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PFUI-RELATED COMPLICATIONS
MINI-REVIEW

Bladder neck incompetence at posterior urethroplasty

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KEYWORDS

Bladder neck;
Incompetence;
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ABBREVIATIONS

BN, bladder neck;
PFUI, pelvic fracture urethral injury

Abstract The finding of an incompetent bladder neck (BN) at the time of posterior urethroplasty will necessarily exacerbate the already difficult situation. In such cases the aim of the treatment is not only to restore urethral continuity by end-to-end urethral anastomosis, but also to restore the function of the BN to maintain urinary continence. Fortunately, the incidence of incompetence of the BN at posterior urethroplasty is uncommon, usually ≈4.5%. It seems that pelvic fracture-related BN injuries, in contrast to urethral injuries which result from a shearing force, are due to direct injury by the sharp edge of the fractured and displaced pubic bone. The risk of injuries to the BN is greater in children, in patients with a fracture involving both superior and inferior pubic rami on the same side, and in those managed initially by primary realignment. An incompetent BN is suspected by finding an open rectangular BN on cystography, and a fixedly open BN on suprapubic cystoscopy. An incompetent BN can be treated either subsequent to or concomitant with the urethral repair, according to whether a perineal or a perineo-abdominal urethroplasty is used, respectively. Several options have been reported to treat pelvic fracture-related BN incompetence, including reconstructing the BN, forming a new sphincter by tubularisation of a rectangular flap of the anterior bladder wall, and mechanical occlusion by an artificial sphincter or collagen injection. Reconstruction of the BN by the Young-Dees-Leadbetter** procedure probably provides the most successful results.

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Introduction

The current concept is that continence of urine in patients having a pelvic fracture urethral injury

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(PFUI) repaired is maintained mainly by the bladder neck (BN), as the external sphincter is usually damaged by the initial trauma or subsequent management [1–3]. Hence, the association of an incompetent BN with a PFUI is one of the most challenging management problems in urology. In such cases the aim of treatment is not only to achieve a free urethral passage by restoring urethral continuity, but also to maintain urinary continence by restoring sphincteric function of the BN. Fortunately, this association is uncommon; it has been estimated that only ≈4.5% of patients having a PFUI repaired have an incompetent BN [4].

Causes and risk factors

It appears that pelvic fracture-related BN incompetence, in contrast to urethral injuries which result from a shearing force, is due to direct injury by the sharp edge of the fractured and displaced pubic bone [4]. Some factors have been reported to influence the risk of BN injury at the time of pelvic trauma, and include the patient's age, pattern of pelvic fracture, and type of initial management of the urethral injury [4–6]. In a previous study, it was found that about two-thirds (67%) of patients having pelvic-fracture related BN injury were boys aged < 15 years [4]. This age-linked preponderance of BN injury is probably related to the small prostates in boys that provide less protection against injury by bone fragments than in adults.

Also, the risk of BN injury might be influenced by the pattern of pelvic fracture. Almost all patients with pelvic fracture-related BN incompetence had fractures of both the superior and inferior pubic rami on the same side [4].

Furthermore, the risk of BN injury might be influenced by the type of initial management of the urethral injury. It has been reported that patients with BN incompetence had more often initially been managed by primary realignment than had patients with an intact BN (75% vs. 33%, $P < 0.05$) [4,5].

The diagnosis of BN incompetence

The diagnosis of BN incompetence in patients undergoing repair of a PFUI is not always easy, largely because these patients are usually dependent on a suprapubic catheter and no urine can be passed or leaked via the urethra. Thus, the documentation of urinary incontinence is not possible subjectively or objectively. In fact, the diagnosis in these patients has been entirely dependent on the finding of an open BN on the resting cystogram and/or a fixedly open BN on suprapubic cystoscopy. However, this is not always true. While an open BN in these patients might be the result of an intrinsic anatomical damage leading to its dysfunction, it might also be the result of normal funnelling of the BN stimulated by a detrusor contraction. This contraction can be voluntary, as during an attempt at voiding, or an involuntary uninhibited contraction because of the presence of a suprapubic catheter [7]. It is not always easy to differentiate between normal physiological funnelling of the BN and an open incompetent BN by cystography without a synchronous urodynamic study [8].

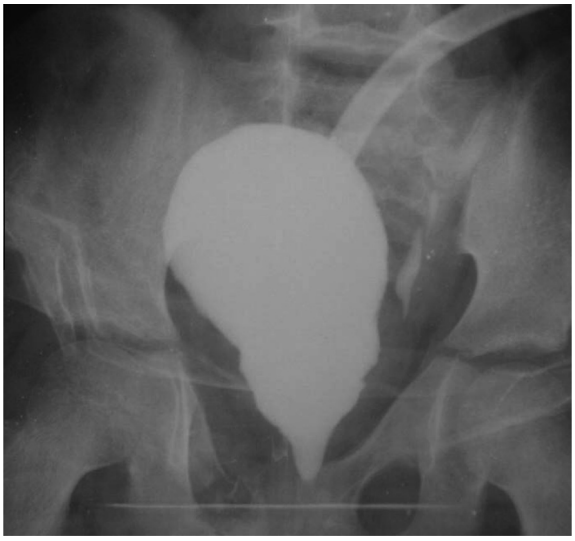

Figure 1 A preoperative cystogram at rest shows funnelling of the triangular BN. The patient was completely continent after perineal urethroplasty.

Nevertheless, Iselin and Webster [1] found that the BN opening as measured on the cystogram is significantly longer in dysfunctional than in functional cases, and suggested that this might help in the differentiation. Also, in a previous study we found that the average length of the BN opening was greater in dysfunctional than in functional cases (1.2 vs. 0.95 cm, respectively), but the difference was not statistically significant ($P > 0.05$) [4]. More importantly, the shape of the functional BN opening on the cystogram differs from that of dysfunctional cases.

In competent cases, there is always funnelling of the BN, which appears triangular, with the right and left borders converging distally (Fig. 1). This funnelling of the BN is probably due to contraction of the bladder musculature pulling on the urethral wall [9]. In incompetent cases, on the other hand, BN opening is rectangular in shape, with the right and left borders nearly parallel to each other (Fig. 2) [4]. It appears that this configuration is due to passive filling of the damaged BN from the bladder with contrast medium, which pushes its walls equally apart. This difference in shape of the BN opening might be used to predict the chance of urinary continence or incontinence after urethral reconstruction, and hence indicates the need or otherwise for a concomitant BN repair.

The timing of treatment

The timing of correction of BN incompetence in patients undergoing repair of a PFUI continues to be a