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THE RELATIONSHIP BETWEEN MAXIMAL URETHRAL CLOSURE PRESSURE AND DETRUSOR OPENING PRESSURE IN 56 CONSECUTIVE WOMEN UNDERGOING URODYNAMIC ASSESSMENT.

Aims of Study

To establish the distribution of these urodynamic parameters, which reflect urethral resistance at different phases of the storage/voiding cycle and to see whether a *linear correlation* exists between them. In addition, to perform a comparison study of *agreement* by examining the relationship between the difference and mean of these two pressure measurements. Maximum urethral closure pressure (MUCP) is measured by urethral pressure profilometry. This is considered by many to be a time consuming, complex and frequently erroneous investigation. If a surrogate marker, derived from cystometry alone could be employed to yield similarly useful information about urethral resistance, then this would prove valuable. This is particularly so with regard to voiding difficulties in women, where urethral pressure profilometry yields useful information about resistance to urethral flow upon which management decisions are frequently based.

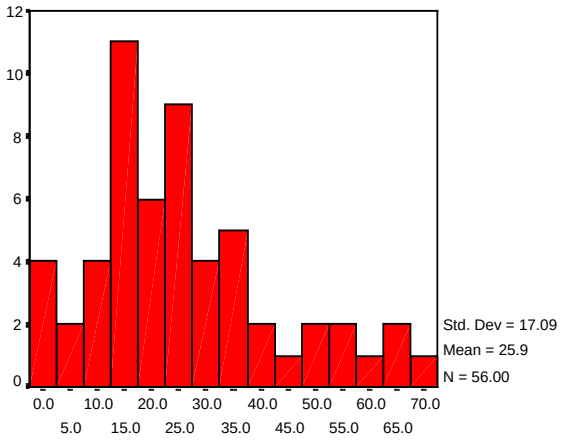
Methods

Data were collected from 56 consecutive women undergoing videourodynamics in a tertiary referral hospital. A Laborie Aquarius 120 urodynamic system was used to perform cystometry using external pressure transducers. Detrusor opening pressure was derived from the pressure-flow study, as the subtracted detrusor pressure at initiation of voiding. Urethral pressure profilometry was performed using a dual sensor Gaeltec 7F transducer catheter according to the technique described by Asmussen and Ulmsten [1].

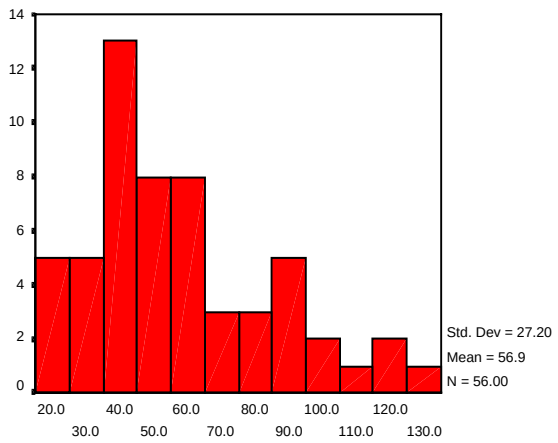
The distribution of the two variables was displayed using histograms and as they both demonstrated skewed distributions, Kendall's tau correlation coefficient for non-parametric data was used. A method of assessing agreement between two parameters of clinical measurement was also undertaken using the method described by Bland and Altman [2].

Results

Maximum urethral closure pressure (MUCP), detrusor opening pressure ($p_{det.open}$) and the difference between these two (MUCP – $p_{det.open}$) show a distribution skewed to the right when plotted as histograms.



detrusor opening pressure (cm of water)

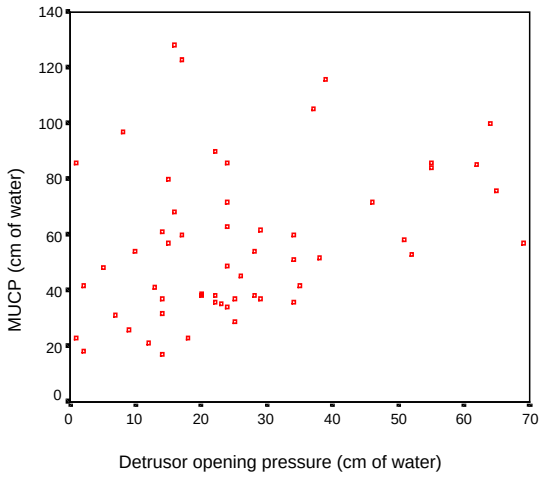


Maximum urethral closure pressure (cm of water)

Recorded maximum urethral closure pressure (MUCP) exceeded detrusor opening pressure ($p_{det.open}$) in 55 out of the 56 women, giving a positive value to (MUCP – $p_{det.open}$). This can theoretically be thought of as the difference in detrusor pressure between the voiding and the storage phases needed to overcome urethral resistance and initiate flow/leakage. This difference reflects the dynamic nature of urethral resistance.

A modest but statistically significant correlation exists between MUCP and $p_{det.open}$

(Kendall's tau correlation coefficient=0.259, P<0.01)



Kendall's Correlation Coefficient (tau) between MUCP and $p_{det.open}$ = 0.259 n= 56
Correlation is significant at the 0.01 level (2-tailed).

The Altman plot of difference (MUCP – $p_{det.open}$) against average (MUCP + $p_{det.open}$ /2) shows poor agreement between the two variables. Although they show some degree of linear correlation, these two parameters are measuring different aspects of urethral resistance in different phases of the micturition cycle.

Conclusions

All the calculated variables of urethral resistance showed a characteristically similar distribution suggestive of a normal natural distribution which has been subsequently skewed to the right by acquired voiding difficulties increasing these measures of urethral resistance.

The correlation between MUCP and $p_{det.open}$ is small but significant. They are measuring different aspects of urethral resistance in different phases of micturition and by different methods. The former evaluates urethral function at rest, whilst the later is a dynamic measure of urethral opening and has been used in men to grade the severity of prostatic obstruction [3].

There are technical reasons why correlation may be poor. One pressure measurement is made with an external pressure transducer and one with a solid-state catheter transducer. Also the methods of measuring urethral pressure are not directly analogous. One is a direct urethral pressure measurement with the catheter transducer in the urethra and the other an indirect inferred measure of the pressure needed to overcome urethral resistance and initiate flow. In this sense, the measurement of $p_{det.open}$ in voiding is more analogous to measuring a Valsalva leak point pressure.

References

1. Asmussen M, Ulmsten U. Simultaneous urethrocystometry and urethral pressure profile measurement with a new technique. *Acta Obstet Gynecol Scand* 1975;54:385-386

2. Bland J, Altman D. Statistical methods for assessing agreement between two methods of clinical measurement. *Lancet* 1986;i:307-310

3. Ameda K, Kobayashi S, Matsuura S. Urethral opening pressure: its clinical significance in prostatic obstruction. *Nippon Hinyokika Gakkai Zassi* 1997;88(4):496-502