

How Does a Dressing Change Sacral Tissue Deformation?

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Introduction

The application of prophylactic dressings has been proposed for the prevention of sacral pressure injuries, but little evidence is available regarding the mechanisms by which the dressings provide this benefit.

Therefore, the purpose of this case series was to address some potential mechanisms *in situ*.

Specifically, this study sought:

- to understand how the presence of a dressing impacted sacral soft tissue deformation under load
- to determine how dressings stretched or compressed on the skin under load

Methods

Participants

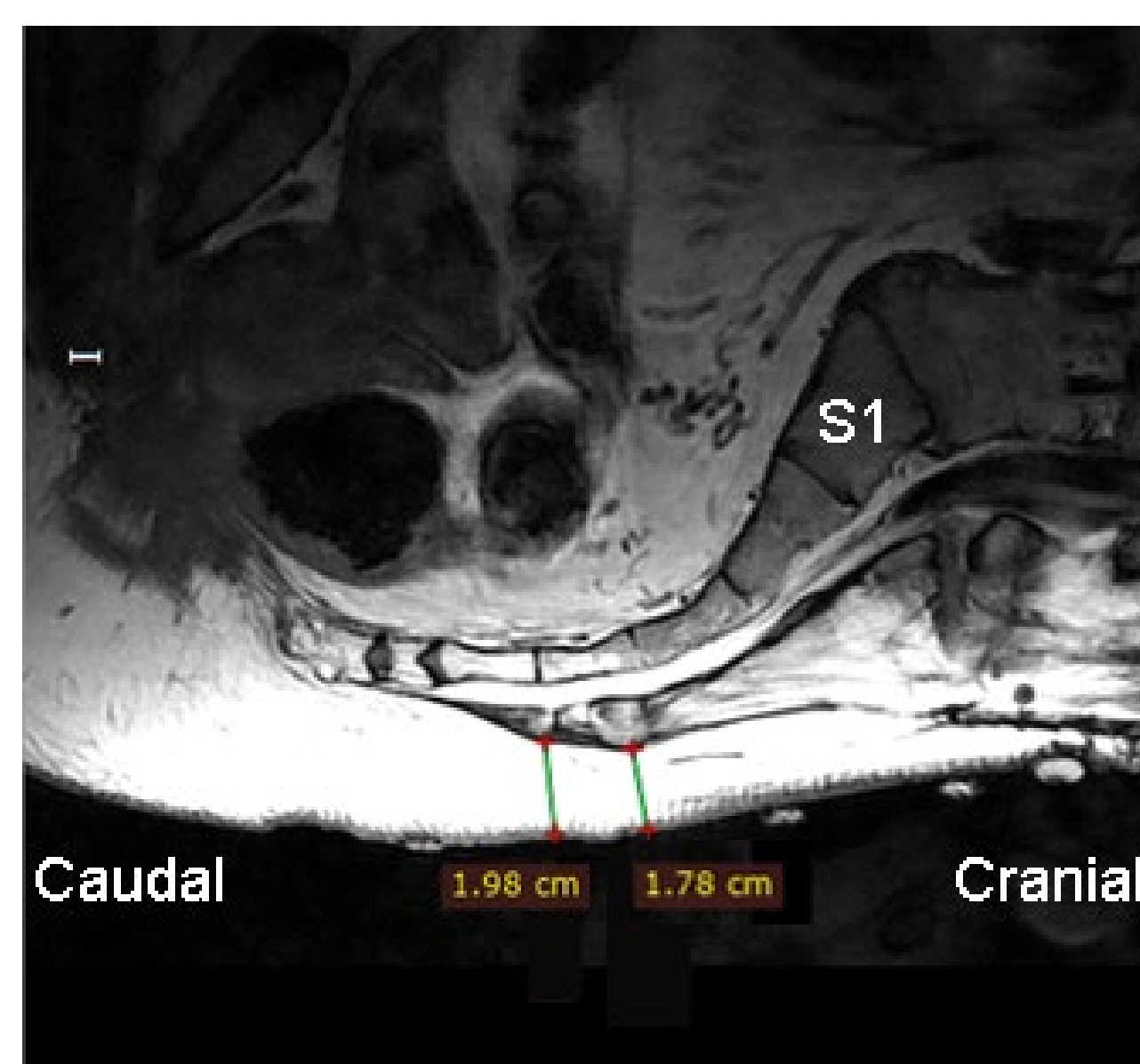
- 3 able-bodied subjects (2 F, 1 M)

Environment

- 4 commercially available dressings
- Dressings contained a grid of 5 embedded silicone markers spaced at 3.8 cm (1.5") apart cranial-caudally and medial-laterally
- Support surface = 3" foam
- Supine
- Head of bed raised 30° (for 1 participant)

Measurements

- 3-dimensional MRI scans of the sacrum and soft tissue
- Soft tissue thickness perpendicular to skin at visible spinous processes (S3, S4, S5) and from joint spaces S5/Cx1 and Cx2/Cx3
- Dressing marker spacing



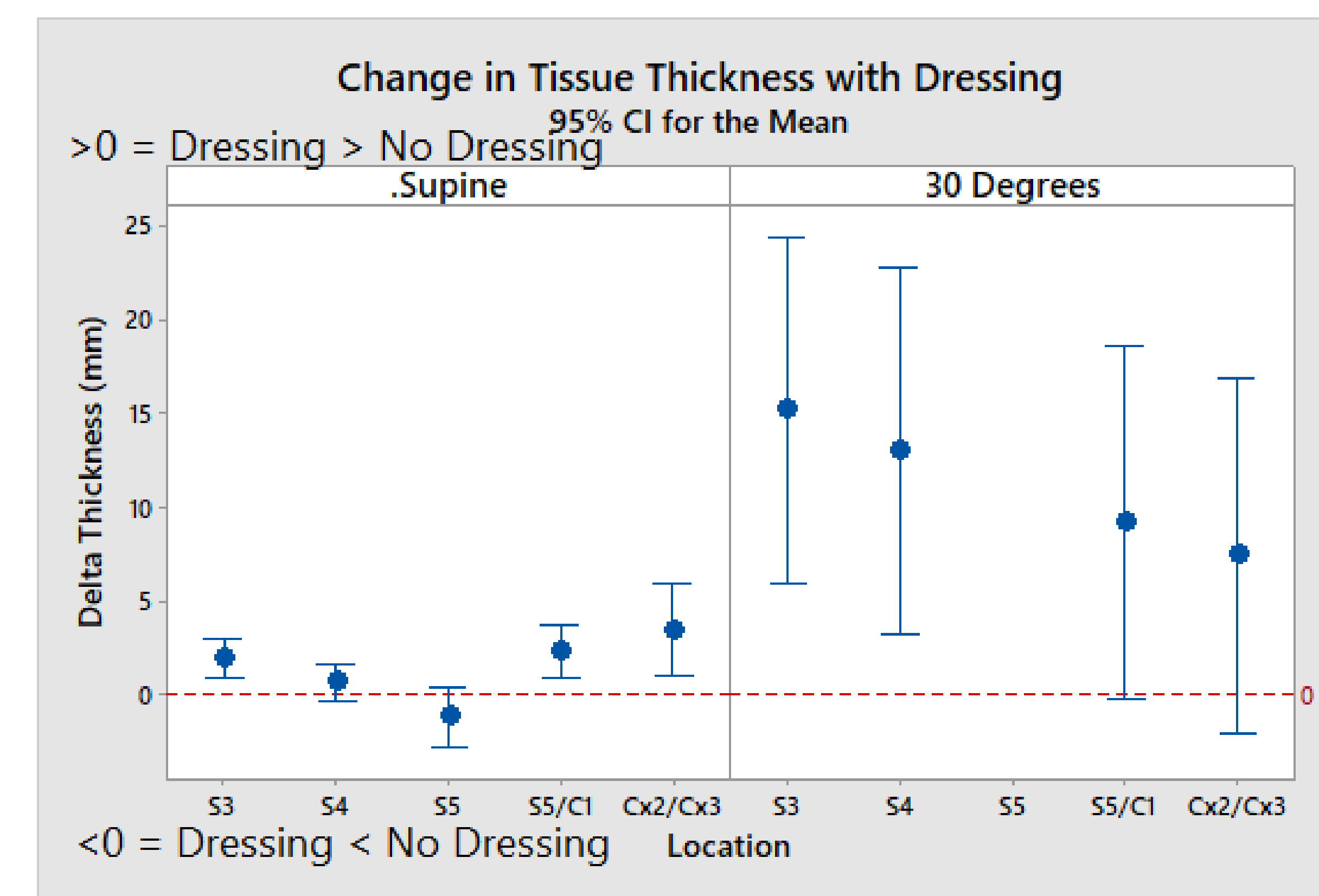
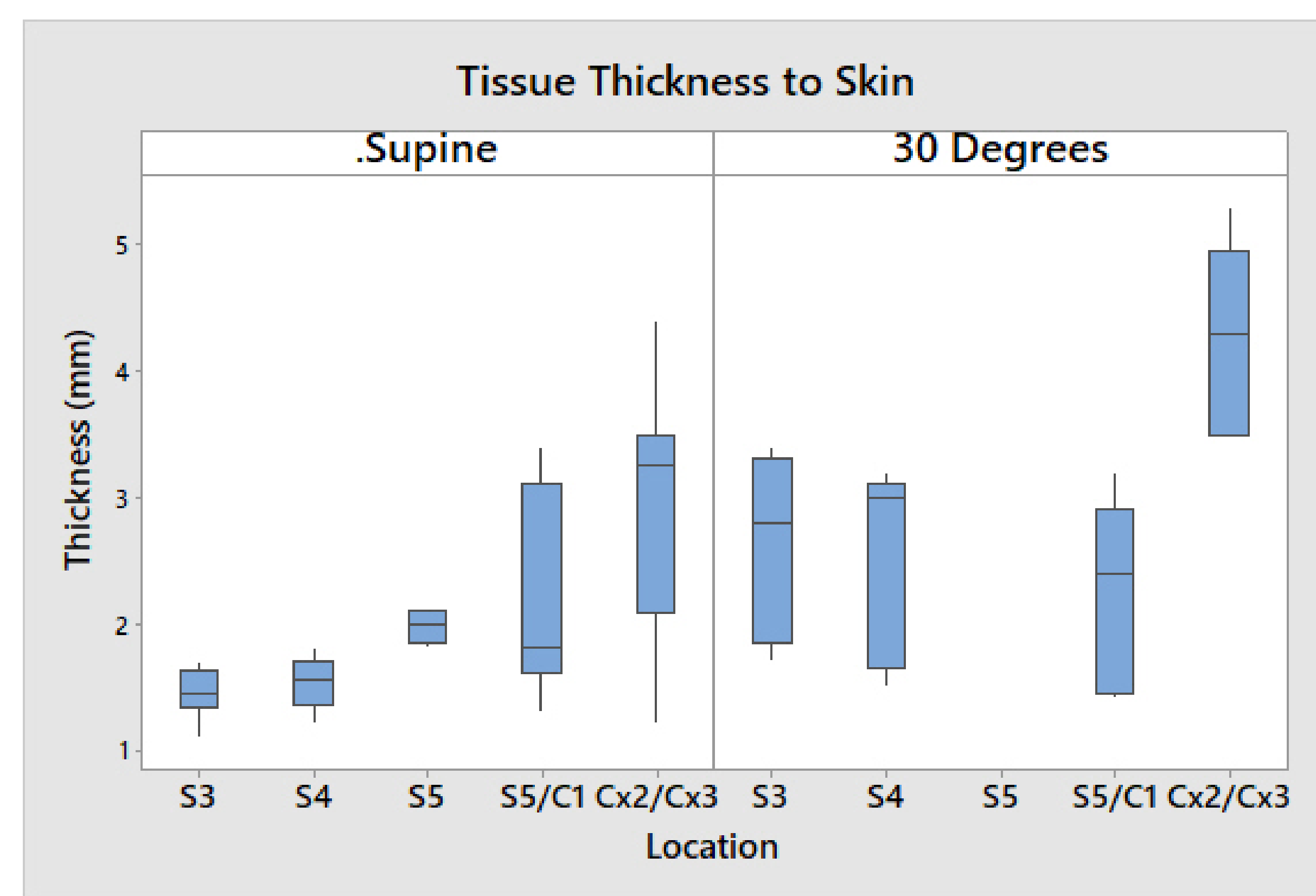
Results: How does the presence of a dressing impact soft tissue deformation?

Supine

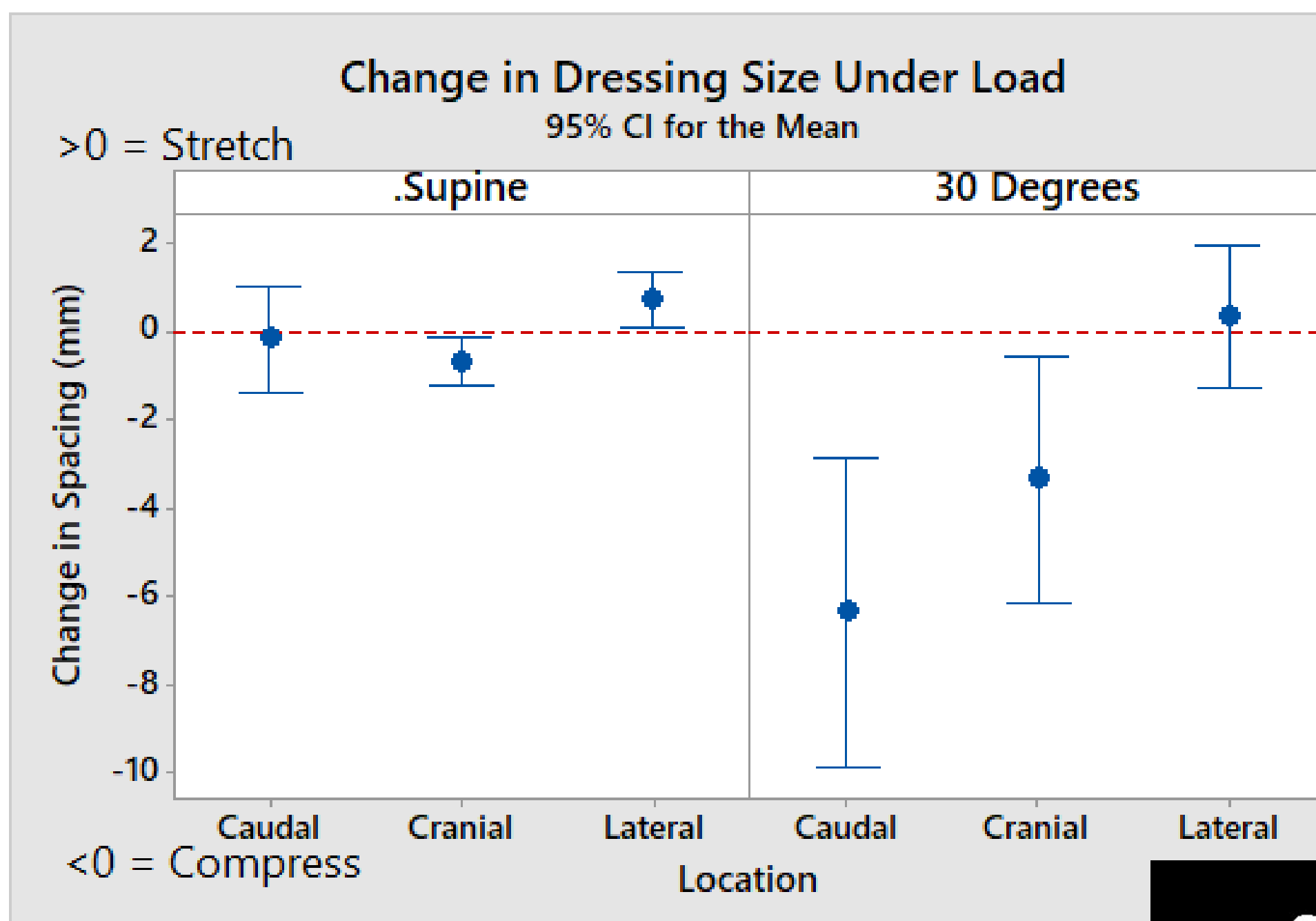
- There is very little soft tissue under the S3 and S4 spinous processes
- Very little change in tissue thickness with a dressing

30 Degrees

- Tissue thickness with a dressing was always greater than without a dressing

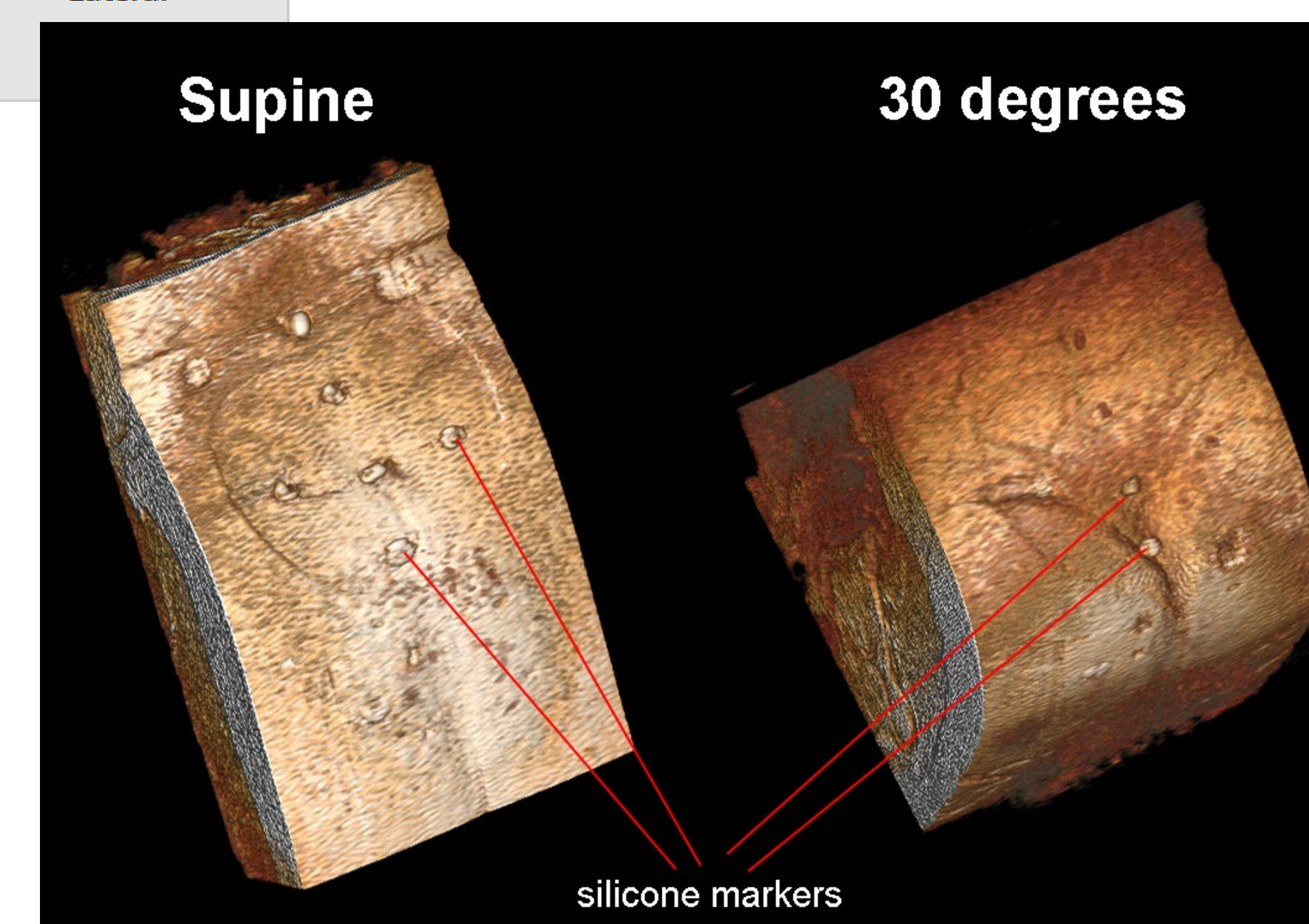


Results: How does the dressing change under load?



- Dressing dimensions did not change significantly in supine
- Dressing compressed cranial-caudally as head of bed was raised, containing tissue under the sacral region
- Similar behavior was seen across all 4 dressings in supine

- The micro-indentation from the dressing was more visible in supine because perpendicular loads are greater
- Notice how the tissue bunches up when the head of bed was raised



Discussion

The dressings adhere to the skin, and because they are stiffer than the skin, the dressing becomes the dominating influence on what happens to the skin in that constrained area. When skin is loaded without a dressing, it can displace laterally, but with a dressing, that lateral displacement is significantly limited. Instead, tissue likely bunches up in the cranial-caudal direction, leading to increased tissue thickness under the sacrum.

Shear stress and strain at the coccyx, where most sacral pressure injuries seem to present, is more likely the mechanical cause than compression.

References

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