Government of Western Australia
South Metropolitan Health Service
Fiona Stanley Fremantle Hospitals Group

Comparison of different methods of compression for managing oedema following hand burn injury

Dale O Edwick[1,2,3], Dana A Hince[4], Jeremy M Rawlins[1,6], Fiona M Wood[1,2,5], Dale W Edgar[1,2,4,5]

Background

Compression for the management of acute burn oedema is frequently used to prevent conversion of the zone of stasis, and is often applied with little objective understanding of the optimal parameters of application or efficacy. The aim of compression is to reduce the formation of oedema and facilitate absorption of molecules by the venous and lymphatic systems.

Aim

- To investigate different methods of compression for managing hand burn oedema to define optimal parameters
- To validate the use of Bioimpedance Spectroscopy (BIS) for measuring oedema change in hand burn injury

Method

A Randomised Control Trial of 100 patients (68 male) presenting to the State Adult Burns Unit at Fiona Stanley Hospital with burns including a portion of the hand.

Patients were randomised to receive one of three compression methods:

- Spiral Coban to fingers, figure-of-eight to hand and wrist
- Cylindrical Coban to fingers, spiral to hand and wrist
- Norco Compression glove (control)

Volume measures were performed using BIS and water displacement volumetry pre-application of compression and at follow-up.

ROM measures were recorded pre- and post-dressings at both timepoints.

Results

Each method of compression resulted in a significant reduction in oedema between initial assessment and follow-up.

There was no significant difference between each method of compression for either volume or BIS measures.

ROM and function improved significantly for all hand and wrist measures with a reduction in oedema. ROM is reduced with compression insitu.

ROM measure	Change from baseline Coefficient	p-value	95% CI Lower	Upper
Hand CFF (cm)	IRR 0.32	0.001*	0.16	0.64
Thumb Opp (Kap)	0.36	0.046*	0.006	0.72
Hand Span (cm)	0.30	0.022*	0.04	0.55
Wrist Flex (°)	3.49	0.022*	0.50	6.48
Wrist Ext (°)	1.97	0.257	-1.44	5.39
Pain (VAS)	-0.64	0.092	-1.38	0.10
Quick DASH	-11.9	<0.001*	-15.2	-8.52

Compression	Volume change (Bioimpedance)	95% CI Lower	Upper
Glove	25.8mL*	-39.2	-12.4
Cylinder	23.9mL*	-34.3	-13.6
Spiral	33.0mL*	-52.3	-13.6

*p<0.05

Discussion

This is the first randomised control trial investigating the use of different methods of compression for the management of post burn oedema.

BIS is a sensitive and reliable measure (ICC 0.9978-0.9999) of oedema change in hand burns, and is strongly correlated with volumetry r=0.79; limits of agreement 198-460mL; bias 329mL.

Conclusion

The findings of this study indicate that any of the most common methods of applying compression for the management of oedema following hand burn injury is effective, and must be applied.

The results show that therapists of different skill levels are able to positively influence oedema, which will optimise healing in our patients.

BIS is a sensitive measure of oedema volume following hand burn injury.