

Effect of subcutaneous pressure on interface pressure measurement during compression therapy

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subcutaneous pressure affects interface pressure measurement. We hypothesize subcutaneous pressure variation affects overall interface pressure measurement.

Materials and Methods

BISCO® (Rogers Co, Rogers, CT) BF-2000 silicone foam mimicking normal lower extremity tissue plane was placed on a cylinder cuff model for the experiment. Picopress® and a piezoresistive sensor were used for interface pressure measurement. External pressure was applied using an automated pressure cuff at 40 mmHg. Subcutaneous pressure, generated by a separate pressure pump underneath the BISCO® BF-2000 foam, started at 3 mmHg with 1 mmHg increment up to 12 mmHg. 3 sample measurements were taken per pressure value. Interface pressure recordings were compared between the true pressure,

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Introduction

Interface pressure is defined as the pressure that occurs at the interface between the body and the support surface. Significant challenges remain in the understanding of interface pressure especially related to how

40 mmHg, versus interface pressure measured by Picopress® and the piezoresistive sensor under different subcutaneous pressures using linear mixed effect model (SAS software, version 9.4, SAS Institute, Cary, NC, USA).

Table 1. Summary of interface pressure measurement by piezoresistive sensor and Picopress®.

Subcutaneous Pressure (mmHg)	Interface Pressure (mmHg)	Piezoresistive Sensor		
		Mean Reading (95% CI)	Difference Between Mean Reading and True Interface Pressure (mmHg)	Percent (%) Difference Between Mean Reading and True Interface Pressure
3	40	42 (39.3, 44.7)	2	5
4	40	42.1 (39.5, 44.8)	2.1	5
5	40	42.3 (39.6, 44.9)	2.3	6
6	40	42.4 (39.8, 45.1)	2.4	6
7	40	42.6 (39.9, 45.2)	2.6	6
8	40	42.7 (40.1, 45.4)	2.7	7
9	40	42.9 (40.2, 45.5)	2.9	7
10	40	43 (40.4, 45.7)	3	8
11	40	43.2 (40.5, 45.8)	3.2	8
12	40	43.3 (40.7, 46)	3.3	8
Subcutaneous Pressure (mmHg)	Interface Pressure (mmHg)	Picopress®		
		Mean Reading (95% CI)	Difference Between Mean Reading and True Interface Pressure (mmHg)	Percent (%) Difference Between Mean Reading and True Interface Pressure
3	40	45.5 (45.1, 45.8)	5.5	14
4	40	45.4 (45.1, 45.7)	5.4	14
5	40	45.4 (45.2, 45.7)	5.4	14
6	40	45.4 (45.2, 45.6)	5.4	14
7	40	45.4 (45.2, 45.6)	5.4	14
8	40	45.4 (45.2, 45.6)	5.4	14
9	40	45.3 (45.2, 45.5)	5.3	13
10	40	45.3 (45.1, 45.6)	5.3	13
11	40	45.3 (45, 45.6)	5.3	13
12	40	45.3 (45, 45.6)	5.3	13

Results

Interface pressure measurements using Picopress® did not differ between the different subcutaneous pressures (mean 45.4 ± 0.4) ($P=0.54$) (Table 1). The piezoresistive sensor, on the other hand demon-

strated different interface pressure measurements under various subcutaneous pressures (mean 42.65 ± 2.7) ($P<0.001$) (Table 1). Moreover, this difference appeared to be linearly related, illustrated as subcutaneous tissue pressure increased, the interface pressure measurement increased as well.

Conclusions

Subcutaneous pressure may affect overall interface pressure measurement according to the piezoresistive sensor but not Picopress®.

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