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TRANSURETHRAL BULKING AGENT LOCATION AND DISTRIBUTION: A 3D ULTRASOUND ANALYSIS

Hypothesis / aims of study

Our aim was to use 3D endovaginal ultrasound (EVUS) to describe the location and distribution of bulking agents following transurethral injection.

Transurethral injection of bulking agents is a viable alternative to surgery for patients with persistent or recurrent stress urinary incontinence (SUI) due to intrinsic sphincter deficiency. It acts by increasing the urethral closure pressure and increasing resistance to urinary flow. However, success rates are highly variable [1]. The optimal site for injection and the amount to be injected is still unclear. The recent study demonstrated that proximal and/or circumferential distribution is related with higher success rate compared with distal and/or partial one [2]. However, it is not always easy to predict the location of bulking agent under the urethra after procedure. Three-dimensional ultrasound imaging is an objective tool for the assessment of the lower urinary tract and pelvic floor. This technique allows for more accurate and precise volume estimation than the conventional imaging, particularly for structures that are irregularly shaped [3]. Bulking agent such as Macroplastique ® and Coaptite ® can be clearly visualized in three-dimensional endovaginal ultrasound (EVUS) and this technique helps to identify the location and distribution of those materials after procedure is completed. It will be of interest to investigate the distribution patterns of bulking agent after uncomplicated bulking agent injection by experienced subspecialists.

Study design, materials and methods

This is the retrospective analysis of 3D EVUS which were performed after bulking agent injection for stress urinary incontinence. All the patients were injected by three senior physicians who have performed more than 300 urethral bulking procedures. Per protocol, one cc of the bulking material is injected at 3 and 9 O'clock position and if coaptation was not achieved an additional one cc was injected at 6 O'clock position (Fig 1). The location, periurethral distribution, and distance of bulking agent from the urethrovesical junction as well as length of the urethra were assessed. The injected bulking agent could be seen as hyperechoic densities around the urethra. The location of the bulking agent from the vesicourethral junction was reported as percentile of the urethral length. The periurethral distribution, location, length of the hyperechoic densities and the distance of the injected material from the urethrovesical junction was assessed.

Results

The 3D volumes of 24 patients were available for review. Two were excluded due to poor quality. The average urethral length was 36.7 mm (range 28.2-50.5mm). 18 (82%) subjects showed two sites of bulking agents. The average location of the left and right implants were at 3.3 (range 1-12) and 8.8 (Range 7-12) O'clock position. The left implants were in 17%ile (+/- 14%, 6.2mm, range 0.5-17mm) length of the urethra, While the right was at 26%ile (+/- 21%, 8.9mm, range 0-24.8mm) length of the urethra. 11/22 subjects (50%) had both side within upper one third of urethra. The difference in distance between two sides was less than 10mm in 12/22 patients (54%). 9/22 patients (41%) had significant tracking of the material within the tissue rather than spherical configuration (Fig. 2).

Interpretation of results

While there is normal placement at 3 and 6 O'clock position, the material are frequently not in the same place along the length of the urethra. Additionally, 41% of material tracks within the tissue and does not contribute to urethral coaptation.

Concluding message

The urethral bulking materials are frequently not in the location that the operator intends them to be. In addition, the tracking of the material contributes to poor coaptation.

Figure 1: Schematic drawing of desired bulking agent application.

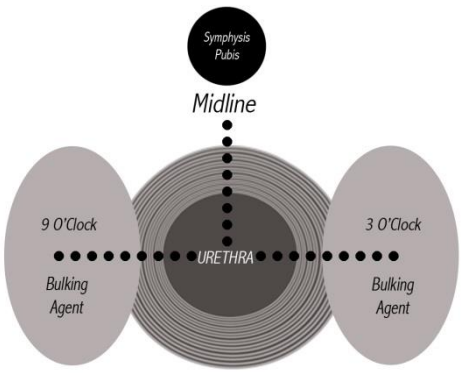
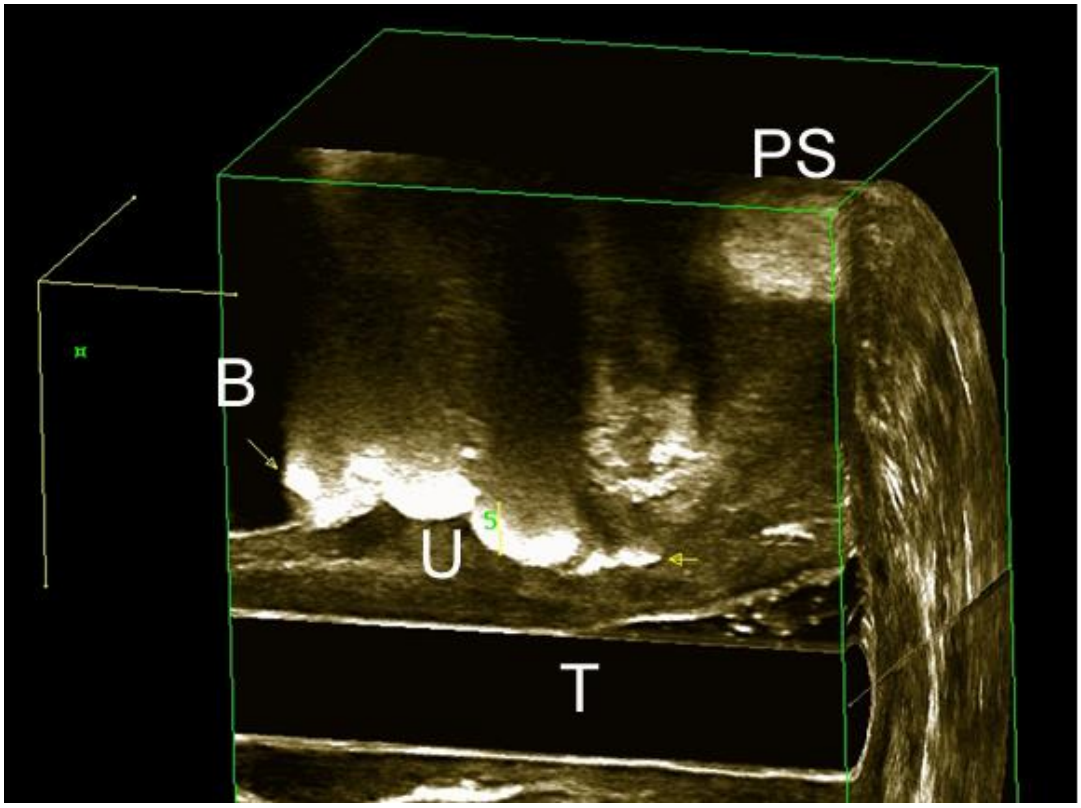


Figure 2: This patient showed the spread of the bulking agent from bladder neck (□) to distal urethra (□) in a sagittal view. T: Transducer, PS: Pubic symphysis, U: Urethra, B: Bladder



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