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CASE REPORT

Evaluation and surgical reconstruction of a post-traumatic urethral diverticulum of penile-bulbar urethra in a young man

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Abstract

Urethral Diverticulum (UD) is an infrequent entity in males. Urethral trauma, iatrogenic or not, is a predominant cause. In this paper, a case of a young man with a post-traumatic urethral diverticulum is presented, both the diagnostic evaluation and the surgical rehabilitation included.

Introduction

Urethral diverticulum (UD) is a localized, separated saccular dilation of the urethra, communicating with the lumen via a discrete orifice¹. While its incidence in women ranges from 0.6% to 5%², it is rare in males, with no estimated prevalence³. Although congenital forms also occur⁴, acquired UD are considered the majority, up to 90% of the cases⁵, with infection, obstruction and various traumas as the commonest etiologic factors⁶. The most common site is the penoscrotal angle⁶. In this paper, we present a case of a young male with a post-traumatic UD in the penoscrotal angle. This issue lies on the diagnostic evaluation, the surgical reconstruction and the outcome of the correction.

Case Presentation

A 28-year-old man presented to our department, 3 years after he has been suffered from a motorbike accident. The patient was polytraumatized with both sacrum and pelvic bones fractures and concomitant bladder and urethra injury. He underwent open surgery for the correction of the bladder, when suprapubic and urethral catheter were positioned, intraoperatively. Urethral catheter was re-
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moved 1 month later, while suprapubic catheter remained for further 3 months. After the removal, the patient demonstrated total incontinence, probably, due to disruption of the external sphincter.

Evaluating the condition of the urethra, an urethroscopy was performed; ventrally, in the boundary between bulbar and pendulous urethra, a saccular dilation was recognized, while the lumen was found to continue naturally dorsally (Figure 1).

The limits of the external sphincter could not be recognized and the initial hypothesis of disruption was confirmed. No other pathology, such as strictures were seen. Hereupon, the patient underwent a retrograde urethrography which demonstrated the typical image of an UD, ventrally, in the distal end of the bulbar urethra (Figure 2). The UD was judged large enough to be ignored and he patient was then scheduled for an open urethroplasty.

The patient was placed in lithotomy position. A longitudinal incision was made in the penile-scrotal junction and the urethra was revealed. The UD was then recognized as follows; a Tiemman Catheter was placed in the first cm of the urethra and water was irrigated. Simultaneously, the surgeon applied pressure in the bulbar region, causing obstruction and provoking dilatation of the diverticulum. Then, the catheter was inserted into the cavity of the diverticulum. Constant irrigation of water kept the UD dilated, mimicking retrograde urethrography (Figure 3). The sac of the UD was then separated from the overlying fascias and it was excised, leaving an elliptical defect (Figure 4). Remainders of scar tissue were excised via diligent spatulation of the borders; a spongiosum-edged defect, length of 2.5cm, appropriate for reconstruction via primary repair, was created. A Silicone Folley catheter No. 18 was then placed up to the bladder. After checking up the capacity of the urethra, the edges were sutured, distally to proximally, with absorbable sutures through a running, intradermal-like fashion, leaving the urethra completely free of foreign materials (Figure 5). The wound was closed carefully up to the skin; Buck’s and Colles’s fascia were sutured accordingly, with knots lying laterally of the urethra, giving additional support to the reconstructed area.

The Folley catheter was removed 10 days after the operation. An urethrocystoscopy was performed 4 months later, which demonstrated a constant urethral lumen. No pathology was found, while the area of urethroplasty was obviously observed as a flat region. A retrograde urethrography confirmed the final result (Figure 6).

Discussion
While Urethral Diverticulum (UD) is relatively common in women with an incidence up to 5%\(^2\), it is, to our knowledge, an infrequent condition in men of unknown incidence, with no more than 400 cases reported in the literature.

Academically, UDs are divided into congenital or acquired\(^1\), with the majority (90%) being acquired\(^5\). The most valid etiology of the former is considered
the abnormal migration of the spongy tissue, giving rise to the defective closing of the urethra, while the sac is lined by epithelium with full-thickness involvement of the urethral wall. For acquired UD, suspected mechanisms involve loss of integrity of the urethra like in cases of periurethral abscess, infection, blunt trauma, urethral stricture disease and urethral stones.

Thus, the sac is lined by granulation tissue and its wall lacks of smooth muscle fibers and contractility. In their study of 22 patients with acquired UD, Cinman et al. recognized causes like failed reconstructive procedures for hypospadias or urethral stricture, prolonged or intermittent catheterization, blunt trauma of the urethra, prior endoscopic urethroto- my or following the placement of urological materials like an artificial urinary sphincter or testicular prostheses. The mechanisms for the formation of the UD a) may be related to distal obstruction and proximally increased urethral pressure with subsequent herniation of the urethral epithelium, like in cases of failed urological procedures or b) may result from constant pressure on the penoscrotal angle, which causes ischemia, fibrosis and finally scar formation, like in cases of prolonged constant or intermittent catheterization. Probably, the sac is a fortification result due to urine extravasation in such regions. Finally, UD have been described as a complication of anorectal malformation repair procedures, occurring in 12% to 18% of cases.

The absence of contractility in the wall of the UD is responsible for the clinical manifestations: post-voiding dribbling and urinary incontinence, dysuria, a palpable penile-scrotal mass, recurrent urinary tract infections (UTIs) or calculus in the sac.

In all cases, retrograde urethrography establishes the diagnosis. Urethrocystoscopy is useful, as it provides additional information like strictures or the involvement of urological materials. Urethral ultrasonography and MRI are also proposed.

The management of UD consists of conservative and surgical approaches. In cases of uncomplicated recurrent UTIs, manual compression of the sac can be proposed and UTIs may resolve. However, if UTIs persist or calculus in the UD is present, surgical intervention is indicated. According to Allen et al., endoscopic unroofing of the diverticulum is considered a feasible solution, but it is inadvisable when surrounding support is deficient, the UD is too thick or fibrous to be adequately incised or a large poorly draining cavity is likely to be left. Moreover, this procedure is linked with increased risk of urethroc- cutaneous fistula formation and it is not suggested by other authors.

The gold standard of the repair is the open procedure, which is governed by 3 basic principles; excision of the sac, rehabilitation of the lumen and appropriate reinforcement of the repair for the prevention of an urethrocutaneous fistula. In the recent literature two studies demonstrated results by standardized approach. In the first study, Alphs et al. performed excision of the UD and primary reap- proximation in defects < 4cm regardless of location, while larger defects were covered with penile skin.
flaps or buccal mucosa graft. In another study, Cinman et al. employed primary repair in cases of UD < 3cm located in bulbar urethra, while in case of larger defects of penile location, the authors exploited the epithelium of the sac as a flap. Both studies demonstrated success rate >90% . Finally, a third approach was performed by Cinman et al., in case of large symptomatic UD, in two patients with concomitant pathology of neuropathic bladder and one patient with extensive fibrosis from pelvic radiation. Urinary diversion with ileal conduit was performed after judging that these patients were in highest risk of recurrence and complications.

In our case, the possible etiology of the UD is the blunt urethral trauma. Histology examination revealed a sac of granulation tissue with surrounding fibrous elements, pointing an acquired UD. Furthermore, the presence of total incontinence could not indicate the presence of an UD and the diagnosis incidentally emerged from the urethrocystoscopy, in terms of evaluation of the urethra's integrity. This study added information like the presence of strictures or the condition of the external sphincter and co-assisted in the determination of the surgical approach. Finally, the retrograde urethrography established the diagnosis.

Regarding the surgical technique, we chose to perform diverticulectomy with primary repair without the use of extra tissue materials (grafts or flaps). The final decision was made in the operating theater, when the urethra was checked adequately capacitated for a primary closure. The intra-dermal-like closure was chosen because it was easy to be performed, leaving minimal knots in the area. Moreover, the overlying fascias were sutured laterally of the urethra's wound, in a multi-layer fashion, in order to eliminate free spaces upon the neo-urethra and the possibility of urethra-cutaneous fistulas. We vacillate over the use of the sac as a flap, because sac consists of granulation and fibrous elements, which could subvert the reconstruction. Alternatively, if needed, ventral or dorsal onlay urethroplasty with buccal mucosa graft could be performed.

To sum up, the acquired UD, albeit rare, should be suspected in cases of urethral trauma, even if any manifestations are absent. Both retrograde urethrography and urethroscopy are extremely helpful, for the diagnosis and the determination of the therapeutic management as well. We strongly believe that the therapeutic approach should be individualized, utilizing all information given, from the time of diagnosis, up to the operating theater.
Περίληψη

Το ουρηθρικό εκκόλπωμα αποτελεί μια σπάνια οντότητα στον ανδρικό πληθυσμό. Το ουρηθρικό τραύμα, ιατρογενές ή μη, είναι μία από τις επικρατέστερες αιτίες. Στην εργασία αυτή, παρουσιάζεται η περίπτωση ενός νεαρού άνδρα με ένα μετατροπικό ουρηθρικό εκκόλπωμα, συμπεριλαμβανομένης της διαγνωστικής προσέγγισης και της χειρουργικής αποκατάστασης.

References