

Impact of Stoma Baseplate Convexity on Tension and Compression Around the Stoma Site: A Finite Element Analysis¹



- ▶ Flat baseplates may not be best suited to all patients, especially those with flush or retracted stomas, skin creases, or folds
- ▶ For patients requiring convexity, the key challenge is selecting a correctly fitting baseplate to prevent leaking, while minimizing pressure injuries

Convexity Key Characteristics:²

Tension location
Depth
Compressibility
Flexibility
Slope

Aim:

To evaluate the effect of baseplate convexity on skin tension and fat compression

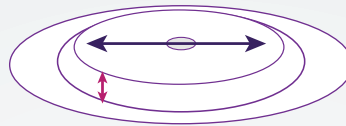
Study Overview

A finite element (FE) analysis simulating the application of convex baseplates with different geometries and flexibilities to an idealised, flat abdomen (representing skin, subcutaneous tissue, and musculature layers) was conducted.

8 x baseplates
(4 tension locations x 2 depths)

Depth: 3.5 mm or 7 mm

Inner diameter/tension location:
4 widths ranging from 30-60mm to support
more central or more peripheral tension location



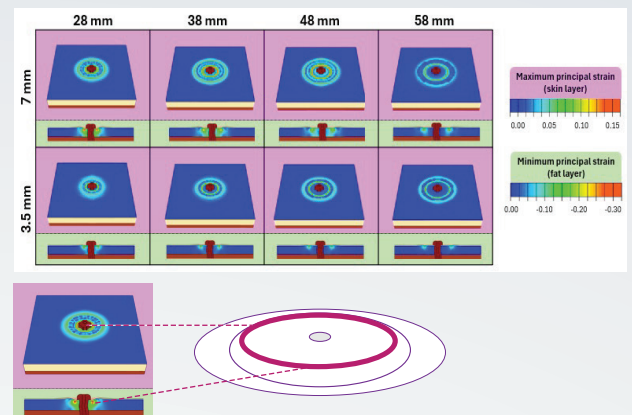
Outputs generated:

Maximum principal strain (MaxPS)
- Tension in the skin

Minimum principal strain (MinPS)
- Compression through the fat layer

Results

- ▶ MaxPS and MinPS in the abdomen was found to depend on both the tension location and depth of convexity for each product
- ▶ 7 mm depth baseplates = higher level of central skin tension and fat layer compression than the 3.5 mm depth baseplates
- ▶ Increasing depth increases force around the stoma
- ▶ Greatest skin tension (MaxPS) and fat layer compression (MinPS) were in the region directly under the inner diameter of the EVA baseplate



This is the first study to evaluate the effect of baseplate convexity on skin tension and fat compression. The relationship of tension location and depth allows clinicians to understand how these convex characteristics may allow product selection with attention to forces applied around the stoma.

Conclusion

The findings illustrate the role of convexity in ostomy care and the value of having a range of baseplate geometries to address patient-to-patient variation in stoma type and peristomal skin.

1. Waller, Jonathan, Gowans, Philip et al, Impact of Stoma Baseplate Convexity on Tension and Compression Around the Stoma Site: A Finite Element Analysis, *Cureus*, 2024/01/11, 10.7759/cureus.52112
2. McNichol L, Cobb T, Depaive Y, Quigley M, Smitka K, Gray M. Characteristics of Convex Skin Barriers and Clinical Application: Results of an International Consensus Panel. *J Wound Ostomy Continence Nursing*. 2021 Nov-Dec 01;48(6):524-532. doi: 10.1097/WON.0000000000000831. PMID: 34781308; PMCID: PMC8601675.