Genitourinary injuries associated with pelvic fractures

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BLADDER INJURIES

The most common mechanisms of bladder injury associated with pelvic fracture are high-energy blunt trauma that disrupts the bony pelvis and direct blow to a distended bladder. When the pelvis is fractured by blunt trauma, shearing force of the disruption frequently tears the bladder at its fascial attachments. Fragments from the fracture site may also lacerate the bladder. However, the sudden force applied to a full bladder may result in an increased intravesical pressure and lead to rupture without pelvic fracture67. Extraperitoneal bladder ruptures are usually caused by distortion of the pelvic ring with cutting off of the anterior lateral wall near the bladder base. These injuries are associated with urinary leakage in the extraperitoneal compartment. Extraperitoneal bladder ruptures comprise 54-56%, of all bladder ruptures. Intraperitoneal bladder ruptures occur when the bladder is almost completely full, so direct blow to the lower abdomen may result in bladder disruption. Ruptures will usually occur at the bladder dome, because it is the weakest and the most mobile point of the bladder. If the urine is infected, urinary peritonitis may occur.

The major sign of urinary bladder injury is macroscopic hematuria which is present in 82-95% of patients, while 5-15 % of patients may have only microscopic hematuria8-11. Abdominal tenderness is present in up to 97%. Bruises over the suprapubic region are characteristic; in the cases of urinary ascites, abdominal distension and inability to void are typical. Pelvic, or lower abdominal pain is usually present. Swelling in the perineum, scrotum, and thighs, or along the anterior abdominal wall can be caused by extravasation of urine.

Disruption of pelvic vessels associated with pelvic fracture may result in heavy bleeding or even hemorrhagic shock. As a result of peritoneal reabsorption of the urine, intraperitoneal bladder rupture is associated with elevated levels of blood urea nitrogen and creatinine. Usual diagnostic procedures include abdominal ultrasonography, ret-
rograde urethrocystography (UCG), intravenous urography (IVU) or computerized tomography (CT)-urography. The last procedure is superior in the assessment of the severity of the bladder injury, pelvic hematoma and the integrity of the whole urinary tract. (Fig. 1.)

Most patients with uncomplicated extraperitoneal rupture can be managed safely by catheter drainage alone. In case of bladder neck involvement, the presence of bone fragments in the bladder wall or concomitant rectal injury, surgical intervention is a solution. Intraperitoneal bladder ruptures should be repaired by a surgical repair. Abdominal organs should be inspected for possible associated injuries and urinoma must be drained, if present.

Complications of bladder injuries are usually caused by delayed diagnosis or treatment. Extraperitoneal bladder rupture may cause a pelvic abscess. Delayed peritonitis can develop as a result of extravasation of urine into the abdominal cavity after intraperitoneal bladder rupture. The most severe complications after urethral trauma are stricture, impotence, and incontinence.

**URETHRAL INJURIES**

Urethral injuries happen more often in men. The most common mechanisms of urethral injury include external blunt trauma and penetrating trauma.

The degree of urethral injuries vary from a mild contusion, with the preservation of epithelial continuity, partial tear of the urethral epithelium, or complete transection of the urethra. Injuries of the anterior urethra are usually caused by blunt trauma, like "straddle injuries" i.e. the fall with a leg on each side of, kick in the perineum, penetrating trauma and penile fractures. On the other hand, injuries of the posterior urethra are usually associated with major and often life-threatening trauma, such as road traffic accidents, falls from heights, industrial accidents, and penetrating trauma. The male posterior urethra is injured in 4-19% in cases of pelvic fractures. The female urethra is rarely injured (0-6%), mostly by contusion or bone fragments.

In patients with posterior urethral injury, blood at the meatus is present in 37-93%. The same sign is present in about 75% of patients with anterior urethral trauma. Female patients with urethral injury and coexisting pelvic fracture may have blood at the vaginal introitus in more than 80% of cases. Initial hematuria and difficult voiding are frequent signs of urethral injury.

Penile and scrotal swelling or butterfly-like hematoma are common consequences of urethral bleeding or urinary extravasation. Rectal examination can detect a large pelvic hematoma that displaces the prostate superiorly. The diagnosis of urethral injury starts with UCG, abdominal ultrasonography and often CT-urography. The amount of urinary leakage and the appearance of the urethra are crucial for the diagnosis of urethral contusion, minimal, partial or complete rupture. (Fig. 2.)

While urethral contusion usually does not require specific treatment, initial suprapubic cystostomy is the standard of care for major straddle injuries involving the urethra. Complete rupture of the anterior urethra requires cystostomy and delayed urethral reconstruction, while complete rupture of the posterior urethra requires primary or delayed surgical reconstruction. In both circumstances, complications frequently occur. The most common complications are urethral stenosis, fistula, impotence and incontinence. Depending of the severity of the stenosis, these patients usually require various endoscopic and reconstructive procedures.

**MATERIAL AND METHODS**

Retrospective study included the patients treated in the Emergency Center, Clinical Center of Serbia, Belgrade, between 2000 and 2009. Of 7445 patients, there were 894 injuries of the urinary tract and 376 pelvic fractures; 55 patients with pelvic fractures (14.6%) had bladder or urethral injuries. There were 31 patients with bladder injuries, 22 patients with urethral injuries, and two patients with associated injuries of the posterior urethra and the bladder neck. (Crnomarkovic, 2010). Two patients had coexisting injuries of the genital organs. The average age was 44.1 years (range 17 to 77), males were most commonly affected (80.5: 19.5%). Extraperitoneal bladder rupture was more common than intraperitoneal (63%: 37%). Posterior urethra was affected in 69.2% of cases, and anterior urethra in 30.8%. The leading causes of trauma were motor vehicle accidents (60.9%) and falls from heights (26.8%).

**RESULTS**

The bladder injuries were treated by surgical exploration, cystostomy, suture of the bladder lesions and urethral catheterization. Urethral injuries were treated by primary cystostomy and urethral reconstruction and catheterization.
in 18 patients (82%), while cystofix- cystostomy was performed in four patients (18%). The last patients required delayed urethral reconstruction.

**DISCUSSION**

Pavelka et al evaluated GU injuries in 308 patients with pelvic ring fractures. They found 50 cases of GU trauma associated with pelvic ring fracture. There were 46% of patients with urethral injuries, and urinary bladder trauma was present in 12% of patients. The urethral injury resulted in erectile dysfunction in 50% of patients. Paparel et al stated that urological complications are rare after pelvic fractures. They also concluded that patients with unstable fractures (type B and C) are at the greatest risk of urological complications. The percentage of extraperitoneal bladder ruptures was higher than intraperitoneal ruptures in the majority of studies.

One of the greatest studies, based on the U.S. National Trauma Data Bank, was published by Bjurlin et al: they found 1444 patients with concomitant genitourinary (GU) injury and pelvic fracture. Men were more affected than women (66.14% vs. 33.86%), and motor vehicle collisions was the most common mechanism of injury. The study concluded that GU injuries increased overall mortality, compared with traumas without associated GU injuries.

All the authors agree that these patients require multidisciplinary approach, and that the best results were achieved in tertiary institutions.

**SUMMARY**

**UROGENITALNE POVREDE UDRIJUNE SA FRAKTURAMA KARLICE**

Uvod: Frakture karlice čine oko 3% svih povreda skeleta. Oko 15% pacijenata sa povredama karlice ima i povrede mokraće bešike i/ili uretre. Najčešći uzroci ovih povreda su saobraćajni udesi i padovi sa visine.


Rezultati: Sve povrede mokraće bešike su zbrinite hirurškom eksploracijom, suturom, cistostomijom i kate terizacijom bešike. Povrede uretre su primarno zbrinite u 82% slučajeva, dok je kod 18% plasiran cistofiks, a rekonstrukcija uretre uradljena naknadno.

Diskusija: Povrede urogenitalnog trakta povećavaju morbidity i mortalitet kod bolesnika sa frakturom karlice. Najbolji ishod lečenja se postiže ako se ovi bolesnici leže u specijalizovanim, terciarnim ustanovama.

**REFERENCES**


