

Imperial College Healthcare

#20401 What is the most accurate way to

assess the true bladder wall thickness?

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Aim

- To assess the most accurate method of Bladder wall thickness (BWT) measurement.
- To assess the impact of different frequency
- probes on BWT measurements.

Methods

- 18 bladder dome specimens were harvested from cadavers with ethical approval.
- Scanned with 3 ultrasound probes
 - AB27D (TA 2D, 7MHz)
 - RAB25D (TA 2/3D, 5MHz)
 - RIC59D (TVS 2/3D, 9MHz)
- GE Voluson E8 scanner.
- Minimum and Maximum width measurements were taken for all specimens using a micrometer calliper.
- 18 samples were scanned on 2 separate occasions by 2 operators.
- All specimens were scanned with 2 methods as shown in Figure 1.

Results

- Spearman's rho correlation coefficient was used to assess the agreement on the readings between the different probes (Table 1).
- 9MHz gave closest readings to micrometre calliper.

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<u>Table 1:</u> BWT measurements with 5MHz, 7MHz and 9MHz ultrasound, using 2 measurement techniques. One measurement was full thickness from the outside of the bright echo, and the inside of the bright echo, as shown in Figure 1.

Interpretation

- The 9MHz TVS probe casts the least acoustic shadows.
- Higher frequency probes delineate more tissue detail giving a sharper image for measurements to be taken.
- The 5MHz and 7MHz probes were curved arrays. The 9MHz probe was an endo array. The inherent technological differences in transmitting the ultrasound waves may have also influenced the measurements.
- Non-invasive method of predicting detrusor over-activity.
- Accurate BWT assessment may reduce the need for invasive and costly urodynamic investigations.¹
- In men BWT is measured abdominally, where peritoneal acoustic shadows can be very prominent.
- The peritoneal surface of the bladder was found to cast an acoustic shadow leading over-estimation of BWT.



<u>Figure 1:</u> BWT ultrasound images measured on a single specimen using 2 techniques: full thickness (including peritoneal bright echo), and detrusor muscle only (without the brightness). A. 7MHz (AB27D); B. 5MHz (RAB25D); C. 9MHz (RIC50D).

Conclusion

Measurement of the detrusor muscle only (without the bright echo) was more accurately correlated with micrometer caliper measurements. The 5MHz scanning showed less reliable results.

Reference

Latthe P et al, Ultrasound bladder wall thickness and detrusor overactivity: a multicentre test accuracy study. BJOG 2017:124:1422-1429