

## ORIGINAL RESEARCH

# Transrectal ultrasonography can safely replace cystography in assessing vesico-urethral anastomosis after radical prostatectomy

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## Abstract

**Objectives:** A well performed vesico-urethral anastomosis (VUA) allows an early catheter removal and cystography is mandatory to exclude urinary extravasation. Aim of the study is to investigate whether transrectal ultrasonography (TRUS) is as reliable as cystography in detecting anastomotic leakage after radical retropubic prostatectomy (RRP) in order to avoid the use of X-rays.

**Methods:** 50 patients (pts) underwent RRP. VUA integrity was assessed 7 days after surgery by cystography and subsequently by TRUS to assess the patency of VUA. Patients who showed extravasation at the cystogram underwent ultrasonography in order to evaluate the leakage shown with cystography.

**Results:** Catheter was removed after 7 days in all patients except 2 pts (4%) showed extravasation at the cystography that was exactly detected at the TRUS investigation, therefore the catheter was maintained for another week. TRUS investigation, performed after cystography, also revealed the presence of a lymphocele and a retropubic hematoma, in two different patients, both completely asymptomatic and misdiagnosed at the cystography.

**Conclusions:** Urinary leakage in the first days after RRP can be frequent and cystography is mandatory to assess VUA integrity, when early catheter removal is planned. TRUS as an alternative investigation technique to cystography, showed a high sensitivity and specificity in detecting extravasation and was also able to diagnose complications related to RRP that cystography didn't show.

## Key words

Prostate cancer, Vesico-urethral anastomosis, Ultrasonography, Cystography

## 1 Introduction

Vesico-urethral anastomosis after radical retropubic prostatectomy (RRP) is an easy procedure but sometimes it can result difficult to perform, and time consuming at the same time, because a deep bony pelvis or a short urethral stump can lead to difficult suture placement. Regardless of the technique used, a well performed vesico-urethral anastomosis should provide

watertight closure, with appropriate mucosal to mucosal coaptation, and a proper tension - free urethral realignment, in order to avoid early or late complications such as urinary extravasation, incontinence, and stenosis of the anastomotic tract<sup>[1]</sup>. Many questions are still open concerning the outcome of vesico-urethral anastomosis; the number of sutures used seems not influence the perioperative and postoperative parameters and, to date, no published clinical studies have specifically addressed this issue, with most clinicians using six stitches as originally described by Walsh<sup>[2]</sup>, but the number of stitches can decrease to four or increase to eight, as described by other experienced investigators, with good functional results as well. In order to improve the functional results of vesico-urethral anastomosis with a low rate of leakage, a good long-term continence and acceptable strictures rates, alternative anastomotic techniques were described. An important issue seems to be the caliber of the bladder neck. Some Authors reported a reduced incidence of bladder neck contracture after increasing the bladder neck caliber from 18Fr. to 22Fr - 24Fr<sup>[3]</sup>. A well performed anastomosis also allows an early removal of the urethral catheter, which is source of discomfort, urinary infection, bladder irritability symptoms, and urethral strictures directly associated with the duration of catheterization after surgery<sup>[4]</sup>. Therefore, many Authors are now removing catheters on postoperative day 7 or even earlier. Patel and Lepor<sup>[5]</sup> reported that even though most patients have a watertight anastomosis on post operative day 3 or 4 after RRP, and show no extravasation on cystography, an early catheter removal produce the risk of acute urinary retention requiring replacement of urinary catheter, and the potential for disruption for the anastomosis or bladder neck reconstruction. Thus many authors recommend delaying catheter removal until post operative day 7 or later. A cystogram is mandatory before early catheter removal in order to exclude extravasation and evaluate the integrity of the anastomosis, and eventually postpone catheter removal in case of leakage<sup>[6]</sup>, because provides a reliable assessment of the anastomotic region. Aim of the study is to investigate whether transrectal ultrasound (TRUS) is as reliable as cystography in detecting anastomotic leakage in early catheter removal after RRP by comparing the two diagnostic techniques, with the purpose to avoid the unnecessary use of cystography considering that cystography is an expensive and x-ray related imaging procedure requiring the use of contrast medium. Costs, time saving and exposure to ionizing radiation are reduced for TRUS in comparison with cystography. Ultrasonographic assessment of the vesico-urethral anastomosis is easily reliable and the "neo-anatomy" of VUA thus obtained is also very useful in the follow up of patients for local recurrence. Besides these considerations, the use of TRUS avoid the possible allergic reactions due to the contrast medium. Therefore TRUS is a valid alternative investigation to cystography in assessing VUA after RRP.

## 2 Patients and methods

Fifty patients, age ranged from 55 to 70 years (see Table 1, 2) suffering from localized prostatic cancer, underwent RRP, and vesico-urethral anastomosis using the Capio RP. The Capio RP is a suturing device with a 45° curvature of the distal end, to be introduced in the urethral stump, which can rotate clockwise from 12 o'clock to 4 o'clock and counter-clockwise from 12 o'clock to 6 o'clock in 30° increase for each rotating movement, allowing the sutures to be easily put inside the urethral wall, in the number and in the position exactly where the surgeon decides, according to the personal experience<sup>[7]</sup>. After the prostate gland and seminal vesicles had been removed, bladder neck was tailored, everting the mucosal, using 2/0 rapid vicryl sutures, to obtain a caliber compatible with the urethra, as well as a diameter of at least 22-24F, for a better and safe Capio RP assisted anastomosis by means of six "inside-outside" stitches with a 2/0 absorbable polyglycolic acid coated suture, on a taperpoint needle for the urethral stump and a ½ circle needle for the bladder neck at 2, 4, 6, 8, 10, 12 o'clock position, over a 20-F foley catheter, in order to obtain a watertight anastomosis. The anastomosis was then checked for water tightness by direct visual observation of the anastomotic suture line after instillation of 250 mL of normal saline in the bladder. Two pre-vacuumed drains were left in place at the end of the procedure. The patency of vesico-urethral anastomosis was assessed 7 days after RRP by cystography and TRUS in all patients. The investigation started with cystography, and the catheter balloon was deflated in order to avoid covering the anastomotic tract and the catheter fixed at the penis with sticking plaster. A plain film of the pelvic region was taken, then radiographic contrast medium was slightly instilled under fluoroscopic control and if there was no vesico-urethral extravasation (VE), the bladder was filled up with 150-200 ml of contrast medium and the catheter removed for radiographic micturition evaluation. The patients were subsequently investigated with TRUS (7.5 MHz transrectal probe) to assess the patency of

the anastomosis during micturition, as soon as the bladder was filled up after intravenous administration of saline solution, with the patients positioned on their right side. The patients who showed a VE at the cystography had the catheter maintained in place and underwent ultrasonography to evaluate the contrast medium leakage and a second cystogram for deciding catheter removal was obtained 5 - 7 days later. Urinary continence was evaluated on the basis of the daily count of pads used. Urinary flow evaluation was performed after catheter removal, one month after surgery and every month thereafter for six months. Radiological studies of the urinary tract were performed by highly specialized radiologists. The physicians who carried out the TRUS were not aware of the results obtained by the radiologists who had previously performed the cystography.

Quality of life and outcome of patients who had the catheter removed were evaluated using a telephone questionnaire.

**Table 1.** Patient distribution for age, clinical stage, serum PSA and histologic Gleason score

Parameter	Group (n=50)
Mean age	63
Pathologic stage (%)	
T1	none
T2	48
T3	2
Mean serum PSA (ng/ml)	6.8
Mean Gleason Score	7

*Note.* PSA = prostate-specific antigen.

**Table 2.** Perioperative and functional outcome

Parameter	Group (n=50)
Stricture (%)	1
Urine leakage at cystography	2
Urine leakage at TRUS	2
Mean intraoperative blood loss (ml)	450
Mean time to drain removal (days)	4
Mean hospitalization time (days)	8
Early radiotherapy because of positive margins (%)	4
Continence at 3 months	50

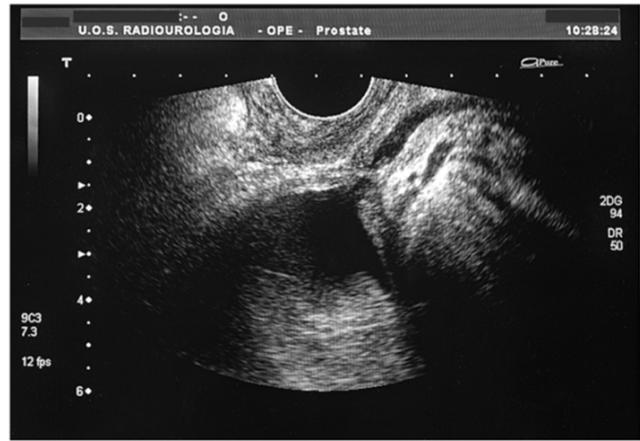
### 3 Results

Patency of vesico-urethral anastomosis was assessed by means of cystography and TRUS in all patients on post operative day 7 during cystography which demonstrated a perfect anastomosis in 48 pts. (96%) (see Figure 1). Two patients (4%) showed a contrast medium leakage at the cystography that was exactly detected at the TRUS investigation (see Figure 2, 3). In one patient ultrasonography showed the presence of a lymphocele (see Figure 4) and in another one the ultrasonography showed a retropubic hematoma, both completely asymptomatic during the postoperative course, and obviously misdiagnosed at the cystography, which however allowed the removal of the catheter after seven days. As far as the bladder outlet status is concerned, 1 patient (2%) developed acute urinary retention after catheter removal requiring reinsertion of a Foley catheter for 2 - 3 days. Two pts. (4%) showed obstruction on Qmax nomogram immediately after catheter removal, but in both cases the urinary obstruction disappeared at the urinary flow evaluation performed subsequently. One patient (2%) developed a clinically significant anastomotic stricture within 8 to 10 weeks from catheter removal and successfully treated with one single endoscopic cold-knife incision. Concerning the pathological findings

48/50 patients were pT2 and 2/50 patients were pT3 and no significant correlation was found between bladder outflow status, continence, and tumor stage or positive surgical margins.



A



B

**Figure 1.** Comparative study in assessing vesico-urethral anastomosis. (A) Cystography after injection of contrast medium with no evidence of extravasation. (B) TRUS of the same patient performed after cystography with no evidence of urinary leakage.



(A)



(B)

**Figure 2.** Comparative study of urinary leakage. (A) Cystography showing extravasation of contrast medium. (B) TRUS of the same patient showing the urinary leakage



**Figure 3.** Sovrapubic Ultrasonography. The urinary leakage is also detected in the same patient with sovrappubic ultrasonography.



**Figure 4.** Lymphocele. Ultrasonography showing the presence of a lymphocele misdiagnosed at the cystography.

## 4 Discussion

Urinary leakage from VUA after radical prostatectomy can be associated with a failed urethral mucosal to mucosal realignment and is relatively frequent in the first days after surgery<sup>[8]</sup>, representing the most important risk factor for the onset of a stenosis of the anastomosis due to infection and fibrosis. Vesical catheter after radical prostatectomy is traditionally removed after two weeks, according to the post operative course and to the surgeon experience. Early catheter removal after radical prostatectomy relieve the patient from discomfort and some morbidities such as urinary infection, bladder irritability symptoms and urethral strictures directly associated with the duration of the catheterization after surgery. Considering the standardization of radical prostatectomy, and the improved techniques for vesico-urethral anastomosis, many Authors are now advocating to remove the catheter on post operative day 7 or even earlier, if the anastomosis is intraoperatively watertight, in order to achieve a catheter free status at hospital discharge with an extremely positive impact for the patient suffering from prostate cancer. A cystogram is therefore mandatory before early catheter removal to exclude urinary extravasation and evaluate the integrity of the anastomosis. Considering that cystography is an expensive investigation and considering also that it needs the use of X-rays and contrast medium, the Authors were looking for an alternative investigation to assess the integrity of the anastomosis for early catheter removal

after radical prostatectomy. De Stefani et al. <sup>[9]</sup> already demonstrated, in a prospective study performed on a 30 patients group, how TRUS with contrast medium (Levovist, Berlex Inc., Canada) is a valid alternative to cystography to evaluate an extravasation of contrast medium from vesico-urethral anastomosis. Our experience with the use of TRUS in assessing vesico-urethral anastomosis showed how this investigation is able to evaluate urine extravasation without the use of echographic contrast medium and it is also able to detect post operative complications such as lymphocele, or haematoma which can't be seen with a cystogram. The ultrasonographic study of vesico-urethral anastomosis, both basal and during micturition, to detect urinary extravasation, suppose a large experience of the investigator and the initial association of cystography and TRUS make the proper evaluation of the urinary leakage surely easier, which after a very short learning curve can be established with the ultrasonography alone. The use of TRUS in evaluating vesico-urethral anastomosis during micturition also provide an early "ultrasonographic assessment of the neo-anatomy" of the vesico-urethral junction, and this could be very useful and important in establishing a baseline image for each patient for later comparison, in the detection of a possible local recurrence, since it may prevent a false positive on subsequent follow up studies <sup>[10]</sup>.

## 5 Conclusions

The results of this study have shown that transrectal ultrasonography can safely replace cystography to evaluate the integrity of the vesico-urethral anastomosis after radical prostatectomy, in order to plan an early catheter removal. The high efficacy and reduced cost, together with the minimal invasiveness without exposure to radiation when compared to cystography, confirm the role of transrectal ultrasonography as a valid alternative investigation to evaluate urinary leakage from vesico-urethral anastomosis, providing also a baseline image for each patient of the ultrasonographic characteristics of the neoanatomy useful for later comparison. Transrectal ultrasonography allows early catheter removal with quick patient recovery and early return to ordinary activities with an improved quality of life.

## References

- [1] Steiner MS, Morton RA and Walsh PC. Impact of anatomical radical prostatectomy on urinary continence. *J Urol.* 1991; 145: 512-515. PMID:1997701
- [2] Walsh, PC. Anatomic radical retropubic prostatectomy. In *Campbell's Urology*. Philadelphia: Saunders. 2002: 3107 – 3129.
- [3] Mc Carthy, J, and Catalona, W. Nerve sparing radical retropubic prostatectomy. In *Textbook of operative Urology*. F. Marshall, ed. Philadelphia: WB Sanders.1996: 537-544.
- [4] Masanori N, Akihiko S, Jyunro Y, Shigetaka S, Shinshi N. Early catheter removal three days after radical retropubic prostatectomy. *Int. J Urol.* 2004; 11: 983-988. PMID:15509202 <http://dx.doi.org/10.1111/j.1442-2042.2004.00935.x>
- [5] Patel R, Lepor H. Removal of the urinary catheter on post-operative day 3 or 4 after radical retropubic prostatectomy. *Urology.* 2003; 61: 156-160. [http://dx.doi.org/10.1016/S0090-4295\(02\)02105-2](http://dx.doi.org/10.1016/S0090-4295(02)02105-2)
- [6] Dalton DP, Scheffer AJ, Garnett JE, Grayhack JT. Radiographic assessment of the vesicourethral anastomosis directing early decatheterization following nerve-sparing radical retropubic prostatectomy. *J Urol.* 1989; 141: 79-81. PMID:2908959
- [7] Perugia G, Teodonio S, Di Viccaro D, Bova G, Balla J, Zanza C, Chinazzi A, Liberti M. Advantages on urinary continence using the Capio RP. Suturing device for vesico-urethral anastomosis after radical retropubic prostatectomy [abstract]. *Neurol Urodyn.* 2010; 29: s685-s686.
- [8] Leibovitch I, Rowland RG, Little JS Jr, Foster RS, Bihrlle R, Donohue JP. Cystography after radical retropubic prostatectomy: Clinical implication of abnormal findings. *Urology.* 1995; 46: 78-80. [http://dx.doi.org/10.1016/S0090-4295\(99\)80163-0](http://dx.doi.org/10.1016/S0090-4295(99)80163-0)
- [9] De Stefani S, Sighinolfi MC, Mofferdin A, Paterlini M, Micali S, Celia A, Peluso G, Bianchi G. Transrectal contrast-enhanced (Levovist) ultrasonography in evaluation of urinary leakage after radical prostatectomy: a preliminary report. *Urology.* 2005; 66: 871-873. PMID:16230158 <http://dx.doi.org/10.1016/j.urology.2005.04.032>
- [10] Goldemberg SL, Carter M, Dashefsky S, Cooperberg PL. Sonographic characteristics of the urethrovesical anastomosis in the early post-radical prostatectomy patient. *J Urol.* 1992; 147: 1307-1309.