Transrectal ultrasound guidance for early transurethral recatheterization after radical prostatectomy

Marco Raber

Received: 26 January 2014 / Accepted: 14 March 2014 / Published online: 8 April 2014
© Società Italiana di Ultrasonologia in Medicina e Biologia (SIUMB) 2014

Abstract

Purpose To study the usefulness of transrectal ultrasound (TRUS) for catheter guidance in cases of early reinsertion after radical prostatectomy (RP).

Methods Since 2007, we have used TRUS for catheter guidance when early reinsertion after RP is required. A preliminary TRUS examination is done to carefully check the state of the vesicourethral anastomosis. The entire catheter insertion, from bulbar urethra to the bladder, is followed step by step by transrectal ultrasound imaging that tracks, while the probe pushes the catheter through a correct entering line. This prevents the incorrect placement of the catheter across the posterior aspect of the anastomosis in a posterior extravesical place.

Results Between 2007 and 2011, 2,165 RPs were performed at reference hospital for prostate cancer. Early catheter reinsertion was required for 56 patients (2.6 %). All procedures were successful. The incidence of vesicourethral stricture after long-term follow-up was not different from that of patients without early recatheterization who were operated with RP in the same period of the study (4.4 vs 4.2 %, respectively; $p = 0.47$).

Conclusions If early recatheterization is required in patients recently operated with RP, we suggest catheter guidance with TRUS.

Keywords Ultrasonography · Radical prostatectomy · Anastomosis · Urethral catheterization

Riassunto

Obiettivi lo studio della utilità della ecografia trans-rettale durante il posizionamento precoce del catetere vescicale nei pazienti operati di prostatectomia radicale.

Metodi dal 2007 abbiamo introdotto la ecografia trans-rettale per la guida al posizionamento del catetere vescicale nei casi di cateterizzazione precoce dopo intervento di prostatectomia radicale. Il posizionamento del catetere vescicale viene monitorato durante il passaggio dalla uretra bulbare alla regione anastomotica e cervico-uretrale mentre la sonda stessa spinge il catetere verso l'alto in modo da imprimergli la progressione nella direzione della vescica. Questa azione ha lo scopo di impedire la progressione del catetere stesso, attraverso la parte posteriore dell'anastomosi ancora non consolidata, nello spazio extravescicale posteriore.

Risultati tra il 2007 ed il 2011, sono state prese in considerazione 2,165 prostatectomie radicali realizzate presso un centro di riferimento per la patologia prostatica. La cateterizzazione precoce è stata necessaria in 56 pazienti (2.6 %). Tutte le procedure sono state portate a termine con successo. La incidenza della stenosi dell'anastomosi nel followup in questo gruppo di pazienti è risultata sovrapponibile a quella del gruppo di pazienti operati di prostatectomia radicale nello stesso periodo dello studio (4.4 vs 4.2 %, rispettivamente $p = 0.47$).

Conclusioni nel caso di necessità di cateterismo precoce dopo intervento di prostatectomia radicale raccomandiamo l'impiego della ecografia trans-rettale per la guida al corretto posizionamento in vescica.

Abbreviations

TRUS Transrectal ultrasound
RP Radical prostatectomy

M. Raber
Unità Operativa di Urologia, Istituto Clinico Città Studi, Milan, Italy

M. Raber (✉)
Via Falcone E Borsellino, 1, 20090 Segrate, MI, Italy
e-mail: marco.raber@ovi.com

Fig. 1 **a** Transrectal ultrasound study of the normal vesico-urethral anastomosis: in the midline sagittal plane are shown the bladder wall (BW), the catheter balloon filled inside the bladder (CB), and the vesico-urethral anastomosis (VUA). **b** Transrectal ultrasound study of the partial disrupted vesico-urethral anastomosis: in the midline sagittal plane are shown the bladder (B), the bladder neck (BN), the posterior anastomosis disruption (PAD) and the associated urinoma below the bladder (U), the pubis (P) and the urethral stump (US). **c** Transrectal ultrasound study of the complete disrupted vesico-urethral anastomosis: in the midline sagittal plane are shown the bladder (B), the trigone wall (T), the bladder neck (BN), the complete anastomosis disruption (AD) and the associated urinoma below the bladder (U), the pubis (P) and the urethral stump (US)

addition, malfunction in draining the bladder requires immediate catheter replacement. Catheterization is usually done using a flexible cystoscope and passing the catheter along a guidewire that is initially inserted into the bladder [5, 6]. This procedure might be very complicated for the operator and uncomfortable for the patient, as it often requires more anesthesia and new access in the operating room just after RP. Catheter insertion in a blind mode, however, might be related to a non-negligible risk of anastomosis disruption [5, 6]. To simplify the procedure and to reduce the risk of catheter displacement or anastomosis damage, we studied the usefulness of catheter guidance under pelvic transrectal ultrasound (TRUS).

Methods

Since 2007, we have used TRUS for catheter guidance when early reinsertion after RP has been required. The procedure is usually performed while the patient is on the left lateral decubitus. Using an end fire transrectal ultrasound probe, a preliminary TRUS examination is performed to carefully check the state of the vesicourethral anastomosis. Typically, three different scenarios might be found: normal appearance (Fig. 1a), partial disruption of the vesicourethral anastomosis (Fig. 1b), or complete disruption (Fig. 1c).

Subsequently, the catheter is inserted into the bulbar urethra. The ultrasound probe is used to achieve correct alignment between the vesicourethral anastomosis and the catheter by placing mild pressure on the posterior aspect of the membranous urethra and the anastomosis (Fig. 2a). The mild posterior pressure of the tip of the probe prevents incorrect placement of an entering line across the posterior aspect of the anastomosis and, consequently, wrong extravescical placement. The catheter is then pushed along the correct entering line through the anastomosis into the bladder (Fig. 2b). In case of complete anastomosis disruption or lack of posterior integrity, the tip of the probe is used to push the catheter tip directly into the bladder through the bladder neck to correctly align it between the urethral stump and the bladder neck.

Introduction

Early recatheterization after radical prostatectomy (RP) is required in cases of acute urinary retention or disruption of vesicourethral anastomosis, after catheter removal, and in cases of incidental displacement of the catheter [1–4]. In

Fig. 2 **a** Transrectal ultrasound pressure on the anterior rectal wall (white bold arrow); **B** Bladder, **U** Urinoma, **C** Catheter, **CB** Catheter balloon, **DA** Disrupted anastomosis. **b** The transrectal pressure on anterior rectal wall closes the preferential direction of the catheter into the urinoma through the complete anastomosis disruption. A mild pressure prevents the catheter from entering the preferential way of the urinoma (red arrow) through the complete anastomosis disruption and directs it toward the correct line (green arrow). **B** Bladder, **U** Urinoma, **C** Catheter, **CB** Catheter balloon, **DA** Disrupted anastomosis

The entire catheter insertion, from bulbar urethra to the bladder, is followed and guided step by step with careful TRUS assessment. The correct placement of the balloon is proven by gently filling the bladder under ultrasound view. In all cases, however, we performed a cystogram to verify the accuracy of the procedure (Fig. 3).

Results

Between 2007 and 2011, 2,165 RPs were done at reference hospital for prostate cancer. Early catheter reinsertion was required for 56 patients (2.6 %). The mean age of the patients was 67 years (SD $\pm$ 9; range 58–74 years).

Fig. 3 Radiographic appearance of the bladder and the anastomosis after the procedure

Catheterization was required for incidental early displacement of the catheter ($n = 2$), malfunction of the catheter ($n = 2$), acute urinary retention ($n = 45$), and vesicourethral disruption ($n = 7$) after catheter removal. Mean operating time was 228 ± 32 s (range 189–322 s). In all cases, the cystogram confirmed the correct placement of the catheter and the correct realignment between the bladder neck and the urethral stump. No complications have been recorded. After long-term follow-up (mean follow-up: 23.3 ± 4.6 months; range 9–61 months), the incidence of vesicourethral stricture in this group was not different from that of the group of RP patients who had not had early catheter reinsertion and who were operated in the same period of the study (4.4 vs 4.2 %, respectively; $p = 0.47$).

Discussion

Reinsertion of the catheter in the early postoperative period after RP might involve a very difficult and complex procedure. Without the support of an anatomically intact anastomosis, the catheter might follow a wrong path that brings it just behind the bladder neck and the trigone, finally causing it to be placed in a space between the posterior bladder wall and the rectum. Balloon filling may further compress the bladder neck, worsening a partial anastomotic rupture or pushing the bladder neck away from the urethral stump with a complete disruption of the anastomosis. To prevent such a complication, catheterization must be done with a guidewire that is initially placed into the bladder under urethrocystoscopy. Ultimately, a checking cystogram must be done for proof of correct catheter placement [5–7]. The whole complex procedure,

however, might be invasive, expensive, and uncomfortable for the patient just after recent RP. We started our experience by chance when we had to check a catheter balloon that was filled improperly in the space between the bladder and the rectum after insertion with a guidewire under fluoroscopy. The clear ultrasonographic view, the simple interpretation of the images, and the ease of placing the catheter in the correct direction through the bladder neck led us to systematically perform this procedure in all early recatheterizations after RP. We choose an end-fire trans-rectal ultrasound probe because of the frontal view angle. The front movements imparted to the probe are seen in the same direction on the screen. The advantage is to reach exactly the targeted anastomosis and to compress it by pushing forward the probe. In this way, it is easier to give the correct direction to the catheter across the fresh and then weakened or damaged vesicoureteral anastomosis.

Conclusion

Catheter placement across a fresh, weakened or disrupted vesicoureteral anastomosis after RP might be a very challenging procedure that potentially could even cause complete disruption, infection and fistula. These procedures often require another access in the operating room and in most of the cases is very complicated. The catheter placement under TRUS guidance, however, is safe, simple and feasible even in the patient room or in the consulting room.

We suggest catheter guidance by TRUS in all cases requiring early recatheterization after RP.

Conflict of interest Marco Raber declares that he has no conflict of interest.

Informed consent All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). All patients provided written informed consent to enrolment in the study and to the inclusion in this article of information that could potentially lead to their identification.

Human and animal studies The study was conducted in accordance with all institutional and national guidelines for the care and use of laboratory animals.

References

1. Koch MO, Nayee AH, Sloan Gardner T, Wahle GR, Bihrlé R et al (2003) Early catheter removal after radical retropubic prostatectomy: long-term follow-up. *J Urol* 169(6):2170
2. Nadu A, Salomon L, Hoznek A, Olsson LE, Saint F, de la Taille A et al (2001) Early removal of the catheter after laparoscopic radical prostatectomy. *J Urol* 166(5):1662
3. Lepor H, Nieder AM, Fraiman MC (2001) Early removal of urinary catheter after radical retropubic prostatectomy is both feasible and desirable. *Urology* 58(3):425
4. Shaw G, Ioannou I, Gelister J, Briggs T (2010) Management of vesico-urethral anastomosis disruption after radical prostatectomy. *Urol Int* 84(4):436
5. Shekarriz B, Upadhyay J, Wood DP (2001) Intraoperative, perioperative, and long-term complications of radical prostatectomy. *Urol Clin North Am* 28:639
6. Fisher RE, Koch MO (1992) Recognition and management of delayed disruption vesicourethral anastomosis in radical prostatectomy. *J Urol* 147:1579
7. Dall'Oglio M, Srougi M, Pereira D, Nesrallah A, Andreoni C, Kauffmann JR et al (2003) Rupture of vesicourethral anastomosis following radical retropubic prostatectomy. *Int Braz J Urol* 29(3):221