

Application of a convex appliance to restore peristomal skin integrity: a case study

ABSTRACT

This case study describes the nursing management of one case of irritant contact dermatitis from faecal fluid around the peristomal skin of a patient with an ileostomy who presented to the outpatient department 1 month postoperatively. This postoperative complication occurred as a result of the stoma being located within wrinkles in the abdomen, causing the appliance to leak and skin ulceration to develop, which prevented firm adherence of the appliance base plate to the peristomal skin. Furthermore, the patient was very anxious as a result of these complications. In this patient's case, the initial goals were to assess and address the peristomal skin complications, provide an appliance with convexity that could be fixed with a belt to stabilise the appliance as early as possible, and finally commence strengthening psychological counselling and dietary guidance for the patient and her family. These nursing interventions were found to reduce the incidence of faecal dermatitis complications around the stoma, improve the patient's quality of life and thus worth applying.

Keywords ileostomy, faecal dermatitis, convex appliance

For referencing Yan F and Jiang M. Application of a convex appliance to restore peristomal skin integrity: a case study. *WCET® Journal* 2020;40(1):10-17

DOI <https://doi.org/10.33235/wcet.40.1.10-17>

INTRODUCTION

The ileum stoma is a small intestine stoma and sometimes it is an indispensable surgical procedure for certain colorectal diseases such as rectal cancer and other conditions such as inflammatory bowel diseases, diverticular disease, radiation enteritis, abdominal trauma and intestinal obstruction¹⁻³. The ileum stoma or ileostomy is generally located in the lower right quadrant or side of the abdomen.

Peristomal skin complications occur frequently following ostomy surgery with prevalence reportedly ranging from 10–70%^{4,5}. Postoperatively within the first year of ostomy surgery the incidence of all forms of peristomal skin damage reportedly range from 15–43%^{6,7}. It is suggested peristomal

skin conditions account for over 40% of visits to enterostomal therapy nurses (ET nurses). Faecal dermatitis is one of the more common early complications after ileostomy surgery, with one study of 220 new ostomy patients identifying a rate of 69%⁸.

Definition, cause and management strategy of faecal dermatitis

Faecal dermatitis is caused by the frequent contact of faecal fluid containing digestive enzymes eroding the skin around the stoma⁹. Latterly the term peristomal moisture-associated dermatitis (MASD) has also been defined as inflammation and denudation of skin adjacent to a stoma associated with exposure to effluent, such as urine or stool^{10,11}. Initially contact irritant dermatitis may present as reddened skin which, with continued contact with effluent, may blister or become denuded. The pattern of skin loss reflects the areas where leakage of faecal material has occurred^{12,13}.

Faecal material contains proteolytic and lipolytic enzymes postulated to damage both protein and lipid-based elements of the skin's epithelial (and moisture) barrier. Effluent from an ileostomy is typically more liquid in nature than effluent from a colostomy and contains abundant digestive enzymes. The consistency of faecal discharge from an ileostomy depends on the location of the stoma within the ileum. The ileostomy

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output may be fluid or viscous (mushy) in consistency. Faecal discharge that is more liquid occurs when the stoma is located closer to the stomach and therefore contains more digestive enzymes.

Tissue that is constantly damaged in the healing process by friction, shear and corrosive substances results in mucosal damage, inflammatory changes, tissue cell proliferation and the development of granulomas. Ostomy mucosa granulomas are raised benign lesions that usually occur where the mucous membrane is joined to the skin or occurs on the stoma mucosa itself. One or more granulomas may grow around the edge of the stoma. Ostomy mucosal granulomas not only cause pain and itching, they are very fragile and prone to bleeding which affects adhesion of the ostomy bag, and which may cause leakage and lead to dermatitis around the stoma.

Further, the often-unbearable pain from faecal dermatitis and continued leakage of the ostomy bag significantly affects the patient's quality of life and early rehabilitation which can have serious long-term physiological and psychological effects on the patient¹⁴.

Convexity in stoma care

In a cross-sectional descriptive quantitative survey in the United States of wound, ostomy and continence nurses, 281 respondents ranked the management of complications of stoma and surrounding skin. Among the management strategies for peristomal irritant contact dermatitis, which was defined as, "Damage resulting from skin exposure to faecal or urinary drainage or chemical preparations"¹⁵, the use of convex appliances, pastes, barrier rings, powders and belts were described. The importance of determining the aetiology of contact dermatitis was also discussed.

Current evidence-based practice endorsed by international experts advocates the application of convexity via convex appliances and accessories in the management of certain peristomal complications. They recommend filling in the depressions made by abdominal contours, skin folds and wrinkles with convex appliances or seals which facilitates protrusion of stomas and flattening out of abdominal folds or skin creases, thereby improving adherence of the appliance and lessening of leakages^{16,17}.

The Ostomy Skin Tool (OST) assists ET nurses to be able to objectively quantify peristomal skin damage in terms of discolouration (D), erosion (E) and tissue (T) and to relate these changes to other health professionals to ensure consistency of understanding and management of peristomal skin damage. Each parameter of DET is scored for the size of the area affected (between 0 and 3) and the severity of skin damage (between 0 and 2), with each of three categories potentially reaching a score between 0 and 5. The overall score range is between 0 and 15, where 0 represents normal skin and 15 signifies the highest amalgamation of severity and extent¹⁸.

A numerical rating scale (NRS) represents the pain degree, with 11 numbers from 0 to 10; 0 means no pain and 10 means the



Figure 1A

most pain. Subjects were marked with one of the numbers according to their personal experience of pain¹⁹.

This article describes the clinical care provided in one case of faecal peristomal skin dermatitis and discusses the rationale for the application of convexity technology in minimising the adverse effect of skin wrinkles near the stoma.

CASE STUDY

Patient overview

A female patient, 42 years old, underwent elective radical resection of her colon because of rectal cancer and an ileostomy was performed on 30 November 2017. Her stoma was not sited preoperatively. After the operation, postoperative education on the management of her stoma and wound was provided. While the patient had the right to independently choose her ostomy appliance, the ostomy product was selected by the hospital ostomy assistant. A two-piece flat base plate was chosen and the patient was scheduled to receive targeted chemotherapy, starting about 3 months later. Targeted therapy drugs are theoretically precision-guided drugs that deliver precise strikes on tumour cells with little damage to normal cells cured.

Assessment of the patient, stoma and peristomal skin

On the first visit to the Outpatient Clinic on 26 December, 1 month post-surgery, the patient was wearing a two-piece ostomy product with a flat base plate. The patient reported severe leakages had been occurring. On assessment, the reason for the leakages around the stoma became apparent.

The ileostomy stoma was located within a large abdominal crease. The stoma protruded just 0.6cm above the level of the peristomal skin. The main problem was the wrinkles on the abdomen, which had loosened the adhesion of the base plate, thus leading to the appliance leaking. The peristomal skin was severely ulcerated on both lateral sides of the stoma with evidence of hyper-granulation. Multiple bleeding points (>50% of the area) were evident around the stoma (see Figure 1A). The

Table 1. The OST score and nursing measures

Date	OST score	Digital pain score ²⁰	Nursing measures
12/26/2017	10	8	Stoma powder + skin protective film + alginate dressing + super thin hydrocolloid + convex surface base plate or flange+ belt
12/28/2017	8	4	Stoma powder + skin protective film + stomahesive paste + convex surface flange + belt
01/03/2017	4	4	Stoma powder + skin protective film + convex surface flange + belt
01/17/2017	4	4	Stoma powder + skin protective film + convex surface flange + belt
01/24/2017	2	0	Stoma powder + skin protective film + convex surface flange + belt
01/30/2018	2	0	Stoma powder + skin protective film + convex surface flange + belt

Table 2. OST DET score

Domain	Affected area	Score	Severity	Score
D: colour change	No colour changes	0	No colour changes	0
	< 25%	1	Colour changes	1
	25–50%	2	Colour changes and complications	2
	> 50%	3	Pain, shine, skin sclerosis, fever, itching, burning sensation	
E: impregnation, ulcer	No impregnation, ulcer	0	No impregnation, ulcer	0
	< 25%	1	The damage is only to the epidermis	1
	25–50%	2	Loss to epidermis and dermis with complications: exudation, bleeding or ulcer	2
	> 50%	3		
T: tissue hyperplasia	No tissue hyperplasia	0	No tissue hyperplasia	0
	25–50%	2	Hyperplasia is higher than skin level, accompanied by complications. To exude, bleed, or ulcer	2

patient complained of a burning pain within the peristomal skin. Green coloured thin faeces exuded from the stoma and lay on the peristomal skin. Assessment of skin integrity using the OST was 10 and her digital pain score was 8 points (see Tables 1 & 2). The patient's abdomen was soft on palpation.

The patient was very anxious, agitated at times and in pain particularly around the stoma. The faecal leakage was causing malodour. She was lethargic and lacked appetite and complained of weight loss of 6kg. Her body mass index (BMI) was 27.4. Her haemoglobin was low and she had pallid eyelids.

As the patient was wearing a flat base on discharge from hospital, the same ostomy appliance was replaced after cleaning the stoma and skin with normal saline, the application of stomahesive powder, skin sealant, stomahesive paste and a belt (see Figure 1B). Unfortunately, approximately 3 hours after the patient returned home the appliance leaked (see Figures 1C

& 1D). The patient was requested to change the appliance and use the alternative convex base plate she had been supplied with during the outpatient visit.

Interventions and stoma management plans

Stoma care and nursing procedures

According to the assessments undertaken, the main nursing problems that existed were: peri-ostomy complications, faecal dermatitis, pain and anxiety. The goals of care identified were to:

- Prevent leakage around the stoma by using suitable stoma care products.
- Promote skin healing around the stoma and reduce hypergranulation (hyperplasia) by using appropriate skin care and dressing products.
- Reduce the patient's peristomal skin pain.



Figure 1B



Figure 1C



Figure 1D

- Alleviate the patient's level of anxiety.
- Prevent the development of clinical malnutrition.
- Reduce the ileostomy output to normal levels and consistency.

Dressing regimen and stoma appliance selection

The peristomal skin was ulcerated because of erosion of the skin by watery faeces with a high enzyme content. In order to prevent potential secondary infection, control bleeding and promote epithelial tissue growth, the following skin care and dressing regimen were implemented:

- The stoma and peristomal skin were thoroughly flushed with normal saline.
- Saline soaked gauze was used to repeatedly but gently wipe away residual loose necrotic tissue and residual faecal material.
- The area was dried with sterile gauze. Any bleeding points were lightly compressed with a saline swab, taking care not to damage the normal tissue of the stoma and peristomal skin while achieving haemostasis.
- Stoma powder was sprinkled on the skin around the stoma. Excess powder was removed after 5–10 minutes.
- The peristomal skin was then sprayed (sheet coating) with skin protection film. About 10 minutes later a bright film on the skin is formed.
- The above steps using Stomahesive powder were repeated 3 to 5 times.
- Where the skin was eroded the ulcerated areas were covered with an alginate dressing and ultra-thin hydrocolloid.
- Stomahesive paste was placed around the stoma before applying the convex base plate and belt to prevent leakage.

Observing the stoma, replacing the appliance and wound dressings

The patient's ileostomy output was so watery that the patient was advised to rest in bed. To prevent any strain on the appliance while lying in bed and to prevent leakage, the patient was instructed that the opening of the ostomy bag

should be toward the right side of the body and the faeces in the ostomy bag should be emptied regularly. The patient was also requested to daily observe the colour of the stoma and look for any bleeding and leakage around the stoma and replace the dressing and ostomy bag should there be any leakage. Generally, the appliance and dressings were replaced second daily, with the dressing component adjusted according to the depth and area of clinical dermatitis. The peristomal skin condition began to improve with the level of skin ulceration reducing to <10% and the pain score reducing to 4 (see Figures 2A, 2B & 2C). Over a month later, the faecal dermatitis had nearly resolved; there were no bleeding points and the peristomal skin was almost healed. The OST score was 2 and the digital pain score was 0 as there was no residual burning pain (see Figures 3A and 3B).

Supplementary ET nursing measures

Self-esteem and self participation in ostomy care

The existence of a stoma alters a patient's original physical function, appearance and self-image, which may lead to a decrease in the patient's self-esteem²¹. Self-esteem is an important evaluation index of an individual's quality of life and mental health. Therefore, ET nurses must implement or facilitate collaborative, complementary nursing or medical measures that improve the quality of nursing and medical care provided. Pain relief was used according to the pain score to reduce pain and reduce the associated negative emotional effects of pain and improve care satisfaction.

Through explaining, demonstrating and encouraging the patient and her family to participate in self-management of the stoma we aimed to guide the patient to master the skills required to replace the ostomy appliance. Further, we sought to teach the patient to assess the stoma and peristomal skin in order to be able manage any peristomal skin complications and prevent further leakages. These measures would have the desired effect of alleviating any negative emotions regarding the stoma, build self-confidence and self-esteem, ensure ongoing healing of the peristomal skin, and prevent further instances of the development of faecal dermatitis.



Figure 2A



Figure 2B



Figure 2C

Some general instructions on how to care for the stoma included advising the patient and her family to replace the ostomy bag when the patient had an empty stomach which would reduce the potential for the stoma to work when changing the pouch. The stoma and peristomal skin were to be cleaned with cold boiled water and a pH neutral soap. The correct methods for using ostomy skin care powder, anti-leakage cream, and Karaya transparent paste to improve ostomy appliance adhesion techniques were demonstrated to the patient and family. The patient was shown how to affix a convex base plate and pouch by tearing off the backing paper, sticking, pressing and smoothing the base plate the from bottom to upper edge of the base plate and from the inside to outside. Also, to ensure that the rim of the ostomy bag is firmly attached to the base plate, the bottom of the pouch was clipped shut and the belt correctly applied to ensure it was not too tight to cause any skin damage.

Durability and wear time of the ostomy appliance were also discussed. The patient was advised not to wear the appliance for longer than 1 week. Examination of the base plate for durability was reviewed. If any whitish part of the base plate was less than 1cm from the edge of the base plate, indicating softening of the base plate, or if there was any leakage, the base plate should be replaced immediately. The ostomy appliance was to be emptied when it was one third to one half full. The ostomy bag was to be rinsed, ensuring that the water did not wash over the bottom plate.

Strengthening inter-professional healthcare communication to improve patient outcomes

It is important for the ET nurse to communicate effectively with other members of the health professional team who may interact with the patient with a stoma to improve patient outcomes.

As the patient had undergone two major surgical procedures within 4 months and seven cycles of chemotherapy, the usual processes of digestion and absorption of nutrients after ileostomy surgery were severely affected. This, coupled with the patient's low nutritional intake of protein, the lack of vitamins and trace elements, led to the patient being malnourished, which detrimentally affected the healing process.

Communication between the ET nurse and doctors occurred regarding the patient's ileostomy complications of liquid ileostomy discharge and leaking ostomy appliance leading to faecal dermatitis and corroded peristomal skin. Ostomy and skin care regimens were discussed to prevent leakages and promote skin healing. As the chemotherapy the patient was receiving was thought to be affecting the ileostomy discharge, the patient's chemotherapy treatment was suspended.

Through the nutrition department, the patient was instructed to increase the number of daily meals and the amount of food eaten each day. The patient was encouraged to: eat more protein-rich foods; eat less easily digestible foods such as mushrooms, corn, leek and other similar vegetables or high fibre foods; chew the food thoroughly to improve digestion and absorption; and to increase their daily intake of fluids to 2000–2500mls including water, juice and soup to improve the patient's nutritional status. These measures were aimed at improving the patient's nutritional status to provide the necessary conditions for tissue repair and healing of the skin around the stoma.

Health education

The advice provided by the nutrition department regarding dietary requirements was reinforced with the patient to ensure the patient achieved and maintained a stable weight. If the patient's stoma discharge became thin and watery and



Figure 3A



Figure 3B

recurrent disease and inappropriate skin care²².

The OST score of 10 points was arrived at because of the improperly sited position of the stoma; the stoma was positioned in a large skin fold of the abdominal wall. The abdominal wall was not flat after applying the non-convex base plate when the patient was either seated, standing or moving. The base plate frequently leaked, causing skin erosion from faecal fluid, and the patient's physical and mental state was affected, creating obstacles to self-care. The lack of prompt attention in managing the leakage of faecal fluid by using an ostomy appliance with a convex base plate resulted in serious stoma dermatitis.

adherence of the ostomy appliance became impaired, the patient was advised to seek medical advice for prescription of oral medication that would inhibit peristalsis to make the faecal discharge more paste-like to reduce leakage.

Evaluation of the supplementary nursing measures

After two episodes of faecal dermatitis around the stoma, the extent of skin damage, amount of bleeding, volume of wound exudate, pain and OST scores were significantly reduced as a result of the supplementary nursing measures introduced coupled with changes to skin care and the ostomy appliance as outlined above.

On 18 April 2018, the peristomal skin dermatitis was successfully healed (see Figures 3A and 3B). The patient was in stable mood, and she continued to receive supportive ET nursing visits for a further six times. The case shows that ET nurses can effectively intervene in the treatment of complications around the ostomy.

DISCUSSION

Postoperatively, management of a stoma can be challenging. In this case study, after assessing the patient's stoma and peristomal skin, the conclusion drawn was that the patient had faecal dermatitis secondary to prolonged contact of ileostomy faecal fluid with the skin. There are numerous reasons why this may occur. The main causes of faecal dermatitis around the stoma are manifested in three aspects: the stoma site is not suitable (usually as no pre-operative stoma siting was undertaken); the ostomy appliance is not suitable (it is incorrectly sized or worn improperly); and the stoma is poorly constructed (flattened or retracted). Other reasons for poor ostomy pouch adhesion, subsequent leakage and impaired skin integrity from exposure to faecal fluid are abdominal distension, poor muscle tone, obesity or a BMI greater than 25 or undulating abdominal contours from subcutaneous fat,

Stoma siting can be performed by an ET nurse or an experienced trained nurse alone or in conjunction with surgical opinion. The guiding principles of stoma siting are that: the patient can clearly see the stoma site in different postures (semi-recumbent position, sitting position and standing positions); the skin around the stoma is flat and healthy (no depressions, scars, wrinkles, belt lines and away from bony prominences); and, the stoma is sited within the rectus abdominis muscle. Optimal placement of the stoma should prevent postoperative complications and should not affect the daily life of patients.

However, postoperatively, the condition of the inner abdominal wall and skin of the abdomen around the stoma will change due to various reasons such as further surgical procedures, healing processes, age, weight loss or recurrent disease²³. Therefore, ET nurses need to regularly assess patients' abdomens and choose stoma supplies that better fit the patients' abdomen and stoma²⁴.

When assessing the contours of the abdominal wall and skin around the stoma, the degree of softness or stiffness of the abdominal wall should be observed. A soft abdominal wall may not be able to support the stoma well because of its insufficient muscle strength. In situations such as this, the stoma would therefore benefit from being supported with a harder convex base plate²⁵.

Ostomy products with convexity are frequently cited as ideal products to manage flat, retracted or sideways slanting stomas and to compensate for irregular peristomal planes such as creases or folds. Convexity was defined²⁶ as "A curvature on the skin side of the barrier or accessory". Convexity assists with product adhesion to the peristomal skin, facilitating longer wear time of ostomy appliances. There are various characteristics associated with convex appliances and accessories that indicate their profile in terms of depth (shallow, medium and deep), softness and hardness²⁷.

The general consensus of opinion regarding the use of convexity is that convexity is beneficial to prevent leakage where there are abdominal or stomal deformities. There is some debate and concern, however, over the use of convexity immediately after surgery due to the potential for mucocutaneous separation. The use of soft convexity postoperatively from an outpatient perspective is acknowledged as a reasonable strategy that significantly reduces appliance leakage, prolongs appliance wear time, and reduces faecal dermatitis, thereby improving patient satisfaction and quality of life²⁸. One study showed that, for ileostomy patients, the early postoperative use of convexity reduce postoperative complications by 85% when compared to the use of an appliance without convexity.

In this case, and to aid the management of peristomal skin complications, a convex base plate was used to support the abdominal wall and flatten skin folds. Other measures that were effectively used in conjunction with convexity to prevent further leakages, aid skin healing and extend the wear time of the base plate were a stoma skin-protecting powder, a skin protective film, stoma paste and a hydrocolloid dressing.

Sodium carboxymethyl cellulose, pectin or Karaya are the main components of stoma skin care powders that are used to manage excoriated weeping skin around stomas. They form a moist thin film on the surface of the damaged skin by absorbing wound exudate to form a crust to which the base plate can stick firmly^{29,30}. Skin protectant sealants can be used to apply a thin film over the stoma powders to provide a dry surface to aid adherence of skin barriers. The main components of the skin protective sealant are vinyl acetate copolymers, propanediol and ethanol. Stoma pastes may also be Sodium carboxymethyl cellulose, pectin or Karaya based. Pastes are easy to form protective layers around the stoma to keep the skin around the stoma smooth and flat and provide a further barrier to faecal material eroding the skin and appliance.

Hydrocolloid dressings are widely used to create a moist wound healing environment. Properties of hydrocolloids include regulation of the oxygen tension at the wound surface, promotion of angiogenesis and formation of capillaries, autolytic debridement of necrotic tissue and fibrin, and stimulation of the release of various growth factors, all of which play a very important role in the healing process. In addition, they can maintain the temperature of wound surface, absorb moisture, avoid mechanical injury of new granulation tissue, and protect nerve endings to reduce wound pain. Thin versions of hydrocolloids are flexible and conformable to tissue planes, have good adhesion, are easy to apply, are waterproof, are comfortable for patients, and can be used to prevent peristomal skin stripping in conjunction with an ostomy appliance. Light colour changes in the hydrocolloid indicate when the dressing should be replaced.

The use of a two-piece ostomy appliance with convexity in the transparent base plate plus adjunct stoma powders, stoma pastes, hydrocolloid dressings and a belt to firmly anchor the

appliance made a substantial difference to the wear time of the appliance and skin healing process. Overall, this management strategy alleviated the patient's anxiety and improved her sense of well-being.

In addition to providing essential stomal therapy nursing services for patients, ET nurses also provide cultural, psychological, educational and rehabilitative services to patients and their families to meet their health needs. ET nurses collaborate with other health professionals and use the latest relevant professional knowledge to provide evidence-based ET practices. Using these care strategies, ET nurses can assist patients with stomas to actively face underlying disease processes, cooperate with prescribed treatment, and actively participate in rehabilitative processes in order to be able to resume a normal life as soon as possible³¹.

There is an ongoing need to identify, recognise and strengthen the professional value of ET nurses and the role they play in assisting people requiring ostomy surgery in China. It is an urgent problem to be resolved within human resources management in all hospitals providing ostomy surgery. Wang Xi and others believe that therapists play an important role in clinical work³².

SUMMARY

This case study has described the challenges faced in managing a severe case of peristomal irritant contact dermatitis or MASD. The key point of the ET nursing intervention and stoma care was to actively treat the denuded skin and wounds around the stoma using a convex base plate and stoma accessories such as stoma powder, skin sealants, stoma paste, thin hydrocolloid dressing and a belt to aid adhesion of the appliance to prevent leakage of the appliance. In the presence of irritant contact dermatitis or MASD, these types of measures should be introduced as early as possible once the cause of the leakage is determined. This reduces patient discomfort, improves the patient's quality of life, and improves wound healing outcomes.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

FUNDING

The authors received no funding for this study.

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