20740 - Ultrasound imaging of pelvic floor function in women who received pelvic radiotherapy: a feasibility study

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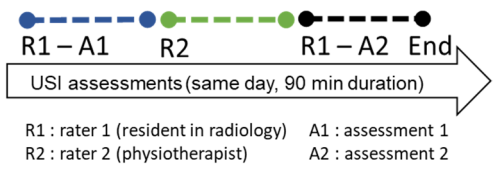
Introduction

- Ultrasound imaging (USI) can produce valid and reliable measures for structures of the bladder wall and urethra, as well as motion of the anorectal angle during pelvic floor muscle (PFM) contraction. [1]
- USI has been used to investigate urogenital morphology in both healthy and incontinent women, but not in women who have been irradiated for pelvic cancer.
- Many women report pelvic floor dysfunction after pelvic radiotherapy (RT) [2]. Evidence is needed to support the use of USI for the investigation of pelvic floor dysfunction in women after pelvic RT. This is important as tissue fibrosis after RT may impair image quality.

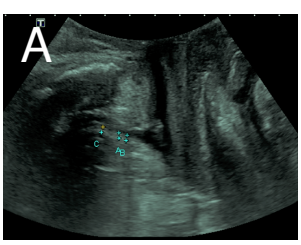
Objective: Evaluate the feasibility of using USI to measure bladder wall thickness (BWT), urethral length (UL) and PFM function in women who have received pelvic RT.

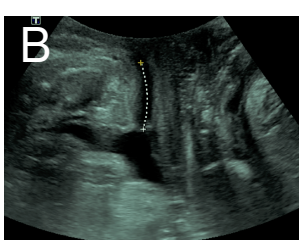
Methods

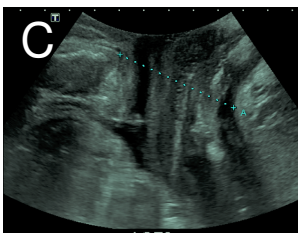
- Sample: women with a history of pelvic RT.
- Design:

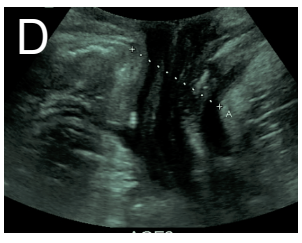


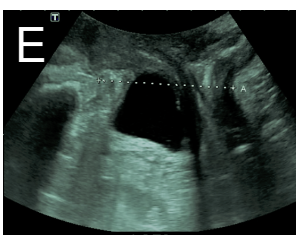
- Measures:
  - Feasibility and acceptability: compliance with the assessment procedures, ability to identify anatomical landmarks, tolerance with the assessment procedures, and protocol duration.
  - 2D transperineal USI evaluation (Aplio 500, Toshiba, USA) using a curved–array transducer (3-7 MHz).
  - Five variables collected:









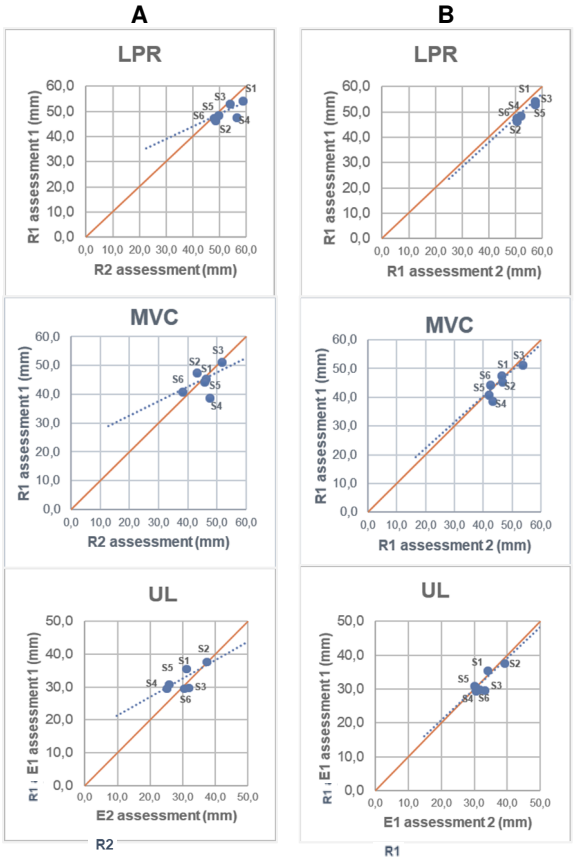


Variables:
A. Bladder wall thickness (BWT)
B. Urethral length (UL)
C. Levator plate at rest (LPR)
D. Levator plate during maximal volontary contraction (MVC)
E. Levator plate during maximal Valsalva manœuvre (MVM)

Results

- Six women were assessed over a 2-month period (age: 33 to 73 years old; 5 to 48 months post-RT; total RT dose received: between 21 and 57 Gray).
- Anatomical landmarks were identified in all participants and no pain or discomfort was reported (0/10 for every assessment and participant).
- Mean duration of a single assessment was 22 ± 9 min, which was longer for Rater 2 (R1: 18 ± 7 min; R2: 32 ± 3 min).

Figure I. Inter- (A) and intra-rater (B) concordance for levator plate at rest (LPR), maximal voluntary contraction (MVC) and urethral length (UL).



LPR: Distance between ano-rectal angle and pubic symphysis at rest; MVC: levator plate during maximal voluntary contraction; UL: distance from bladder neck to inferior border of pubic symphysis; R1: Rater 1; R2: Rater 2; mm: millimeters; S1 to S6: Subject 1 to Subject 6.

Conclusions

- Feasibility and acceptability of USI procedures for the measurement of BWT, UL and PFM variables in women after RT are supported by compliance with the protocol, an adequate duration and no discomfort reported.
- The ranges of values appear to correspond with existing values from the literature, [1, 3]. Intra-rater concordance appears to be higher than inter-rater concordance. Raters with different experience in USI appear to show good concordance. Our team will pursue and determine intra- and inter-rater reliability of these measures.
- USI is likely to be a valuable option for the investigation of pelvic floor dysfunctions in women who have been irradiated for pelvic cancer.

References

1. Yang SH, Huang WC, Yang SY, Yang E, Yang JM. Validation of new ultrasound parameters for quantifying pelvic floor muscle contraction. Ultrasound in Obstetrics and Gynecology. 2009;33(4):465-471.
2. Donovan KA, Boyington AR, Judson PL, Wyman JF. Bladder and bowel symptoms in cervical and endometrial cancer survivors. Psycho-oncology. 2014;23(6):672-678.
3. Pomian A, Majkusiak W, Kociszewski J, et al. Demographic features of female urethra length. Neurourology and urodynamics. 2018.