

From theory to bedside: applying convex ostomy principles in clinical care

ABSTRACT

Introduction Convex ostomy baseplates are designed to help minimise the risk of leakage and support the maintenance of peristomal skin health. Their performance is defined by five key characteristics: depth, slope, tension location, compressibility and flexibility. The adhesive component further plays a role in ensuring a secure and comfortable seal.

Aim The aim is to translate technical parameters that define convexity into practical clinical guidance, illustrating how these characteristics inform product selection and support optimal patient outcomes.

Methods This article synthesises current evidence and definitions of convexity parameters and integrates them with clinical reflections from two experienced stoma care nurses. Two real-world clinical cases are presented to demonstrate the practical application of convexity principles in postoperative stoma management.

Results Across the two cases, clinicians applied the five convexity parameters together with adhesive considerations to address challenges such as uneven abdominal contours, firm or bending abdominal walls, peristomal folds, mucocutaneous dehiscence and risks of leakage. In both scenarios, tailored convex product selection supported secure sealing and protected peristomal skin.

Conclusion Understanding the clinical relevance of convexity characteristics and adhesive performance is essential for effective product selection in stoma care. Individualised product selection based on patient-specific needs enables clinicians to optimise fit, maintain peristomal skin health and improve clinical outcomes.

Keywords parameters of convexity, flexible adhesive, clinical practice, patient-centricity, soft convex

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INTRODUCTION

Leakage remains one of the most prevalent and distressing complications following ostomy surgery, often leading to peristomal skin complications, discomfort and negatively affected quality of life¹⁻³. Convex skin barriers were specifically developed to address anatomical and topographical challenges around the stoma, which may be difficult to manage effectively when using flat baseplates.^{4,5,6} The function of convexity is to:

- flatten irregular peristomal contours;
- apply mechanical tension to the peristomal skin; and
- elevate the stoma above skin level⁷⁻⁸.

Historically, nurses have primarily recommended using convex ostomy products for patients experiencing leakage and peristomal skin complications—as a solution to these issues. Early post-operative use of convexity was often discouraged due to concerns about mucocutaneous separation (dehiscence) and other complications.^{9,10} However, subsequent clinical research has demonstrated that it is safe to apply convex devices even in the immediate post-operative period

when clinically indicated.¹¹ With growing evidence, clinical guidelines and practices have evolved.^{5,6} Now, more clinicians recognise that convex products are not only safe but can offer significant benefits in the post-operative period. As convex products facilitate immediate and consistent contact between the ostomy appliance and the peristomal skin, they may help to improve the reliability of the seal and reduce the risk of leakage, particularly for poorly spouted stomas.^{12,13}

The aim of this article is to translate the technical parameters that define convexity—depth, slope, tension location, compressibility and flexibility—into practical guidance for clinical decision-making. In addition to exploring these five core convexity characteristics, the adhesive is highlighted as a critical component of any ostomy baseplate in achieving a secure, reliable seal. Finally, two clinical cases demonstrate how stoma care specialists apply these principles in daily practice; aligning product features with individual anatomical and clinical needs to prevent leakage and optimise patient outcomes.

FIVE PARAMETERS OF CONVEXITY

In recent years, the industry has worked to standardise the description of convex baseplate features to help clinicians make informed product selections and allow for evidence-based comparisons across brands and patient groups.¹⁴ The five fundamental characteristics—depth, slope, tension location, compressibility and flexibility—have been defined and published as a basis for this framework.¹⁴⁻¹⁶ In Table 1, we briefly present the definition of each parameter and provide considerations for clinical practice.

Table 1. Five parameters of convexity and their clinical relevance^{14,17}.

Convexity parameter	Definition	Clinical relevance
Depth	Distance from the apex of the convex dome to the base of the baseplate.	Depth should be selected to match/mirror the peristomal topography, ensuring maximum skin contact and reliable adhesive performance.
Slope	The angle from the base of the convex baseplate to the apex of the dome.	Slope influences pressure distribution and stoma protrusion. An optimal slope minimises leakage risk by enhancing seal stability.
Tension location	The position where the convex shell exerts maximum pressure on the skin (for plateau-shaped convex baseplates, such as SenSura® Mio, the tension location nearly coincides with the maximum cutline of the baseplate).	Tension location close to the stoma should be considered when the stoma needs to protrude more. Tension location further from the stoma should be considered when peristomal skin folds and creases need to be flattened.
Compressibility	Capacity of the convex dome to be displaced or flattened.	Less compressible products (requiring higher force to displace) provide greater mechanical support. This is useful for soft abdomens or when the abdomen needs to be flattened or the stoma needs to protrude more. More compressible products (requiring less force to displace) will conform more easily to abdominal contours and can be useful for firm abdomens and in the post-operative period.
Flexibility	The ability of the baseplate to bend and adapt to body movements.	Flexibility enhances comfort and minimises the risk of detachment during movement.

THE ADHESIVE COMPONENT

While the mechanical parameters of convexity have been widely discussed in literature,¹⁴⁻¹⁶ the adhesive is an equally critical factor when it comes to ensuring a secure seal and reducing the risk of leakage. Ostomy adhesives belong to the class of pressure-sensitive adhesives (PSAs), which develop immediate adhesion under light pressure. Their role extends beyond fixation in that the adhesive helps to:

- support the pouch;
- protect peristomal skin from effluent exposure; and
- ensure a predictable wear time.

Their key attributes include secure sealing, moisture absorption, resistance to effluent erosion and ease of removal when needed.¹⁸ In convex products, the combination of an appropriate adhesive and a well-designed convex shell is essential to ensure both immediate skin contact and long-term wear performance. Table 2 contains a summary of the key adhesive performance factors relevant to convex systems.

When applying the product onto the skin, convexity helps to achieve consistent contact by projecting into the peristomal skin and applying gentle tension, which flattens creases and enhances adhesive engagement. To illustrate this, we conducted a computational simulation comparing the application with four fingers of one-piece SenSura® Mio products: a light convex and a flat baseplate, (Figure 1), (technical details of the conducted simulation can be found in the appendix to this article, available online). The visualisation demonstrates that when a flat product is applied, initial

Table 2. Key adhesive performance factors for ostomy (convex) products and their clinical relevance during the cycle of product application, wear time and removal.

Adhesive parameter	Clinical relevance	When most relevant?
Tack	Enables quick, secure application and repositioning	During and right after application on skin
Adhesion	Maintains an effective seal throughout wear time	During wear time
Erosion resistance	Resists breakdown from effluent exposure	
Absorption	Manages moisture and supports peristomal skin health	
Compatibility with convex shell	Maintains seal and comfort	
Elasticity	Follows body movements	
Ease of removal	Minimises skin trauma during baseplate changes	Upon removal

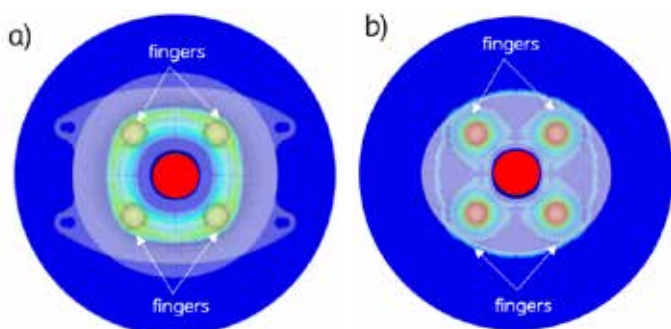


Figure 1. Computational simulation of pressure distribution during the application of an ostomy baseplate with four fingers on the skin (The red circle in the middle represents the stoma).

a) When applying the convex product, the pressure is distributed evenly around the stoma promoting immediate skin contact.

b) When applying the flat product, pressure is localised under the fingertips during immediate application, requiring additional manual smoothing to achieve uniform contact and a secure seal.

contact occurs primarily under the fingertips, creating localised pressure points. The product then needs to be smoothed out to make sure it has uniform contact with the skin. By contrast, the convex product distributes pressure more evenly across the baseplate during application, promoting immediate and uniform skin contact. This feature can be particularly beneficial for individuals with limited dexterity or reduced visibility.

Once the product is in place, the adhesive must work with the elastic convex shell to maintain seal integrity during dynamic movements, such as bending, stretching, sitting and lying down, while offering optimal elasticity (Figure 2). This



Figure 2. Example of a convex product combining flexible shell design with elastic adhesive (SenSura Mio Convex).

interaction ensures that the appliance remains stable without compromising comfort.

APPLICATION AND REFLECTIONS ON THE USE OF CONVEXITY IN CLINICAL PRACTICE

Two experienced stoma care specialists have contributed clinical cases to demonstrate how they have used convex ostomy products to address specific patient challenges in their daily practice. Both highlighted that selecting the right convex product requires an individualised approach, considering each patient's unique body profile, stoma type and peristomal skin condition.

CLINICAL CASE 1: Postoperative stoma management in a patient with a complex abdominal profile

Patient profile

A 73-year-old male underwent a protective loop-ileostomy following rectal resection. After surgery, the patient experienced prolonged intervals (4–8 hours) without stoma output, followed by sudden releases of large volumes (500–800ml) of thin stool, typically after stoma digitalisation or catheter insertion. These measures were necessary to ensure the stool flow and thus to alleviate the symptoms of pain and nausea, which raised concerns about paralytic ileus or stoma torsion.

Clinical assessment

A postoperative physical examination revealed an uneven abdominal topography with deep folds, and a stoma positioned adjacent to the umbilicus. The stoma itself was at skin level, with intact sutures and healthy mucosa (Figure 3a).

Therapeutic approach and ostomy appliance selection

Given the anatomical and postoperative challenges, the healthcare professional (HCP) prioritised preventing leakage and avoiding skin complications. Although a convex baseplate would have been optimal, it was necessary to allow digitalisation and the insertion of a catheter during the long phases without stoma output, and to ensure that the subsequent high output volume was directed into the stoma bag. For this reason, the HCP chose a flat baseplate with post-operative drainable bag (equipped with the opening

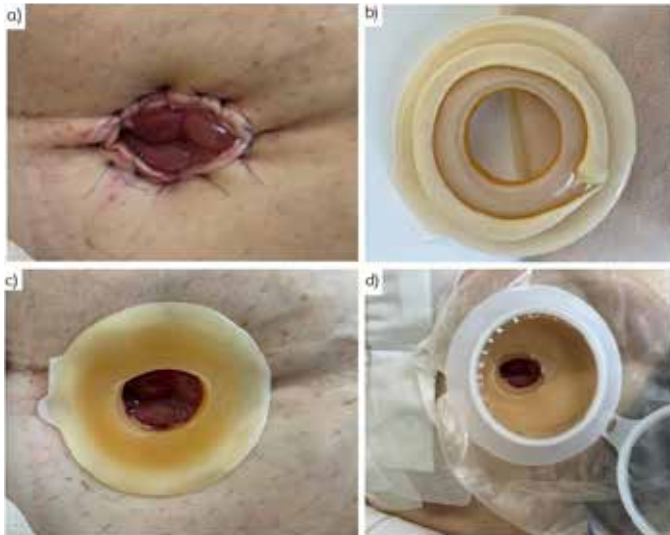


Figure 3. a) Photo of the stoma and peristomal area post-operatively, b) Supporting products used on uneven peristomal topography: convex hydrocolloid seal to balance the flush stoma and paste to even deep folds, c) Hydrocolloid seal with paste after application on the skin, d) Initially used flat baseplate with post-operative bag equipped with a window allowing access to the stoma (applied on the skin).

to access the stoma), combined with a convex hydrocolloid seal and stoma paste to level creases and folds (Figure 3b-d). The preferred long-term solution was identified as a SenSura Mio Soft Convex baseplate (Coloplast) with a drainable bag, supplemented by a hydrocolloid seal and belt. Monthly body profile checks were recommended to make sure the product continued to fit properly.

The convexity characteristics considered in this case were:

- **Compressibility:** A soft-convex product was selected to avoid excessive pressure on the firm abdominal wall.
- **Flexibility:** This was necessary to accommodate abdominal wall movements, as the stoma was located along a bending line.
- **Depth:** A convexity depth of 6mm was deemed sufficient.
- **Slope:** A wide plateau and flatter slope were preferred to compensate for peristomal folds.
- **Tension location:** The tension point was positioned further from the stoma to better manage creases and folds in the skin.

Follow-up

Four days after surgery, intestinal paralysis resolved, and the ileostomy began producing 'mushy' stool. During this period, the initial post-operative appliance maintained a secure seal, and there was no leakage. The appliance was then changed to a SenSura Mio one-piece Convex Soft system with stoma paste, and the use of an ostomy belt was recommended for added stability. By day 12, abdominal swelling had subsided and parastomal sutures were removed, allowing the folds to recede and eliminating the need for stoma paste. The patient adapted well to instructions in the clinic and was discharged on day 14, managing self-care independently. Transition to outpatient follow-up occurred without complications.

Healthcare professional's reflections

The clinician emphasised the importance of individualised product selection in complex postoperative cases. The use of convexity, even in the early postoperative period, was justified by the patient's anatomical abdominal features and the subsequent risk of leakage. The combination of a convex hydrocolloid seal and paste addressed the immediate need for a secure appliance fit, while ongoing regular assessment ensured adaptability to changes in the patient's body profile.

The case illustrates the need for frequent assessments in the early postoperative phase to address immediate anatomical and functional challenges associated with increased risk of leaking stoma appliances. The goal was to prioritise leakage prevention and individualised product selection for a secure fit.

CLINICAL CASE 2: Postoperative stoma management in a patient with cognitive impairment

Patient profile:

A 74-year-old retired nurse underwent emergency surgery for large bowel obstruction with intra-abdominal sepsis secondary to benign diverticular disease. Preoperative stoma site marking was performed, but due to significant abdominal distention and intra-abdominal inflammation, the loop trephine colostomy was located higher than planned, in the epigastric region, under the left breast.

Clinical assessment:

The patient showed signs of impaired cognition and was being cared for by family members. After surgery, the stoma was flush with the skin. There was immediate mucocutaneous dehiscence on the lateral side, along with induration and erythema radiating toward the left ribs. Within 48 hours, a large, ulcerated area developed, progressing to dehiscence at the mucocutaneous junction, forming a cavity (Figure 4a). Initial concerns included possible fistula formation, which was excluded. There was a risk of faecal contamination of the cavity, pain from effluent contact with the skin and septic complications.

Therapeutic approach and ostomy appliance selection

Initial management included insertion of a gelling fibre wick (Aquacel, ConvaTec) to soak slough and wound exudate



Figure 4. a) Stoma site 48-hours post-surgery, visible mucocutaneous dehiscence and ulceration around the stoma, b) Stoma site at the follow-up visit, cavity had resolved and peristomal skin had improved.

away from the cavity and into the bag and protective thin, hydrocolloid seals, placed in one layer circumferentially around the stoma up to the mucocutaneous junction, to provide a levelling effect, with further seals, placed at the lateral edge to provide levelling, and to ensure extra absorptive element to cope with exudate and keep the area intact until next pouch change.

Despite theoretical concerns about convexity on compromised peristomal skin, a SenSura Mio one-piece Convex Soft (Coloplast) with drainable bag was applied to capture effluent and prevent leakage into the wound. This decision was based on clinical experience and the need to maintain a secure seal while protecting vulnerable tissue. Family involvement was structured: caregivers were reassured that complex wound care would remain under professional supervision, while pouch changes were standardised and simplified for eventual delegation. The use of a gelling fiber wick was replaced by enzyme alginogel (Flaminal gel, Flen Health) as it was easier for the family to use. Both the wick and the gel have the same absorptive properties for soaking up exudate and wick it away from the base of the wound to allow the granulation at the base.

The convexity characteristics considered in this particular case were:

- **Compressibility and flexibility** Soft convexity minimised pressure and accommodated abdominal contour and wound discomfort.
- **Depth and slope** Adequate depth and gentle slope directed effluent into the pouch, reducing leakage risk.
- **Tension location** A wide plateau ensured adhesion over the dressings without compromising wound healing.

Follow-up

At follow-up two weeks post-discharge, the cavity had resolved, peristomal skin was healthy (Figure 4b), and the patient continued using a soft convex pouch with stable output in terms of volumes, consistency and regularity. Care transitioned successfully to the family members, supported by ongoing professional oversight during rehabilitation.

Healthcare professional's reflections

Early demonstration of a manageable routine was critical to reduce family anxiety and promote confidence. Pain management (regular analgesia, pre-change dosing) and nutritional support were emphasised.

The case illustrates the importance of individualised product selection, balancing theoretical contraindications with practical needs to achieve containment of stool, protect skin integrity and support caregiver involvement.

CONCLUSION

A thorough understanding of the clinical relevance of convexity parameters: depth, slope, tension location, compressibility, and flexibility, is crucial for the effective use

of convex products in stoma care. Equally important is the selection of a flexible adhesive, which ensures a secure seal and adapts to body movements. By combining individualised product selection with regular reassessment, clinicians can optimise comfort, protect peristomal skin, and deliver better outcomes for patients living with a stoma.

CONFLICT OF INTEREST

NR and FS are members of Coloplast global ostomy advisory board, however, they did not receive remuneration for contributions to this manuscript. RB, JMRM, RL, AB and ASH are employed by Coloplast A/S.

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