

The Use Of Tonometry As A Diagnostic Tool In Lymphoedema: Review

Pallotta OJ

Biomedical Engineering Department, Flinders Medical Centre, Adelaide, SA, Australia

Introduction Lymphoedema is a chronic disorder in which fluid, protein and fibre accumulate in the tissues due to the destruction of the lymphatic system. Over time the affected limb becomes abnormally larger, harder and gradually increases its resistance to indentation upon pressure. Appropriate treatment requires accurate diagnosis of the pathophysiologic changes. These changes can be monitored by the use of tonometry. Tonometry measures the resistance of tissues to compression, providing a sensitive measure of fluid and fibrous accumulation within the tissues.

Method This review provides an overview of the use of tonometry in the management of lymphoedema. In particular it highlights its use as an evaluation tool and how it is capable of increasing our understanding of lymphoedema and its progression. Papers have been reviewed from the inception of tonometry to current research from a variety of teams involved in lymphoedema.

Results Literature suggests that tonometry provides more accurate and complementary information than the traditional circumference and volume measurements. It is able to provide a better understanding of the underlying tissue's content and condition. More specifically tonometry is capable of indicating the extent of fibrotic induration and the progression of lymphoedema within the limb. The mechanical tonometer is often considered to be misleading, arbitrary and susceptible to the user's technique [1]. This has led to attempts to overcome these problems by using electronic tonometers, mechanical impedance and acoustic techniques. Whilst these methods provide additional information they are not suitable for clinical use.

There are two main areas of research related to tonometry. One focuses on using tonometry to monitor the effect of treatment and progression of lymphoedema (clinical approach). The other involves exploring the capabilities of tonometry to derive models for a range of tissue disorders (experimental approach).

Conclusion Provided there is consistent user technique, mechanical tonometry is capable of providing information about the assessment of lymphoedema. This constraint has led to altering the mechanical tonometer or utilising alternative variations. Mechanical tonometry will continue to be used as an evaluation tool until new tonometers become clinically suitable.

References

1. Bates DO, Levick JR and Mortimer PS (1994), 'Quantification of Rate and Depth of Pitting in Human Edema Using an Electronic Tonometer', *Lymphology* 27, pp 159 – 172