

DOES THE URETHRAL SPHINCTER CHANGE WITH ADVANCING AGE?

Hypothesis / aims of study

Urethral pressure measurements have been used to assess urethral function. In continent women there is a decrease in the urethral length and maximum urethral pressure with increasing age¹. This can be postulated to be due to a loss of urethral sphincter bulk. Cadaver studies of the female urethra have shown a loss of striated muscle at the bladder neck and along the dorsal wall of the urethra as women age², unfortunately these findings could not be related to urinary symptoms. Two dimensional ultrasound measurements of the urethral sphincter in patients with urodynamic stress incontinence have been reported to show an age related decrease in rhabdosphincter thickness³. This age related finding may relate to the increased prevalence of incontinence with age. Three dimensional ultrasound of the urethral sphincter is a more accurate technique for studying the urethral sphincter and it has been shown that women with urethral sphincter incompetence have a smaller sphincter volume in compared to those who are continent⁴.

The aim of our study is to assess urethral sphincter volume in relation to age using three-dimensional ultrasound and to assess whether these changes are seen in all urodynamic groups.

Study design, materials and methods

Women referred to a tertiary urogynaecology clinic with lower urinary tract symptoms without previous continence procedures were studied. Saline cystometry or videocystourethrogram was performed to obtain the urodynamic diagnosis. Urodynamic diagnoses of urodynamic stress incontinence (USI), detrusor overactivity (DOA), mixed urinary incontinence (MI) and voiding difficulty were made. An absence of urodynamic diagnosis in spite of urinary symptoms was recorded as a normal urodynamic study (NUDS).

The women then had a transperineal ultrasound scan of the urethra using a 3 dimensional ultrasound scan (5 MHz, Kretztechnik, Zipf, Austria). The urethra was divided to four quartiles. Quartile 1 next to bladder neck and quartile 4 near the urethral meatus. The rhabdosphincter and urethral core (smooth muscle) volumes were calculated for total sphincter and in each quartile. The volumes obtained were correlated with age using Pearson correlation. The best line of fit was calculated using the least squares method. Statistical analysis was carried out using the SPSS program version 12.0 (SPSS Inc., Chicago, Illinois, USA).

Results

47 women attended for investigations- 10 were diagnosed with DOA, 18 had USI, 10 with MI, 2 voiding difficulty and 7 NUDS. The mean age was 48 (range 28 to 81) years. Data presented for both urodynamic group of USI and DOA (Table 1).

Table 1: Pearson correlation coefficient of sphincter volumes against age for the total sphincter and each quartile

		DOA (n =10)	USI (n = 18)
Total striated sphincter volume (ml)		- 0.700*	0.052
Striated Sphincter volume (ml)	Quartile 1	- 0.647*	0.222
	Quartile 2	- 0.546	0.009
	Quartile 3	- 0.641*	- 0.075
	Quartile 4	- 0.578	0.007
Urethral Smooth muscle (ml)	Quartile 1	0.415	-0.006
	Quartile 2	0.150	0.034
	Quartile 3	0.448	0.058
	Quartile 4	0.466	0.233
Sphincter length on ultrasound (mm)		- 0.663*	0.239

* = correlation is significant at the 0.05 level (2 tailed)

Fig 1: Total sphincter volume plotted against age for all patients

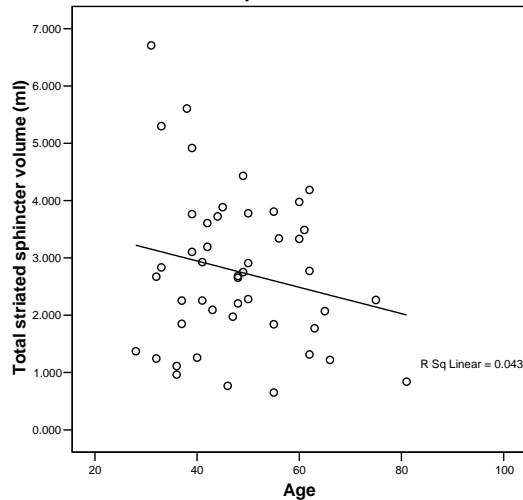


Fig 2: Total striated sphincter volume plotted against age in women with DOA only

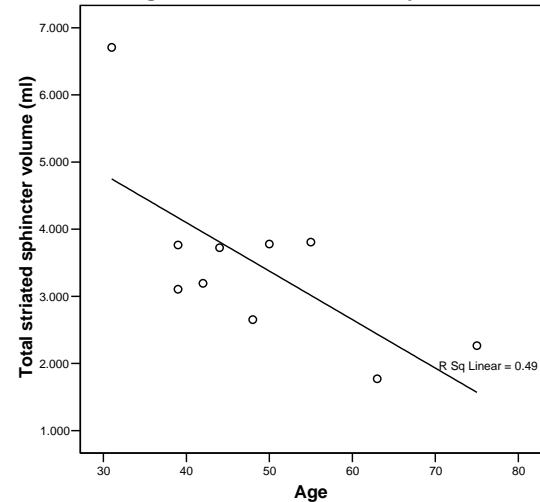


Fig 3: Total striated sphincter volume plotted against age in women with USI

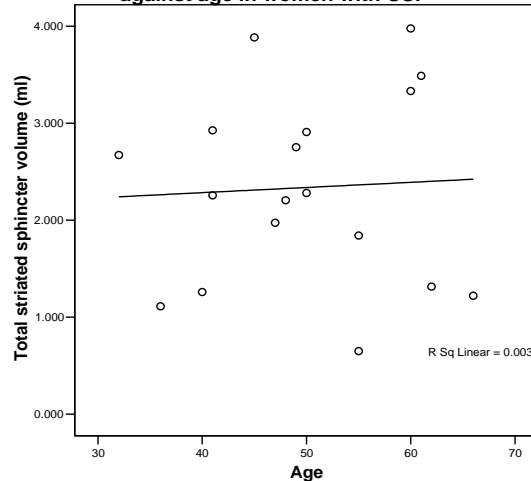
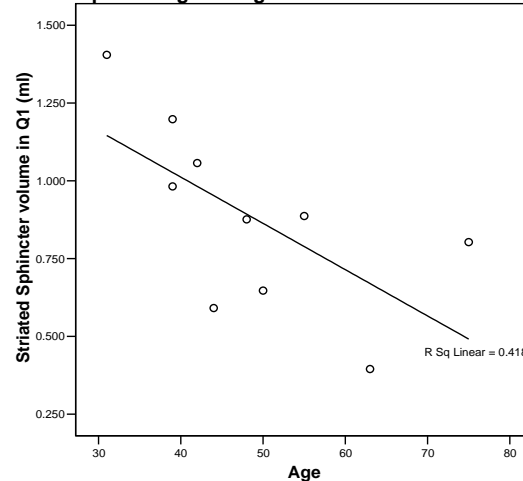


Fig 4: First quartile striated sphincter volume plotted against age for DOA Patients



Interpretation of results

There is a decrease in striated sphincter volume mainly in patients with DOA rather than USI with increasing age. This decrease appears in all quartiles of the sphincter but is seen most in the first quartile around the bladder neck. There was no significant change in urethral core (smooth muscle) volume, interestingly there was an increase in the urethral core (smooth muscle) volume in patients with DOA. There was also significant decrease in urethral length in this group. The sphincter volume did not decrease with increasing age in USI patients which may relate to small numbers in this study or the sphincter volume has already greatly reduced and therefore does not change with increasing age.

Concluding message

This study confirms cadaver studies of decreasing striated muscle volume with increasing age in patients with DOA only. These changes were not seen in those with urodynamic stress incontinence.

Reference

1. Acta Obstet Gynecol Scand. 1980;59(4):331-5.
2. Am J Obstet gynecol. 2002;186:351-60.
3. J Ultrasound Med. 2004;23:631-7.
4. Obstet Gynecol. 1999;94(2):295-301.