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PHARMACEUTICAL SCIENCES**<http://doi.org/10.5281/zenodo.2560712>Available online at: <http://www.iajps.com>**Review Article****REVIEW OF ABDOMINAL STOMAS**

Afraa Hashim Mutahar ^{1*}, Yahya Salem Alzahrani ², Mohammad Talal Alotaibi ², Baraa Saud Murshid ³, Ridha Hussein Bohassan ⁴, Faisal Rabih Fatayerji ⁵, Ethar Adnan Kensarah ⁵, Abdullah Mohammed Alsuaylik ⁶, Mohammed Abdullah Alariefy ⁷, Wala Hassan Bakhamees⁷, Mojahid Mohammad Felimban ⁸

¹ College of Medicine, Batterjee Medical College, Jeddah, Saudi Arabia, ² College of Medicine, Umm Al-Qura University, Mecca, Saudi Arabia, ³ Department of General Surgery, King Abdulaziz Hospital, Mecca, Saudi Arabia, ⁴ College of Medicine, Aljuf University, Aljuf, Saudi Arabia, ⁵ College of Medicine, King Abdulaziz University, Jeddah, Saudi Arabia, ⁶ Department of Pediatrics, Prince Saud Bin Jalawy Hospital, Al-Ahsa, Saudi Arabia, ⁷ College of Medicine, University of Jeddah, Jeddah, Saudi Arabia, ⁸ College of Medicine, Ibn Sina National College, Jeddah, Saudi Arabia.

Abstract:

Abdominal stomas are artificial openings surgically-created on the abdominal wall for the purpose of diverting the flow of body fluids (such as urine or stool) to get out from the body. Stomas are usually indicated when the distal portion of the bowel or urinary lumens are mal-functioning (e.g. due to surgical resection, neoplastic infiltration, traumatic injury, ...etc). Several types of abdominal stomas exist. The most common types of abdominal stomas are intestinal or urinary, Intestinal stomas include ileostomy (where ileum is opened to the abdominal surface), cecostomy (where caecum is directly connected to the abdominal wall), and colostomy (where colon is opened to the external surface of the abdomen). Urinary stomas include vesicostomy (where the urinary bladder is connected to the abdominal wall and opened externally on the skin surface), ureterostomy (where the ureter/s is/are connected to the abdominal wall surface), and ileal conduit (where a proportion of the ileum is used to divert the urine flow from the urinary tract to the abdominal wall). Each type of stomas has its technique, subtypes, indications, and complications. The aim of this article is to enlighten the different types of abdominal stomas, their subtypes, techniques, indications, and potential complications.

Keywords: Abdominal stomas, cecostomy, colonoscopy, end-loop, ileal conduit, ileostomy, loop, stomas, ureterostomy, vesicostomy.

Corresponding author:**Dr. Afraa Hashim Mutahar,**

College of Medicine, Batterjee Medical College, Jeddah, Saudi Arabia

Phone (or Mobile) No.: +966500609384

Email: afraa.mu@gmail.com

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INTRODUCTION:

The term “stoma” is a Greek term that means “mouth” [1]. In surgical field, stomas refer to an artificial surgically-made openings that connect bowel, intestinal, or urinary lumens with the external abdominal surface [2]. Abdominal stomas are artificial openings created on the abdominal wall for the purpose of diverting the flow of body fluids (such as urine or stool) to get out from the body. Stomas are usually indicated when the distal portion of the bowel or urinary lumens are mal-functioning (e.g. due to surgical resection, neoplastic infiltration, traumatic injury, ...etc) [3]. In several European countries, reports estimated that about 100,000 patients are indicated for abdominal stoma, and more than two thirds of them are permanent³. Abdominal stomas need special care to minimize any potential complications [4,5].

Several types of abdominal stomas exist. The most common types of abdominal stomas are intestinal or urinary, and each of them have several subtypes [3,6]. Intestinal stomas refer to the surgically-created to divert the flow of stools from the bowel to the abdominal surface [3]. They include three main types namely ileostomy (where ileum is opened to the abdominal surface), cecostomy (where caecum is directly connected to the abdominal wall), and colostomy (where colon is opened to the external surface of the abdomen)⁷. Urinary stomas, on the other hand, refers to artificially created stomas to divert the flow of urine due to distal destruction or mal-function of urinary bladder or urinary tracts [8-10]. Urinary stomas include vesicostomy (where the urinary bladder is connected to the abdominal wall and opened externally on the skin surface), ureterostomy (where the ureter/s is/are connected to the abdominal wall surface), and ileal conduit (where a proportion of the ileum is used to divert the urine flow from the urinary tract to the abdominal wall) [11-13].

Each type of stomas has its technique, subtypes, indications, and complications, and the aim of this article is to enlighten those different types of abdominal stomas, their subtypes, techniques, indications, and potential complications.

INTESTINAL STOMAS:

Intestinal stomas (or ostomies) are surgically-made artificial openings created on the surface of the abdominal wall via connecting a proportional of the gastrointestinal tract directly to the external surface of the abdomen [3]. The aim of this procedure is to divert or re-direct the flow of stools to exit the body through this artificially made stoma rather than its

natural flow through the rectum and anus. This is indicated in cases where the distal parts of the gastrointestinal tracts are anatomically destroyed (e.g. colorectal cancer indicated for total meso-rectal excision, traumatic injury to the colon, diverticulitis, pelvic tumors), physiologically mal-functioning (e.g. stool incontinence), or both⁷. According to the portion of the intestine that was connected to the abdominal surface, intestinal stomas are classified into ileostomy, cecostomy, or colostomy. According to the indication, intestinal stomas are classified into temporary (created for a certain period of time and will then be closed) and permanent stomas (created for an irreversible cause and will not, thus, be closed) [14].

Indications of intestinal stomas

Intestinal stomas may be indicated for a temporary cause that results in temporary dysfunction of the distal portions of the bowel, or for permanent loss of these portions. Examples of indications of temporary intestinal stomas include intestinal obstruction (particularly distal obstruction), fulminant colitis in patients with inflammatory bowel diseases (IBD) such as ulcerative colitis (UC) or Cron’s disease (CD), rectal temporary dysfunction following anterior rectal resection (i.e. low rectal anastomosis), patients with complicated diverticular disease, or patients undergoing operative treatment of a high anal fistula. In these cases, a temporary intestinal stoma is created until resolution of the primary cause, and then the stoma is closed [15-17]. Permanent intestinal stomas, on the other side, are indicated when the primary etiology is irreversible, for instance, in cases of rectal carcinoma surgical excision or for patients with inoperable distal cancer (e.g. colonic or distal carcinoma). In these cases, reversal of the cancer and restoration of the normal anatomy and physiology of intestinal lumen and passage of stool is impossible [18-20].

Ileostomy

Ileostomy refers to creating an opening connecting a loop of ileum with the abdominal surface. It aims at diverting the flow of faeces, intestinal gases, or the intestinal content to the external surface. The intestinal discharge is usually liquid in form [21]. The most common indication of ileostomy is for cases where total removal of colon and rectum (proctocolectomy) is indicated such as familial polyposis coli, advanced ulcerative colitis (UC) or advanced Crohn’s disease (CD). Ileostomy can also be used as an alternative for loop colostomy in cases of total proctocolectomy (i.e. ileo-anal pouch) and anterior rectal resection (i.e. low rectal anastomosis) [3].

In ileostomy, a skin incision is made few centimeters lateral to the umbilicus, and all the layers of the abdominal wall are dissected over the right iliac fossa. The loop of ileum is then pulled out side the abdomen and sutured to the outer surface of the abdomen [2].

Colostomy

Colostomy is one of the most common types of intestinal stomas performed. It implies making an artificial opening between any portion of the colon than has a mesentery (e.g. ascending colon, transverse colon, or descending and sigmoid colon) and the abdominal wall to divert the flow of flatus and faeces outside the body to be collected in an external bag. The effluent is usually well-formed faeces. The transverse colon is used in diseases affecting the left (descending) colon, and the sigmoid colon is used in diseases affecting the sigmoid colon, rectum, or rectosigmoid junction [3].

Many types of colostomy were developed, the most common of which are loop colostomy, end colostomy, and double barrel colostomy. Loop colostomy is the most common type of colostomy used in emergency cases (e.g. acute fulminant colitis, trauma, ...etc.), and is usually made as a large temporary stoma that will be closed later. In loop colostomy, a portion of the colon is brought out on the abdominal surface and is held in place with an external device (e.g. a rod) not to be internalized. This loop of bowel is then sutured to the abdominal wall and two openings are created on the surface of this loop: one for passage of faeces and the second for passage of mucous [21-23]. During loop colostomy procedure, an eight to ten centimeters transverse incision is made in the skin in the right upper abdomen for transverse colon (over the rectus abdominus muscle midway between xiphisternum and umbilicus) or in the left iliac fossa for sigmoid colon. All abdominal skin, subcutaneous, and muscle layers are incised transversely to reach the bowel. The loop of bowel is prepared via removing the overlying omentum (on the anterior surface) to avoid pain on traction and pain, and then a rubber tube is used to make an opening in the colonic wall to facilitate bringing it out. After bringing the targeted colonic segment outside the abdomen, an external device (commonly a colostomy bar or a glass rod) is applied to prevent re-entry of the bowel to the inside. The bowel is then dissected longitudinally over its anti-mesocolic border (to allow only a single finger to pass) and sutured to the abdominal wall [19,23].

In end colostomy, the stoma is created from the distal end of the utilized colon segment. This procedure is

also referred to as 'Hartmann's procedure' [24]. The distal part of the colon is usually either surgically resected (for the primary etiology) or closed and sewn shut. Hartmann's procedure is commonly indicated in patients who had left colonic tumors resected or patients with complicated diverticulitis [25,26]. In Double barrel colostomy, the bowel segment used is severed surgically, and both created ends are opened and pulled out to be attached on the surface of the abdominal wall. Though two openings exist on the abdominal surface, only the proximal one is functioning. The main advantage of double-barrel colostomy is that it ensures absolute rest (complete de-function) of the distal bowel segment (e.g. distal colon, sigmoid colon or rectum) [27].

Cecostomy

Cecostomy is another type of intestinal stomas in which the caecum is opened to the abdominal surface. The main indications of cecostomy are caecum trauma and closed loop syndrome. The skin is incised at the right iliac fossa and, like ileostomy and colostomy, all layers of the skin are dissected, and the caecum is brought out, opened, and dissected [28]. All stomas are applied on the skin on top a protective skin barrier that stays between the skin surface and the bag, and the bag (or pouch) can be either drainable or closed-end [3].

Complications of intestinal stomas

Intestinal stomas need special care to prevent, early diagnose, and management potential complications. The most common complications of colostomy are stenosis of the stoma's orifice, necrosis of its distal end, formation of fistula, bowel retraction, or bowel prolapse. Other complications include bleeding (mostly due to formation of granulomas around the orifice margins), diarrhea (usually due to infective enteritis), or herniation. Local complications may occur such as folliculitis, dermatitis, or candidiasis. Diarrhea can be resolved with administration of oral antibiotics (e.g. metronidazole) for a couple of days. Otherwise, the vast majority of the remaining complications require revision of the operation [3]. Ileostomy has similar complications (i.e. bleeding, hernia, loop retraction or prolapse, necrosis of the distal end, and stenosis of the orifice). Additionally, fluid and electrolyte imbalance may also occur, and is referred to as 'ileostomy flux'. Local skin complications are also common around ileostomies such as sloughing, skin excoriation, or erosion [29].

URINARY STOMAS:

Urinary stomas are also common. They imply making an artificial orifice on abdominal surface that connects the urinary system with the exterior. Using

urinary stomas, urine flow does not go towards the urinary bladder and urethra, but rather it is re-routed to the abdominal surface via a surgically made stoma³⁰. Urinary stomas are applied to the surface of the abdomen in one of two forms: the flush stoma which is preferable for cases who need continent urinary diversion and protruding stoma for incontinent diversion. Various types of urinary stomas are available such as vesicostomy, ureterostomy, and ileal conduit [30].

Indications of urinary stomas

Urinary stomas are indicated when the natural urinary flow is disrupted either due to urinary bladder or sphincteric problems. Patients who are indicated for urinary bladder excision (e.g. due to malignant infiltration or trauma) require urinary stomas [31]. Also, urinary stomas are indicated for patients who have dysfunction of detrusor muscle or urinary bladder sphincter secondary to neurological deficits. Neglected vesico-vaginal fistula, neglected ectopic vesicae, or advanced inoperable cases of these conditions are other indications of urinary stomas. Any inoperable obstructive uropathy is a potential indication for urinary stomas [30].

Vesicostomy

Vesicostomy implies making an orifice in the urinary bladder wall and connecting it with the lower abdominal surface [32]. Vesicostomy can be either continent or incontinent. In incontinent vesicostomy, the urinary bladder is directly opened to the skin surface and the patient does not have the ability to control when to and when not to evacuate it [33]. Continent urinary diversion, on the other hand, implies the use of a catheterizable channel between the urinary bladder and the skin surface³⁴. The channel is created from the urinary bladder wall via making a long rectangular flap that is then tabularized and connected to the abdominal wall. The distal end is kept under the subcutaneous fascia and maintained under no tension to ensure continence [34].

Ureterostomy

As the name indicates, ureterostomy is an artificial opening made between the ureter/s and the abdominal surface. In this procedure, the ureter/s is/are directly implanted into the abdominal surface for urinary diversion [35,36]. Loop ureterostomy is similar to loop colostomy where a loop of ureter is brought out the outer surface of the abdomen and held on surface by an external device. The ureterostomy stomas are usually created on posterior abdominal wall [36].

Ileal conduit

Ileal conduit is the usage of a small loop of ileum to

create a passage between the urinary pathway (e.g. ureters or urinary bladder) and the abdominal surface. This loop of ileum acts as a conduit to divert the urine flow outside the body [11,37]. Ileal conduit is the most common type of urinary stomas used for urinary diversion. During the procedure, a long segment of ileum (about 18-20 centimeters) proximal to the ileocecal valves used. The segment is connected to both ureters on one side and to the abdominal surface on the other side [37].

Complications of urinary stomas

As with any type of stomas, urinary diversion stomas carry many complications. Early complications of urinary stomas include stenosis of the orifice, retraction, fistula formation, bleeding, and ischemia. Late complications include prolapse, hernia, obstruction, and local skin irritation [38,39]. Stomal stenosis may result from ischemia, infection, or retraction, and it may occur early or late after surgery. Retraction is often caused by obesity, poor wound healing, tension, or steroid use. Fistulas usually indicate underlying infection. Bleeding may be mild and self-limited (mostly due injury to mucosal microvasculature) or active requiring revision of surgery (mostly due to failure to ligate a mesenteric vessel). Necrosis of urinary stomas usually results from excessive stripping or tension over the vascular supply and mesentery of the ureters or urinary bladder. Parastomal hernial are prevalent among obese, malnourished patients, those who had previous abdominal incisions, underlying wound infection, or large stoma. Aside from skin infection and irritation, most of the stoma complications necessitate revision of surgery [38,39].

CONCLUSION:

Abdominal stomas are common surgical procedures indicated for various diseases. They aim at diversion of flow of body contents (e.g. urine or faeces) to the exterior of the body. The most common abdominal stomas are intestinal and urinary stomas. Intestinal stomas imply diverting the stool flow from the natural pathway through the rectum and anus to the abdominal surface mostly due to distal pathologies affecting colon, sigmoid, or rectum. Examples of intestinal stomas include ileostomy, cecostomy, and colostomy. Urinary stomas, on the other hand, aims at diverting urine flow to the skin surface. They are indicated in patients with bladder cancer, detrusor or sphincter dysfunction, or distal obstructive uropathy. Examples of urinary stomas include vesicostomy (continent and incontinent), ureterostomy, and ileal conduit. The most common complications of abdominal stomas are stenosis, obstruction, retraction, prolapse, hernia, bleeding, fistula

formation, and local skin irritation and/or infection.

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