



## Review article

# Current Status of the Prevention and Treatment of Stoma Complications. A Narrative Review<sup>☆</sup>



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## A B S T R A C T

The aim of our study was to perform a review of the literature to assess the results of prevention and treatment of stoma complications.

Medline, EMBASE medical database and the Cochrane Library were searched up to December 2012.

Stomal complications are prevalent and associated with a worse quality of life and increased health-economic burdens. The most common complications are attributed to stoma construction. Attention to the finer technical points performed by experienced surgeons reduces morbidity. The use of mesh reduces the risk of parastomal hernia and recurrence rates in hernia repair.

Preoperative stoma site marking and postoperative care by a stomatherapist are crucial for the patients' successful adaption, improving quality of life, promoting their independence and reducing the rates of complications.

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## Estado actual de la prevención y tratamiento de las complicaciones de los estomas. Revisión de conjunto

## R E S U M E N

El objetivo es realizar una revisión del estado actual de la prevención y tratamiento de las complicaciones de los estomas.

Se ha realizado una búsqueda de la literatura en Medline-PubMed, EMBASE y Cochrane Library hasta diciembre de 2012.

Las complicaciones de los estomas son frecuentes e implican una peor calidad de vida y un aumento del costo para el sistema sanitario. Muchas están en relación con la técnica quirúrgica y son susceptibles de prevención con una correcta cirugía realizada por cirujanos con experiencia. El uso de mallas reduce el riesgo de hernia paraestomal y la tasa de

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recurrencia después de su reparación. Es fundamental el papel de la enfermera estomate-rapeuta para elegir la localización del estoma en la fase preoperatoria, y en la fase de seguimiento, para conseguir una mejor adaptación e independencia de los pacientes ostomizados, lo que redundará en una mayor calidad de vida.

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## Introduction

Surgical treatment of colorectal malignancies or inflammatory bowel disease may require the construction of a stoma, which can be associated with complications that affect patients' quality of life and increase the health system's financial costs.

It is estimated that half of all patients with intestinal stomas will have complications. However, several studies describe the rates of 70%–80%,<sup>1–25</sup> or even 96% during the 3 weeks after surgery<sup>26</sup> (Table 1). This wide range makes it difficult to know the incidence due to factors such as follow-up duration, definition of complications, stoma type, type of surgery (emergency or deferred), or underlying disease.<sup>2</sup>

Complications are classified as early or late<sup>1</sup> (Table 2). Early complications present immediately after surgery (under a month) and late complications appear after this period.

The aim of our study was to review stoma complication prevention and treatment.

## Method

A search was carried out of Medline-PubMed, EMBASE and the Cochrane Library up to December 2012. Key words used were: stoma complications, stoma location, parastomal hernia, stoma prolapse, peristomal dermatitis. The prevention and treatment of complications were considered key points. It was established that there was a lack of high quality studies.

## Results

### Prevention of Complications

#### Risk Factors

Different studies identified risk factors including age, inflammatory bowel disease, body mass index,<sup>5,12,26,27</sup> comorbidity, diabetes, ASA anaesthetic risk, lack of pre-operative care by stoma nurse specialists,<sup>1,5,12,17,24,26–35</sup> and emergency surgery.<sup>5,28</sup> Many of these factors cannot be controlled by the surgeon but it is essential to consider that many complications are linked with the surgical technique and therefore can be prevented.<sup>20–22,36</sup>

#### Preoperative Consultation

All patients awaiting stoma construction should attend a pre-operative consultation to receive technical advice and emotional support, to enable the patient to adapt better after surgery.<sup>15,24,37</sup>

Recent studies observed that pre-operative education within a recovery programme helps to reduce delay in hospital discharge until the patient is able to independently care for their stoma.<sup>38</sup> A prospective randomized trial<sup>39</sup> observed that pre-operative advice is more effective than postoperative advice and is associated with a reduction in the time taken to manage the stoma, reducing post-operative hospital stay and financial costs.

#### Preoperative Choice in Stoma Location

A badly positioned stoma is a frequent complication. Self-care is hindered and it interferes with pouch adherence,<sup>40</sup> leading

**Table 1 – Rate of Stoma Complications.**

Main author	Year	No.	% of complications
Pearl <sup>22</sup>	1985	610	25.9
Porter <sup>25</sup>	1989	126	44.0 <sup>a</sup>
Unti <sup>9</sup>	1991	229	13.1
Londono-Schimmer <sup>23</sup>	1994	203	51.2 <sup>a</sup>
Park <sup>15</sup>	1999	1616	34.0
Saghir <sup>14</sup>	2001	121	67.5
Kairaluoma <sup>13</sup>	2002	349	12.0 <sup>b</sup>
Arumugam <sup>12</sup>	2003	97	50.5
Mahjoubi <sup>9</sup>	2005	330	69.4 <sup>a</sup>
Robertson <sup>10</sup>	2005	408	23.5
Mala <sup>7</sup>	2008	72	27.0
Nastro <sup>4</sup>	2010	1216	46.4
Parmar <sup>5</sup>	2011	192	27.1

<sup>a</sup> Only colostomies.

<sup>b</sup> Only temporary stomas.

**Table 2 – Classification and Stoma Complication Rate.**

% early complications	% late complications
Hydroelectolytic disorders 20–29	Cutaneous 12–43
Cutaneous 6–42	Stenosis 2–15
Mucocutaneous dehiscence 7–25	Parastomal hernia 0–25
Collapse/retraction 3–35	Bad position 8–43
Infection/abscess 2–15	Prolapse 2–25
Necrosis 1–34	
Intestinal obstruction 2–7	
Bleeding 2–3	

to a leakage of faeces which irritates the skin around the stoma. This in turn makes it difficult for the pouch to adhere. A vicious circle of leakage and skin irritation is created which exacerbates the condition. The ostomy patient's quality of life is affected,<sup>3,4,15,17,32,41–44</sup> and this leads to increased financial costs due to the need for specialist care and the use of multiple appliances.

A comparative study of patients with preoperative stoma siting vs patients without preoperative siting, found that the patients without preoperative stoma siting considered their location to be inappropriate. This led to changes in their lifestyle and greater rejection, compared with the group who did have preoperative siting.<sup>45</sup> Another recent study found that pre-operative choice of stoma location significantly reduced the risk of complications.<sup>4</sup>

This complication is therefore easily avoided when the most appropriate site is selected by specialist staff before surgery, even in the case of emergency surgery.

#### Technical Aspects

A series of basic universally accepted principles<sup>46,47</sup> exists although technical variations are defined.

It is recommended that the orifice should be prepared prior to surgical incision so that it is made perpendicularly to all abdominal wall layers. If a laparoscopic approach is used, the stoma is constructed in the trocar site positioned in the area marked by the stoma specialist nurse.

Good release of the segment next to the intestine for stoma formation is required, including, if necessary, splenic flexure mobilization in colostomies, to achieve tension-free exteriorisation.<sup>16,48</sup> In obese patients these procedures may be more difficult. Therefore, to minimize risk of retraction, an end loop colostomy has been described where the end of the closed colon remains inside the abdomen and the anti-mesenteric side is open as a loop colostomy.<sup>49</sup>

Rods may be used for loop stomas. Technical modifications have been described in obese patients or those with short mesenteries, such as the suture-bridge<sup>50</sup> or subcutaneous bridge device.<sup>51</sup> There is no evidence to support systematic use, however, and a randomized study even observed that routine use is unnecessary.<sup>52</sup>

Blood supply must be meticulously maintained to prevent ischaemia and necrosis, mainly in end stomas and above all when some of the vascular arcades require ligation.

A correct opening in both skin and fascia is important to prevent narrowing which may lead to ischaemia or stenosis. The diameter of the orifice would vary depending on stoma type: end or loop, colostomy/ileostomy. A cutaneous and fascia orifice of 3 or 4 cm in diameter is usually sufficient.

A stoma should not lie flat on the skin. A recent study<sup>26</sup> noted that the mean height of the ileostomy in patients without complications was 22 mm, whilst in those with complications it was 15.7 mm. In our study, logistic regression analysis noted that a stoma under 10 mm, for either ileostomies or colostomies, is a risk factor for complications. Another study found that ileostomies with a height <20 mm, both end and loop, produce higher leakages and skin problems.<sup>53</sup>

1 cm is therefore sufficient in a colostomy. In an ileostomy, however, 5–6 cm should be exteriorised to enable eversion, resulting in a final length of 2.5 cm.<sup>54</sup>

#### Parastomal Hernia

This is one of the most studied technical aspects. Recent randomized trials,<sup>55–58</sup> a metaanalysis<sup>59</sup> and two systematic reviews<sup>60,61</sup> observed that the incidence of parastomal hernia

**Table 3 – Prevention of Parastomal Hernia With Mesh.**

Author	Year	Design	No.	Follow-up (months)	Recurrent Mesh vs no Mesh	P
Hammond <sup>55</sup>	2008	Randomized Or controlled	20	6.5 <sup>a</sup> (1–12)	0/10 vs 3/10	
Serra-Aracil <sup>56</sup>	2009	Randomized or controlled	54	29 <sup>b</sup> (13–49)	14.8 vs 40.7	.03
Jänes <sup>57</sup>	2009	Randomized or controlled	55	65.2 <sup>b</sup> (57–83)	14.6 vs 40.7	.03
Wijeyekoon <sup>59</sup>	2010	Meta-analysis	129	NA	17/21 vs 2/15	.001
					12.3 vs 54.7	.02
					12.3 vs	.02
					54.7	
Tam <sup>60</sup>	2010			1–83	7.82 vs 55	.0001
					7–55 vs 55	.0001
Shabbir <sup>61</sup>	2012	Systematic review	128	NA	12.5 vs 53	.0001
					12.5 vs 53	.001
López-Cano <sup>58</sup>	2012	Randomized or controlled	36	12 <sup>c</sup>	50 vs 93.8	.008
					50 vs 93.8	.008

<sup>a</sup> Mean.

<sup>b</sup> Median.

<sup>c</sup> All assessed in this follow-up time.

for both end and loop stomas and in open and laparoscopic surgery was significantly reduced using a prophylactic mesh, with no increase in complications. The rate of complication observed with prophylactic mesh is 12.5% and without it 53%<sup>61</sup> (Table 3). Furthermore, in the case of hernia, the need for surgery is 0% if a mesh is used and 13% if none is used.

Although the use of prophylactic mesh used in the same surgical procedure to construct the stoma may reduce the risk of parastomal hernia,<sup>62</sup> the technique or type of mesh which obtain the best results, as well as the patient groups with risk factors who could benefit are yet to be determined.

#### Ostomy Patient Follow-up

After surgery the presence of early complications must be monitored. As the patient recovers, the information they received in the preoperative stage is reinforced. It is important to teach them about caring for themselves so as to be independent. On hospital discharge it is essential to confirm continuity of care by a stomatherapist,<sup>63,64</sup> and indicate which devices and products are required for care, prevention and treatment of complications.<sup>9,29,41,65,66</sup>

When the patient is discharged they follow a programme of visits with the stomatherapist, the frequency of which will be decided on an individual basis depending on how well they are coping with their stoma.<sup>67</sup> The programme covers aspects such as hygiene and pouch changing. Advice on sexual dysfunction, pregnancy or even work disability will also be necessary.

Late complications must be monitored. Regular follow-up by a stoma specialist can prevent these complications,<sup>53</sup> enabling prompt intervention to keep the stoma in optimal condition,<sup>32,68,69</sup> which will result in a better quality of life<sup>3,4,17,32,41,42,44</sup> and lower financial costs.<sup>70</sup>

#### Treatment of Complications

##### Early Complications

These represent 39%–82% of stoma complications.<sup>15,24,71</sup> They involve higher hospital stay and outpatient care, which increases both financial and psychological costs. Complications may become serious, with the need for reoperation (7%) and mortality (0.6%–8%).<sup>1,7,8,23,28–30,36</sup>

Early complications may appear in isolated form, but two or more can be associated in the same patient.

**Infection/Abscess.** Their treatment includes antibiotics and local drainage. If there is an abscess it requires drainage, through an incision in the mucocutaneous junction or the skin surrounding the pouch application area. This results in the drainage remaining inside the pouch or on the outer skin, respectively.

After spontaneous or surgical drainage a peristomal fistula may appear, especially in Crohn's disease.<sup>72</sup> Many superficial fistulas heal spontaneously but the deeper more persistent ones require resection and reconstruction of the stoma with relocation to prevent infection of the primary site.<sup>71,73</sup>

**Mucocutaneous Junction Dehiscence.** It may be limited or total, and it is a predisposing factor of stenosis.<sup>71,73</sup> A greater

incidence was noted with braided multifilament sutures and a lower incidence with monofilament suture material.<sup>74</sup>

Nursing care is essential for keeping the subcutaneous site clean between the stoma and the skin, filling it with absorbent materials, paste or powder depending on its depth until the new mucocutaneous junction has healed by secondary intention. In more complex cases assisted vacuum cures have been used.<sup>75</sup>

**Bleeding.** Treatment depends on the origin and intensity. If it is mucocutaneous, the application of compresses with cold serum or adrenalin may suffice. Local haemostasis with resorbable sutures is performed if a vessel is bleeding. A surgical revision to perform haemostasis may be needed if the haematoma presents, in order not to compromise the viability of the stoma.

**Necrosis.** It is a priority to confirm the extent of ischaemia. If necrosis is thought to be limited to the mucosa, generally associated with venous congestion, it is possible to detect arterial bleeding of the muscular intestinal wall by insertion of a needle; under these circumstances it is better to wait for spontaneous resolution.<sup>73</sup>

If the end of the loop above the fascia is affected, a conservative approach may be adopted until a new mucocutaneous junction is formed. If stenosis or another complication later presents, the stoma may be reconstructed electively.

If necrosis extends below the myofascial and peritoneal layers, immediate reoperation is required for stoma resection and reconstruction.<sup>10,16,73</sup>

**Retraction.** Collapse or retraction occurs when the end of the stoma is positioned below 0.5 cm from the skin's surface during the first 6 weeks.<sup>12</sup>

Retraction without complete mucocutaneous dehiscence, with stoma umbilication, is most frequent.<sup>73</sup> In these cases, the device on the abdominal wall must be sealed to avoid bowel leakage, pouch detachment and irritation dermatitis.

Complete collapse with mucocutaneous detachment leads to subcutaneous contamination, but if it is subfascial with peritonitis and sepsis, immediate reoperation is required. If the mucosa is viable and no excessive tension exists, it may be sufficient to eliminate the non-viable tissue, adjust the bowel loop and reconstruct the stoma by suturing it to the skin.<sup>71</sup> If this is not technically feasible, the loop will need to be mobilized and a new stoma created.

**Hydroelectrolytic Alterations.** Up to 20% of ileostomy patients present diarrhoea and dehydration, with sodium loss, which results in compensatory hyperaldosteronism.<sup>76,77</sup> It is therefore mostly a subclinical problem and will gradually improve.

Risk of serious dehydration and electrolytic imbalance is highest between postoperative days 3 and 8.<sup>78</sup> During the first 3 weeks of hospital stay 16% of ileostomy patients present high outputs (>2000 cc/24 h), with dehydration, hypomagnesaemia and malnutrition. A proximal intestine <200 cm and intra-abdominal sepsis/obstruction are risk factors. 49% resolve spontaneously and 51% require further medical treatment, essentially because of a short bowel.<sup>79</sup> High output is more frequent after emergency surgery.<sup>35</sup> A recent study observed

that the rate of re-admittance 60 days after colorectal resection with ileostomy was 16.9% and the most frequent cause was dehydration (43.1%).<sup>80</sup>

**Bowel Obstruction.** More frequent in patients with an ileostomy.<sup>73</sup> It is more frequent in the post-operative period following low anterior resection when a derivative ileostomy is performed.<sup>81</sup>

Digital examination through the stoma is useful since in some cases this allows the careful insertion of a Foley type probe through the ileostomy to decompress the obstructed loop or provide irrigation with saline.<sup>73</sup>

Initial treatment is conservative. If it does not resolve or signs of peritoneal irritation appear, reoperation should be performed. Mortality rates of reoperation for this complication are around 1%.<sup>82</sup>

#### Late Complications

These mainly occur in permanent stomas. However, some may present at early stages in temporary stomas.

**Stenosis.** Defined by the impossibility of inserting a finger or Hegar dilator n°12 through the stoma.<sup>36</sup> It is more common in the mucocutaneous junction but it may occur at the abdominal wall level. It is usually well tolerated, although obstructive episodes may occur due to faecal impaction.

Dietary measures may be used for treatment, ensuring that fibre is processed. In colostomy patients, irrigations may be useful. If the problem is not resolved the stoma may be reconstructed through laparotomy or laparoscopy. Occasionally it may be locally repaired by a plastia.<sup>83</sup>

**Prolapse.** Any stoma may prolapse but this complication is more frequent in loop colostomies.

Surgical treatment is used when the patient's quality of life is affected or in rare cases of complications such as stoma strangulation or incarceration. The type of intervention will be determined by the clinical situation of the patient and difficulty in managing the stoma. Re-establishment of intestinal transit should be considered in these cases if feasible.

If it is not possible, a local approach may be used (peristomal). This is not an aggressive procedure; it may be performed with local anaesthesia and consists of releasing the stoma from the abdominal wall, resecting the redundant intestine, and reconstructing the stoma. In stomas with both loops prolapsed, the distal loop may be closed, converting it into an end stoma, adjusting the fascia closure to the diameter of the new stoma. Local approach is associated with a high percentage of recurrence.

Relocation of the stoma is performed when the site is inappropriate or when another associated complication exists that requires this relocation. There are several options available; these include relocation to the opposite side of the abdomen, the use of mesh through laparotomy, or a laparoscopic approach.

**Parastomal hernia.** This is more frequent in colostomies and in end stomas (due to the temporary nature of loop stomas). The majority appear in the first few years after surgery.<sup>23</sup> They may lead to local discomfort, the sensation of mass in the abdomen,

pain, and difficulty in pouch adherence. Less frequent complications are obstruction, strangulation, or intestinal perforation.<sup>84</sup>

Clinical diagnosis requires careful inspection with the patient standing up, without the pouch, performing the Valsalva manoeuvre or by digital examination around the stoma. Radiological diagnosis in asymptomatic patients is unnecessary.

Hernias with mild symptoms may be managed conservatively, with an ostomy hernia belt.

A third of patients will require surgery for complications.<sup>57</sup> There are several options: local repair, relocation of the stoma and correction with meshes with or without a laparoscopic approach. Local repair is non aggressive in multi-operated, at-risk patients and with previously relocated stomas. It consists of moving the abdominal wall stoma, excising the hernial sac and closure of the muscles of the abdominal wall. The preferred relocation of the stoma is the opposite side or at least a different quadrant of the abdomen. The results of both techniques are not encouraging, with recurrence between 50% and 76%<sup>85</sup>; moreover, in the case of relocation, hernias may present in both the laparotomy and the previous stoma site.

For this reason meshes are increasingly used and present significantly lower rates of recurrence. A recent systematic review<sup>86</sup> describes a recurrence rate of 6.9%–17%, depending on the level of the mesh location, corresponding with a lower rate of retromuscular position. Intraperitoneal “key-hole shaped” location has also been described, with a recurrence rate of 7% in laparotomy and 34.6% in laparoscopy. In 1985 Sugarbaker<sup>87</sup> described an intraperitoneal technique based on lateralizing the colon between the mesh and the abdominal wall; with this technique rates of recurrence were 15% for laparotomy and 11.6% for laparoscopy. More recently, the use of biological meshes has been proposed with 15.7% rates of recurrence.<sup>88</sup>

**Bad position.** Treatment is a challenge for the stoma specialist, because the stoma will be folded. Convex type appliances can be used, filler pastes, or belts to improve adherence and prevent leakages. In many cases the location will need to be changed, with prior pre-operative marking.<sup>1,71</sup>

**Cutaneous complications.** Both early and late complications may present. They are the most common cause for stoma therapy treatment consultation.<sup>9,29,41,65</sup> Complication rate is higher in ileostomies, since bowel movements are more liquid and more frequent. Also, proteolytic enzymes and alkaline content may damage the epidermal structure and provoke cutaneous excoriation.<sup>10,15,22,89</sup> This is most often due to the incorrect application of appliances.

Severity varies from mild dermatitis to cutaneous necrosis and ulcers. Correct treatment is essential to prevent the vicious circle of peristomal dermatitis and stoma malfunction. In this regard, stomatherapy is essential.<sup>90-92</sup> Treatment consists of careful cleaning of the skin with water, drying, and the application of stoma pastes, powders and protective creams. The diameter of the opening must be adapted to the stoma size. Multiple appliances attached to the skin for 48–72 h must be used to prevent frequent changing. To reduce ileostomy output, dietary recommendations must be established and both fibre and anti-diarrheal medication used. Topical cortico-steroids and barrier creams may also be used.

Antibiotics or anti-fungal drugs can be administered. When allergic dermatitis is present, the appliance which has caused the discomfort is replaced by another and the skin wounds are treated. Multiple accessories may be adapted to the circumstances in each case (powders, moldable pastes, convex discs, belts, absorbent hydrocolloid dressings). Sophisticated corrective measures have been proposed in cases of dermatitis due to a lack of sealant or cutaneous irregularities. These include subcutaneous infiltration of porcine collagen<sup>93</sup> and liposuction.<sup>94</sup>

It is sometimes necessary to perform biopsies to rule out other aetiologies, such as inflammatory bowel disease or malignancy.

#### *Infrequent Specific Late Skin Complications*

**Fistula:** this may affect ileostomy patients with Crohn's disease. Intestinal content may leak outside the pouch and result in local sepsis. Due to local infection stoma relocation to another site must be performed.

**Pyoderma gangrenosum:** this presents as painful inflammatory ulcerations in the peristomal skin, especially in ileostomy patients with inflammatory bowel disease. Initial treatment is systemic, intra-lesional or topical with corticosteroids, and tacrolimus, or immunomodulators. If this fails, relocation of the stoma is necessary.<sup>95,96</sup> To prevent this complication a segment of the intestine should be selected for the stoma which has not been affected by the disease.

**Peristomal bleeding:** caused by ulceration, traumatism, polyps, recurrent Crohn's disease or secondary varicose veins in portal hypertension. Treatment may be compression, sclerosis or detaching the mucocutaneous union and performing haemostatic suture of the distal end of the stoma. In some cases this may require systemic decompression of the portal hypertension.<sup>97</sup>

## Conclusions

Stoma complications are frequent and compromise quality of life. Many are secondary to stoma construction, and may therefore be prevented through good surgical technique employed by experienced surgeons. The use of meshes reduces the risk of parastomal hernia and the rate of recurrence after repair. The role of the stoma therapy nurse is essential in selecting the stoma site in the pre-operative phase and also in the follow-up phase, to help ostomy patients adapt better and gain independence, and achieve a better quality of life.

## Conflict of Interest

The authors have no conflict of interest to declare.

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