

THE POSSIBLE MECHANISM OF FAILED MID URETHRAL SLING PROCEDURE RESULTING FROM INCORRECT SLING LOCATION

Hypothesis / aims of study

Although the mid urethral sling(MUS) has been adopted as the most common procedure for the treatment of stress urinary incontinence(SUI), a recurrent rate of 5~23% has been encountered after this procedure[1]. Incorrect sling location has been identified as the most important reason that results in a failed MUS[2]. The aim of this study was to investigate the possible mechanism that an incorrect located sling results in failed anti-continece procedure.

Study design, materials and methods

The present study includes three parts.

Part one. Twelve adult females with complains of persistent or recurrent SUI after MUS procedures (3 from our institute and 9 referred from outside institutes) were included in this study. All these patients were treated by repeat transobturator MUS procedures during January 2002 and December 2011. Preoperative clinical evaluation included history and physical examination with cough test, Valsalva test, voiding diary, urinalysis, urodynamic study, and vesico-urethroscopy with a 8Fr.ureteroscopy. The diagnosis of recurrent SUI was confirmed and patient complicated with outlet obstruction, urethral erosion or neurogenic voiding dysfunction was excluded. Sling location and its influence on the urethral closure function were observed by simultaneous vesico-urethralscopy examination and finger palpation. The sling location was also explored and confirmed during the repeat MUS procedure.

Part two. Ten adult continent women were examined under mucus anaesthesia with 8Fr. ureteroscopy to observe the urethral lumen structure and the urethral closure function at rest and on stress respectively.

Part three. Seven female urethra specimens (4 from fresh corpses, 3 surgical specimen) were harvested and processed for gross observation and histological study. The morphology of the urethral sphincter system(USS) was described and the sphincter closing mechanism were deduced. Analog MUS procedure was conducted in a semi-pelvic specimen of an adult female to observe the relationship of sling location and urethral closure function.

Results

The demographics and peri-operative evaluation data of patients with recurrent or persistent SUI are noted in Table 1. Of the 12 patients, 9 had been identified having incorrect sling location (6 proximal, 3 distal).

Table 1. Demographics and peri-operative evaluation of patients with recurrent SUI

	Slings at Proximal urethra	Slings at Proximal urethra	Slings at distal urethra	Total
No of patients	6	3	3	12
Mean age	52.3	59.7	55.6	54.9
Median partiy (range)	1(1~4)	1(1~2)	2(1~2)	1(1~4)
Prior difficult labour	2	3	1	6
Urodynamic SUI	5	2	3	10
Retropubic sling	3	0	1	4
Transobturator sling	3	1	2	6
Mini Arc sling	0	2	0	2
Prolapse repair	1	0	0	1

The female urethra can be divided into 3 parts by in vivo endoscopic observation, as well as by gross observation and histological study of the female urethra specimen. The proximal urethra has a wide funnel-like lumen, which is opening both at rest and on stress(See Fig 1. P1,P2). The middle urethra has a very striking structure in its lumen, the cresta urethralis. At rest, the lumen is a narrow aperture. On stress, the lumen is closed with the cresta urethralis invade in(M1,M2,M3). The distal urethra again has a wide gourd-like lumen and ends in the meatus(D1,D2), which is not closed both at rest and on stress. It is observed on analog MUS procedure that, only when the tape being placed beneath the middle urethra, the urethral lumen can be closed effectively.

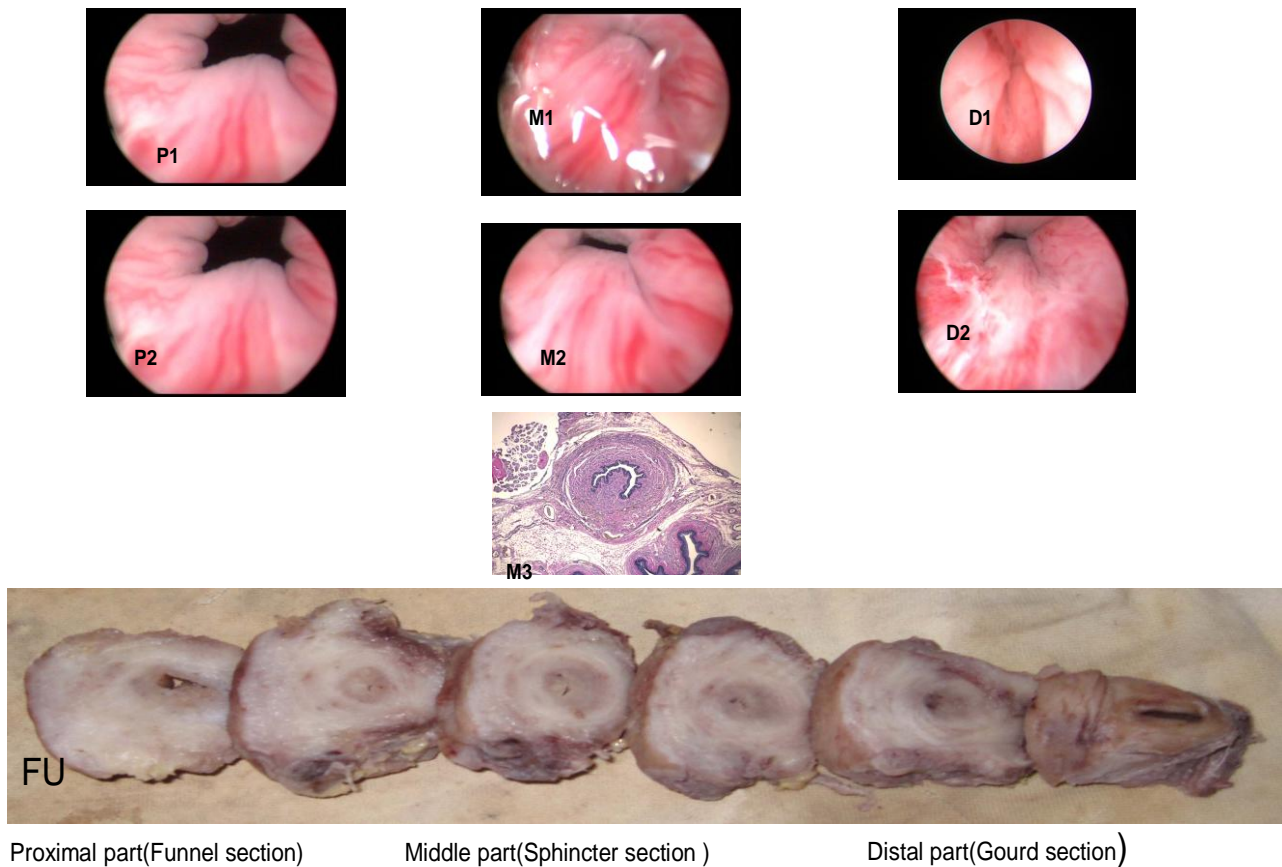


Figure 1. The appearance of urethral lumen and histological structure of three sections of the female urethra. P1:proximal urethra on stress; P2:proximal urethra at rest; M1:middle urethra on stress; M2:middle urethra at rest; D1:distal urethra on stress; D2:distal urethra at rest; M3:histological structure of middle urethra;FU:female urethra.

Interpretation of results

The majority of patients with recurrent or persistent SUI after MUS procedures had been noted having incorrect sling location. The mechanism of failed MUS resulting from incorrect sling location seems related to the morphological structure of different section of the female urethra. The cresta urethralis, a striking structure existing only in the middle urethral lumen, seems playing important role in the sphincteric closure mechanism in normal adult women. The MUS may work by supporting and pushing the cresta urethralis into the urethral lumen on stress.

Concluding message

The cresta urethralis, existing only in the middle section of urethra, plays an important role in the urinary continence function. Mid urethral sling closes the urethral lumen by supporting the cresta urethralis and pushing it invade into the urethral lumen on stress. If positioned incorrectly beneath proximal or distal urethra, the sling will not be able to close urethral lumen tightly, because proximal or distal urethral lumen is wide and lacks the cresta urethralis.

References

1. Holly Richter, et al. Retropubic versus transobturator midurethral slings for stress incontinence. N Engl J Med. 2010;362:2066~76.
2. Alienor Gilchrist, et al. Sling location in women with recurrent stress urinary incontinence following midurethral sling. Urology 2012; 79:76~9.

Disclosures

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