, a more difficult operation when compared to reversal of loop stomas and usually involves re-laparotomy, although if expertise allows a laparoscopic approach can be undertaken. The reality is that reversal is never achieved in around 40% of end stomas following Hartmann’s procedure.<sup>8</sup>

As previously mentioned, following the formation of an end stoma any remaining distal portion of colon is often closed over and dropped back into the abdominal cavity. However, if there are concerns that the distal closure may break down, releasing intestinal content into the peritoneal cavity and inducing faecal peritonitis, it is possible to bring the distal end to the skin as a

mucus fistula (Figure 2). This can be at a separate site to the proximal end (e.g. the inferior portion of a midline laparotomy) or at the same site, forming a double-barrelled stoma.

Advantages of this technique are that it reduces the risk of serious postoperative morbidity and may make reversal easier. This has to be weighed against the fact the patient will have two stomas to deal with. A compromise strategy has also been suggested where the closed distal end is brought through the anterior sheath but the skin is closed over it. Therefore, if the stump leaks the content will drain percutaneously. Trickett et al. (2005) reviewed rectal stump management following emergency subtotal colectomy in inflammatory bowel disease. They demonstrated that the subcutaneous placement of the stump, compared to intraperitoneal placement, resulted in reduced incidence of pelvic sepsis and a significantly shorter postoperative stay.<sup>9</sup>

**Unusual stomas**

Less common intestinal stomas include caecostomy for decompression of colon, appendicostomy for administration of ante-grade enemas (chronic constipation), and the use of small bowel as an ileal conduit for reconstruction of the urinary tract following cystectomy. Attempts have been made to create continent stomas using plastic valves (Koch ‘continent’ ileostomy). Results, however, have been poor and their use is limited. The surgical placement of a feeding tube into proximal jejunum for enteral feeding (feeding jejunostomy) is an important part of a surgeon’s skill set.

**Indications for intestinal stomas**

**Ileostomy**

The indications for the different forms of ileostomy are shown in Table 1.

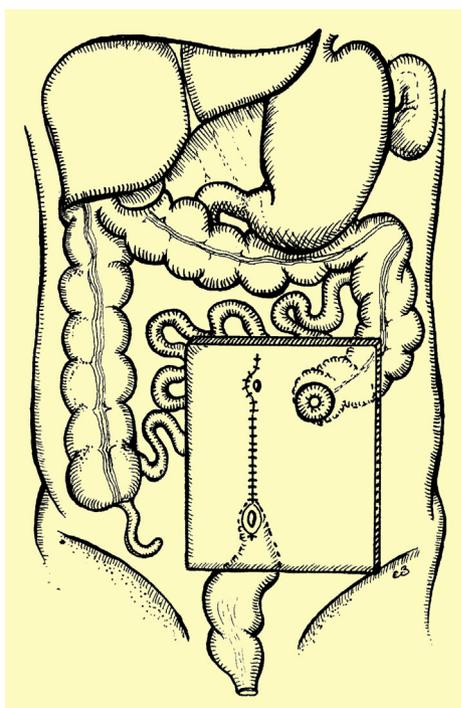
**Colostomy**

The indications for the different forms of colostomy are shown in Table 2.

**Physiology of intestinal stomas**

**Ileostomy**

The primary functions of the small bowel are chemical digestion of food and absorption of the products of digestion. The absorption of the majority of nutrients takes place in the jejunum. The ileum is



**Figure 2** End colostomy and mucous fistula

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