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## Urologic complications of diastasis of the pubic symphysis : A trauma case report

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**Somboonpanya P. Urologic complications of diastasis of the pubic symphysis : A trauma case report. Chula Med J 2001 May; 45(5): 433 - 9**

*This report describes a case with urologic complications following diastasis of the pubic symphysis caused by blunt trauma. After a motor vehicle accident, this patient passed had bright red blood through the urethral meatus, showed perineal ecchymosis and pain on pelvi compression. Retrograde urethrography revealed a posterior urethral rupture. Treatment involved location of the site of the urethral tear, and placement of a urethral stent by foley catheter, via the meatus and guided under direct vision into the bladder. Orthopedic surgeons performed internal plate fixation of the pubic diastasis. At long term follow-up, the patient had incontinence and impotence.*

*Diastasis of the pubic symphysis is unique among the various types of pelvic fractures. Its presence requires the co-operation of the trauma surgeon, orthopedic surgeon, and urologist to ensure expedient and effective treatment.*

**Key word :** *Urologic complications of diastasis of the pubic symphysis.*

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**ทูลสวัสดิ์ สมบูรณ์ปัญญา : ปัญหาแทรกซ้อนเกี่ยวกับทางเดินปัสสาวะที่เกิดจากการแยก  
ของกระดุกเชิงกราน : รายงานผู้ป่วย. จุฬาลงกรณ์เวชสาร 2544 พ.ศ; 45(5): 433 - 9**

รายงานนี้นำเสนอผู้ป่วยอุบัติเหตุทางการจราจร ซึ่งพบปัญหามีการฉีกขาดของทางเดินปัสสาวะ  
ร่วมด้วยการแยกของกระดุกเชิงกราน จะพบว่าผู้ป่วยจะมีอาการของปัสสาวะมีเลือดปน ปวดบวม  
บริเวณฝีเย็บ และการวินิจฉัยทางรังสี พบมีการฉีกขาดของทางเดินปัสสาวะ จำเป็นต้องได้รับการผ่าตัด  
ใส่สายสวนปัสสาวะคาไว้ และให้ศัลยแพทย์กระดุก ร่วมผ่าตัดยึดกระดุกเชิงกรานให้เข้าที่เดิม และอาจ  
พบปัญหาของการกลั้นปัสสาวะไม่ได้ หรือมีการไม่แข็งตัวของอวัยวะเพศตามมาได้ในภายหลัง

Pelvic fractures may vary in severity from stable disruptions that require only symptomatic treatment to severe crush or shear injuries that may require emergency fixation for treatment of accompanying hemodynamic instability. Diastasis of the pubic symphysis (open-book injury), either alone or with concomitant pelvic ring fractures elsewhere, is a variant of pelvic disruption that may have a higher predilection for genitourinary complications than the more common lateral compression/internal rotation-type injury.<sup>(1)</sup> In addition to the well-known urologic sequelae of pelvic fractures (i.e., impotence, incontinence, urethral stricture),<sup>(2)</sup> pubic diastasis has been associated with stress urinary incontinence in females, bladder and bowel hernias, and bladder interposition and perforation as a consequence of reduction.<sup>(3)</sup> Treatment of this injury requires the cooperation of the urologist and the orthopedic surgeon in the management of the patient with concomitant posterior urethral disruption. We report a case of pubic diastasis with an associated posterior urethral injury after blunt trauma and discuss its management.

### Case report

The patient was a 35 year-old man who presented to the emergency department after a motor vehicle crash in which he was a driver. At evaluation, the patient was found to be hemodynamically stable and complained of pelvic pain. Bright red blood was present at the urethral meatus, and perineal ecchymosis and edema were noted, pelvic compression was positive.

Anteroposterior radiographic examination of pelvis demonstrated separation of the pelvic

symphysis and a comminuted pelvic rami fracture. Retrograde urethrography revealed a posterior urethral rupture (Figure 1).

The patient was subsequently brought to the operating room, where the pelvis was explored through a low midline incision.

A pelvic hematoma was evacuated. The retropubic space was exposed in the midline and appeared to be intact. The prostatomembranous urethra, however, was completely disrupted; the anterior aspect of the prostate was split longitudinally, revealing the prostatic urethra. Puboprostatic ligaments were sharply transected, and a 20 F Foley catheter was inserted via the urethral meatus and guided under direct vision through the posterior urethra and into the bladder. The prostatectomy was closed, and a suprapubic cystostomy was brought out through a separate stab incision. Subsequently, orthopedic surgeons performed an internal plate fixation of the

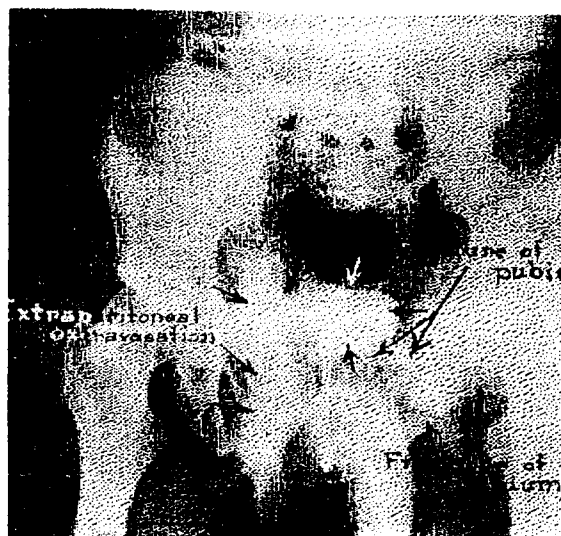


Figure 1. Retrograde urethrogram demonstrating diastasis of the pubic bone and extravasation of contrast.

pubic diastasis, followed by sacroiliac screw fixation. The patient's postoperative course was unremarkable, and he was discharged home in good condition approximately 2 weeks after injury. At 6-month follow-up, however, the patient reported total incontinence of urine and complete absence erections.

### Discussion

It has been reported that 12 to 22 % of pelvic fractures may present with associated genitourinary injuries.<sup>(4,5)</sup> Conversely, nearly all patients who present with genital or lower urinary tract injuries after blunt trauma have fractures of the bony pelvis.<sup>(1)</sup> The most common segment of the male urethra to be injured as a result of blunt pelvic trauma is the prostatomembranous portion. The membranous urethra, normally 2.0 to 2.5 cm. In length, contains both smooth and skeletal muscle, which make up portions of the internal and the external sphincters, respectively. It is believed that injury to this segment is the result of shearing forces at work: the prostatic urethra, with its puboprostatic ligamentous attachments to the pelvis, is pulled in one direction while the membranous urethra, lying within the urogenital diaphragm, is forced in another. Additionally, important structures that pass through the urogenital diaphragm along with the urethra may suffer a similar fate.<sup>(6)</sup> The paired internal pudendal arteries and veins supply and drain the penis, the pudendal nerve (S2-4) gives rise to the dorsal nerve of the penis, which gives somatic motor innervation to the bulbospongiosus and ischiocavernosus muscles, and the autonomic nerves of the pelvic plexus (S2-4) are responsible for the erectile mechanism.

The case described here represents an

unusual injury after blunt pelvic trauma: prostatomembranous urethral disruption combined with longitudinal rupture of the prostatic urethra. This may have been the direct result of the diastasis of the pubic symphysis. As the adjoining portions of the pubic ramus separated, its puboprostatic attachments pulled the dense endopelvic fascia covering the prostate apart, splitting the anterior portion of prostate in two. To better establish urethral continuity in treating this problem, it is recommended that the puboprostatic ligaments, if not already retracted, be transected to allow the bladder and posterior urethra to be repositioned deep in the pelvis.

The cause of impotence after blunt pelvic trauma has been ascribed to stretching or tearing of these neurovascular structures, although some controversy exists regarding which structure (i.e., nerve, artery, or vein) may be primarily responsible. Arterial microvascular reconstruction procedures have met with success rates of up to 78 % after demonstration of a discrete, obstructive lesion on selective arteriography. Additionally, studies using duplex sonography have demonstrated a vascular cause of impotence in 80 % of patients; in the remaining 20 % of patients, this is attributed to disruption of nervous structures.

It is a rare occurrence for a patient to present with genital or lower urinary tract injury after blunt trauma without concomitant pelvic fractures. Consultation between trauma surgeons, urologists and orthopedists should occur in pelvic trauma during, or immediately after, initial evaluation and resuscitation of the patient.<sup>(7)</sup> It is the orthopedic surgeon who will determine the need, timing and method of pelvic fixation.

In the absence of hemodynamic instability, a stable, undisplaced pubic diastasis less than 2.5 cm. does not require fixation.<sup>(6)</sup> It is recommended that a diastasis greater than 2.5 cm. Undergo either internal or external fixation. This decision is based on several factors. After a thorough evaluation to determine the presence of extrapelvic sources of ongoing hemorrhage, hemodynamic instability may be attributed to pelvic venous plexus injury or, rarely, arterial injury such as external iliac or gluteal artery disruption. The latter injuries usually present with massive hemorrhage and are best treated with angiography and selective embolization. External fixation is indicated in the hemodynamically unstable patient who has not responded to fluid resuscitation and has no obvious sources of extrapelvic bleeding.<sup>(4)</sup>

The treatment of public diastasis with concomitant posterior urethral disruption, as well as the initial management of the urethral disruption itself, remains controversial. Open reduction and internal fixation (ORIF) of pubic diastasis has been recommended when posterior urethral or bladder injuries necessitate surgical exploration. This is supported by the finding that plate fixation of open-book injuries is superior to external fixation in biomechanical laboratory testing.<sup>(7)</sup> ORIF also eliminates an external frame that may hinder exposure during laparotomy and that may interfere with patient mobility in the postoperative period. Conversely, Russell has recommended external fixation in the face of bladder or urethral injuries, citing an increased risk of secondary infection from a suprapubic cystostomy tube, which is frequently inserted at the time of urologic repair.<sup>(8)</sup> Yet others have advocated ORIF in the face of bladder or urethral injuries without the use of a

suprapubic cystostomy tube. Urethral realignment and/or bladder repair performed with simple Foley catheter urethral stenting carries only a 10% incidence of infection.<sup>(7)</sup>

Despite good arguments against suprapubic cystostomy by Routt and others,<sup>(7)</sup> there are many advantages to suprapubic cystostomy. These include: (1) the prevention of urinary clot retention (and its potentially disastrous consequences) in the postoperative period; (2) prevention of urinary extravasation from the disrupted urethra, with subsequent abscess formation; (3) ease of performing cystourethrography in follow-up evaluation; and (4) allowing the option of cut-to-the-light endoscopic urethrotomy for treatment of urethral strictures. In the last example, endoscopic treatment of severe stricture disease is facilitated by insertion of a flexible cystoscope through the suprapubic cystostomy track and into the posterior urethra. Internal urethrotomy is then performed with a cystoscope inserted retrograde through the urethral meatus, using the illumination from the antegrade cystoscope as a guide for incision.<sup>(9)</sup>

Based on the available literature, several centers have recommended immediate suprapubic cystostomy with delayed (3 months or greater) repair of the inevitable urethral stricture. The method of management has been supported by numerous studies demonstrating lower incidences of impotence, incontinence, and urethral stricture after such treatment. Although this appears to be well established in the literature, some authors have disputed these findings. The dissenting group recommends suprapubic cystostomy with primary urethral repair at the time of exploration.<sup>(10-11)</sup>

Several reports of complications unique to

pubic diastasis can be found in the literature. Herniation of the small bowel or bladder through a pubic separation is frequently the result of inadequate reduction of the pubis or untreated separations. Affected patients may complain of pubic pain with a suprapubic, transpubic, inguinal, or scrotal hernia evident. The rectus abdominis muscle may be torn from its insertion on the pubis, and these hernias frequently recur after herniorrhaphy unless anterior rectus fascia, Marlex, or Mersilene mesh is used in the repair. In fact, suspicion should be raised when an inguinal hernia recurs after repair in a patient with a previous history of pelvic fracture.<sup>(12)</sup>

Stress urinary incontinence has been described in females after pubic diastasis, presumably as a result of disruption of the ligamentous supporting structures (i.e., pubourethral ligaments, pubocervical fascia, and pelvic floor musculature) of the bladder neck and urethra. The result is a lessened intraurethral pressure increase with Valsalva maneuvers. In one case, female incontinence was eventually treated with creation of a neourethra from an anterior bladder flap.<sup>(13)</sup>

Erosion of bony fragments through the bladder mucosa, either spontaneously or as a result of interposition of bladder and perivesical tissue during external fixation, has been described.<sup>(3)</sup> Again, these patients may present with hematuria, often related to exertion, and may complain of urinary frequency, urgency, or dysuria. Plain film radiography demonstrates inadequate reduction of the diastasis, and cystography may reveal bladder herniation through the disrupted symphysis or pseudodiverticulum formation.<sup>(14)</sup> In the absence of bladder or urethral injury, it is recommended that a Foley catheter be inserted and that external fixation be performed under

fluoroscopic guidance with simultaneous instillation of radiographic contrast into the bladder to minimize the possibility of bladder entrapment.<sup>(14-15)</sup>

## Conclusions

Diastasis of the pubic symphysis is unique among the various types of pelvic fractures. Its presence requires the cooperation of the trauma surgeon, orthopedic surgeon, and urologist to ensure expedient and effective treatment. Life-threatening hemorrhage from a disrupted pelvic venous plexus may require prompt external fixation. The urologist should be aware of the possibility of bladder interposition in this setting and its prevention through fluoroscopic cystourethrography during reduction. The decision to undertake primary versus secondary repair of posterior urethral disruption remains controversial. The indications for and importance of suprapubic cystostomy after bladder or urethral disruption, however, should be considered and its risk/benefit ratio analyzed in the management of the acute blunt trauma patient.

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