Overview of Genitourinary Trauma

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Emergency departments (EDs) treat approximately 27.7 million patients per year for trauma in the United States (Pitts, Niska, Xu, & Burt, 2008). About 10% of all traumas primarily involve the genitourinary (GU) system, while another 10% to 15% of patients with abdominal trauma have concurrent GU injuries (Bent et al., 2008; Dandan & Farhat, 2009a, b; Lee, Oh, Rha, & Byun, 2007). The organs involved include the kidneys, bladder, ureters, urethra, penis, and scrotum. Female genital trauma is usually due to childbirth, female circumcision, or sexual assault; those topics are beyond the scope of this article. The purpose of this article is to examine the emergency care of patients presenting with GU trauma and males with genital trauma.

For any patient arriving in the ED, the first priority is assessing and stabilizing the ABCs – airway, breathing, and circulation – during the primary survey, along with maintaining cervical spine immobilization. The purpose of the primary survey is to identify and treat any life-threatening problems. These issues must be addressed definitively prior to assessing the rest of the patient’s injuries in the secondary survey. During the patient’s stay in the ED, the nurse must constantly re-assess the primary survey and act on any problems identified. The purpose of the secondary survey is to identify and treat all injuries (Galvin, 2005). See Table 1 for a description of the primary and secondary survey as it relates to the trauma nursing process.

Interventions designed to maintain patient airway and cervical spine, ensure optimal oxygenation, and restore or maintain adequate circulating volume are crucial. At the very least, trauma patients need cervical spine immobilization, high-flow oxygen, and two large-bore IVs with which to infuse either warmed crystalloids or blood products. Most seriously injured trauma patients will have either a nasogastric or orogastric tube to decompress the stomach. If there are no contraindications (such as...
blood at the urinary meatus or a displaced prostate), trauma patients also need a Foley catheter for hourly urine output measurements, cardiac monitoring, and continuous pulse oximetry. Maintaining normothermia is critical to prevent coagulopathies. Pain management is an important component of emergency nursing. The nurse should also prepare the patient for diagnostic testing and admission to the hospital if required (Campbell, 2007; Emergency Nurses Association [ENA], 2007; Galvin, 2005).

Table 1. Trauma Nursing Process: Primary and Secondary Survey

<table>
<thead>
<tr>
<th>Mnemonic</th>
<th>Component</th>
<th>Potential Actions</th>
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<tbody>
<tr>
<td><strong>Primary Survey</strong></td>
<td></td>
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<tr>
<td>A</td>
<td>Airway</td>
<td>Assess for and ensure a patent airway. Interventions may include positioning, oropharyngeal or nasopharyngeal airways, or may need to intubate patient. Always ensure cervical spine immobilization.</td>
</tr>
<tr>
<td>B</td>
<td>Breathing</td>
<td>Assess for and ensure adequate breathing. Interventions may include applying supplemental oxygen, utilizing an oximeter, or providing breathing with a bag-valve-mask device or ventilator.</td>
</tr>
<tr>
<td>C</td>
<td>Circulation</td>
<td>Assess for and ensure adequate circulation. Interventions may include direct pressure to bleeding sites, establishing two large-bore IVs with which to provide blood products or fluids, attaching patient to cardiac monitor.</td>
</tr>
<tr>
<td>D</td>
<td>Disability</td>
<td>Assess for general neurological status with a brief and focused examination. Most abnormalities will be addressed in the secondary survey, but if the patient shows acute deterioration in mental status, interventions are directed toward reduction of increased intracranial pressure and may include hyperventilation and rapid operative management.</td>
</tr>
<tr>
<td>E</td>
<td>Expose/environmental controls</td>
<td>The patient is fully exposed, and measures are taken to ensure the patient stays warm. Interventions may include using overhead heat lamps and warmed blankets.</td>
</tr>
<tr>
<td><strong>Secondary Survey</strong></td>
<td></td>
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<tr>
<td>F</td>
<td>Full set of vitals/ Five focused interventions</td>
<td>Obtain a full set of vital signs if not already done. Five interventions include cardiac monitor, oximeter, insertion of a Foley catheter and either oro-gastric or naso-gastric tube (if no contraindications), and facilitating laboratory studies if not already done. Facilitate family presence at the patient's bedside within institutional policies.</td>
</tr>
<tr>
<td>G</td>
<td>Give comfort measures</td>
<td>Assess and treat patient's pain and distress with either pharmacological or non-pharmacological measures.</td>
</tr>
<tr>
<td>H</td>
<td>History and head-to-toe examination</td>
<td>Obtain further patient history from one of three sources: pre-hospital personnel, the patient or significant others, or the patient's records. The head-to-toe assessment is a systematic approach to assessing the head, face, neck, chest, abdomen, pelvis, and extremities using inspection, auscultation, palpation, and percussion. Specific interventions for problems found may include applying dressings, administering a tetanus vaccination, splinting an extremity, or ordering diagnostic studies.</td>
</tr>
<tr>
<td>I</td>
<td>Inspect posterior surfaces</td>
<td>Assess for abnormalities to the patient's back and buttocks by logrolling the patient using cervical spine immobilization. Specific interventions may include assisting with a rectal examination and hemocult examination of stool, removing wet clothing or blankets, or rolling the patient off the backboard.</td>
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Patient history includes discovering the underlying mechanism of injury. There are two types of abdominal trauma: blunt and penetrating. Blunt trauma injuries result from force applied to the body without causing an open wound. Causes of blunt
Advantages
Rapid evaluation

Disadvantages
Operator dependent
Rarely finds hollow viscous injury

Results
As accurate as DPL

CT
Detailed images
Able to follow progression of non-operative cases

Expensive
Time-consuming
Patient must be hemodynamically stable
Can miss injuries especially to diaphragm and GI tract

High specificity

DPL
Rapid evaluation
Useful for difficult cases: unstable, unreliable historians

Invasive
Bleeding and infectious complications

Can have false-positive results

Note: FAST = focused abdominal sonography for trauma, CT = computerized tomography, DPL = diagnostic peritoneal lavage.

Source: Adapted from Galvin, 2005.

Renal (Kidney) Trauma

The kidneys are the GU organs most likely injured in the trauma patient, and kidney trauma is seen in 8% to 10% of patients hospitalized for abdominal trauma (Bent et al., 2008; Gervasini, 2007; Hackenschmidt, 2007; Lee et al., 2007; Shariat, Roehrborn, Karakiewicz, Dhami, & Stage, 2007). Often injured in the patient with multi-trauma, kidneys are susceptible to contusions, lacerations (fractures), and avulsion of the renal vasculature (Campbell, 2007; Rao et al., 2005), usually from blunt trauma (Dandan & Farhat, 2009a; Hackenschmidt, 2007; Lee et al., 2007; Rao et al., 2005). Kidney trauma should be suspected in individuals with chest, abdominal, or back injury (Campbell, 2007). Nurses should be especially alert for renal trauma because it is often missed (Rao et al., 2005). Children are more prone to kidney injury than adults because their kidneys are more mobile, more forward anatomically, are larger compared to body size, and are not as protected by fat (Campbell, 2007; Lee et al., 2007; Rzucidlo & Shirk, 2004).

Clinical Manifestations and Diagnostic Testing

Specific signs and symptoms of renal trauma include Grey- Turner’s sign (ecchymosis in the flank area), abdominal or flank tenderness or pain, possibly a
palpable mass, and hematuria. Renal trauma is suspected with hematuria and is confirmed with imaging studies (CT), although the trend is toward performing fewer CTs (Al-Qudah & Santucci, 2006; Bernard, 2009; MacDougal, 2005; Malcomb et al., 2008; Rao et al., 2005). Kidney injuries are graded on a 1 to 5 scale (see Table 3). Nurses must ensure complete and accurate assessments of patients with renal trauma; relying on abdominal findings to signify continued or increased bleeding may lead to shock. Since the kidneys are retroperitoneal organs, abdominal signs will be a late finding (Hackenschmidt, 2007).

**Treatment and Nursing Care**

Treatment has also become more conservative. Injuries graded I to III can usually be managed with bed rest, increased fluid intake, possible antibiotics, and close observation. Pain medication without antiplatelet effects is preferred, especially if there is hematuria (Al-Qudah & Santucci, 2006). Lacerations can often be managed conservatively, with only grades IV and V usually needing surgery (Bent et al., 2008; Campbell, 2007; MacDougal, 2005; Rao et al., 2005). The goal is to repair the kidney if possible; total nephrectomy is only necessary if the vasculature is completely avulsed and the kidney is ischemic, or if the kidney is the site of life-threatening uncontrollable hemorrhage (Master & McAninch, 2006; Rao et al., 2005). Thrombosis of the renal vein or artery is treated by angiography with embolization (Rao et al., 2005). Complications of renal trauma include urine extravasation (most common), infection, abscesses, urinoma formation, secondary hemorrhage, hypertension, “Page” kidney (scarring leading to hypertension), hydronephrosis, calculi, and chronic pyelonephritis. The latter four complications are usually seen after four weeks (Al-Qudah & Santucci, 2006; MacDougal, 2005; Rao et al., 2005).

Treatment of complications is straightforward. Urine extravasation is diagnosed with IVP or CT scan and usually resolves on its own. Urinomas (urine-filled cysts or collections of urine) occur after extravasation. Most are self-limiting, but either draining the cyst itself or placing a retrograde stent need to be drained. Post-traumatic hypertension can occur via several mechanisms, but all have in common decreased renal blood flow leading to the production of renin and the activation of the renin-angiotensin system. Conservative treatment is recommended with the fewest possible medications because this may clear spontaneously. For resistant cases, revascularization or even total nephrectomy may be required (Al-Qudah & Santucci, 2006).

Nursing care specific for the patient with renal trauma includes obtaining a past medical history with an emphasis on prior renal disease or hypertension. The patient with a solitary kidney presents a special challenge. The nurse should assess for pain, particularly at the costovertebral angle, and hematuria. The patient may have a flank mass or hematoma and/or abdominal or back pain (Campbell, 2007).

**Ureter Trauma**

**Clinical Manifestations and Diagnostic Testing**

The ureters are hollow organs and rarely injured from blunt trauma (Dandan & Farhat, 2009b). They are more often injured as a result of penetrating trauma, including pelvic fracture (Bent et al., 2008; Gervasini, 2007; MacDougal, 2005). Clinical findings are often vague or nonspecific; hematuria may be the only suspicious finding (Bent et al., 2008). Diagnosis of ureteral injury is made with CT scan.

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**Table 3. Kidney Injuries**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
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<tbody>
<tr>
<td>I</td>
<td>Renal contusion with microscopic hematuria; urological studies normal Subscapular hematoma, not expanding with no parenchymal laceration</td>
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<tr>
<td>II</td>
<td>Perirenal hematoma, not expanding, confined to renal retroperitoneum Laceration less than 1 cm parenchymal depth of renal cortex without urinary extravasation</td>
</tr>
<tr>
<td>III</td>
<td>Laceration greater than 1 cm parenchymal depth of renal cortex without collecting system rupture or urinary extravasation</td>
</tr>
<tr>
<td>IV</td>
<td>Laceration through the cortex, medulla, and collecting system Main renal artery or vein injury with contained hemorrhage</td>
</tr>
<tr>
<td>V</td>
<td>Laceration resulting in a completely shattered kidney Avulsion of the renal hilum, devascularizing the kidney</td>
</tr>
</tbody>
</table>

**Note:** Advance one grade for bilateral injury up to grade III.

**Sources:** Used with permission from Moore et al., 1989.
Treatment and Nursing Care

Treatment includes operative repair or stenting if the disruption is less than 50% of the diameter of the ureter (Bent et al., 2008; Gervasini, 2007).

Bladder Trauma

Clinical Manifestations and Diagnostic Testing

The bladder is a hollow organ that may rupture as a result of blunt trauma (Gervasini, 2007; MacDougal, 2005). Bladder injuries can be intraperitoneal (from penetrating trauma or bladder rupture); extraperitoneal, which is associated with pelvic fractures (Dandan & Farhat, 2009b); or combined (Campbell, 2007). The amount of urine contained in the bladder at the time of injury may be directly related to the risk of rupture. However, the bladder is more likely to be injured as a result of penetrating trauma, often by bony fragments from pelvic fractures (MacDougal, 2005). Approximately 80% of bladder trauma is related to pelvic fracture (Bent et al., 2008; Campbell, 2007). Gross hematuria is the classic finding for bladder rupture (Bent et al., 2008). Nurses should suspect a bladder injury when the patient continues to be oliguric, despite adequate fluid volume replacement, or if the patient who is not hypovolemic is unable to void after the injury (Dandan & Farhat, 2009b; MacDougal, 2005). Suprapubic abdominal pain may be assessed. Other findings can include bruising or edema of the lower abdomen, perineum, or genitalia (Dandan & Farhat, 2009b). Only 2% of bladder ruptures are seen in isolation, so these patients require expert assessments to find other injuries (Campbell, 2007). Diagnosis is best made with a cystogram, with or without CT (Bent et al., 2008).

Types of bladder injuries are shown in Table 4.

Urethral Trauma

Clinical Manifestations and Diagnostic Testing

Because of the exposed nature of the male urethra, men are more likely to suffer injuries to this organ (Dandan & Farhat, 2009a; Gervasini, 2007). The urethra is composed of anterior and posterior segments. The anterior urethra is most often injured by straddle injuries. Posterior urethral injuries usually result from pelvic fractures (Campbell, 2007; Dandan & Farhat, 2009a; MacDougal, 2005). Direct blows to the peritoneum can also result in urethral injuries (Campbell, 2007). Less common etiologies include mutilation or instrumentation (Campbell, 2007). Classic signs of urethral trauma include blood at the urinary meatus and a displaced or high-riding prostate gland on digital rectal examination, both of which are contraindications for catheterization (Bent et al., 2008; Dandan & Farhat, 2009a; Gervasini, 2007; MacDougal, 2005). The patient may also have edema, ecchymosis, and hematoma of the perineum if the injury is to the anterior segment (Bent et al., 2008; Dandan & Farhat, 2009a). Com-

Table 4. Bladder Injuries

<table>
<thead>
<tr>
<th>Grade I</th>
<th>Hematoma or contusion</th>
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<tbody>
<tr>
<td>Grade II</td>
<td>Extraperitoneal bladder wall laceration less than 2 cm</td>
</tr>
<tr>
<td>Grade III</td>
<td>Extraperitoneal bladder wall laceration greater than 2 cm</td>
</tr>
<tr>
<td>Grade IV</td>
<td>Intraperitoneal bladder wall laceration less than 2 cm</td>
</tr>
<tr>
<td>Grade V</td>
<td>Intraperitoneal or extraperitoneal bladder wall laceration extending into the bladder neck or urethral orifice</td>
</tr>
</tbody>
</table>

Source: Used with permission from Moore et al., 1992.
plete ruptures are seen more often in children because their urethras are less elastic (Campbell, 2007). Complete urethral tears can be prevented by avoiding Foley catheterization in patients with blood at the urinary meatus, although this practice has come under some criticism as being unfounded (Bent et al., 2008; Campbell, 2007; Dandan & Farhat, 2009a). Patients may complain of inability to void (Dandan & Farhat, 2009a). Common diagnostic imaging includes CT, cystogram, or a retrograde urethrogram.

Treatment and Nursing Care

Treatment will vary depending on the extent and location of the injury (Gervasini, 2007). Specific assessments include suprapubic, perineal or genital pain (particularly associated with urination), and inspection and palpation for bladder distention. Nurses should prepare to assist with suprapubic catheterization (Campbell, 2007).

Injuries to the External Genitalia

Clinical Manifestations and Diagnostic Testing

The penis, scrotum, and testes are all vulnerable to both blunt and penetrating traumatic injury. Treatment for minor to moderate injury includes elevation with towels and cold packs (Gervasini, 2007). Testicular injuries include contusions or rupture from blunt trauma. Scrotal trauma often includes penetrating wounds, burns, or avulsions. The penis is subject to diverse injuries, including zipper injuries, fractures (rupture of the corpus cavernosum), amputations, or strangulations. External genitalia are at risk for injury from human or animal bites. Common symptoms include pain; swelling; ecchymosis; and a tender, firm, scrotal mass that doesn’t transilluminate. A fracture of the penis is often accompanied by a cracking sound, extreme pain, and marked swelling. The penis will also appear deformed (Merck, 2007).

For testicular injury, an ultrasound is the most accurate diagnostic tool (Gervasini, 2007). A retrograde urethrogram should be performed for penile injuries to rule out urethral involvement (Merck, 2007).

Treatment and Nursing Care

Treatment includes operative interventions for testicular rupture, penile fractures, or penetrating trauma. Attempts to reattach the amputated penis should be made if the amputated part was salvaged and maintained properly. Zipper injuries should be treated by removing the zipper. Health care providers may try one attempt at unzipping the zipper after it has been well-lubricated with mineral oil. If this is unsuccessful, use a sturdy wire cutter (a diagonal cutter) to cut the cross bar that goes across the top of the zipper (the bar that attached both sides of the zipper). Once cut, the two plates will fall apart, and the teeth will pull away from the skin (see Figure 1) (Merck, 2007). Bite wounds need to be cleansed, and the patient should be given appropriate prophylactic antibiotics. In any penetrating injury, the nurse should assess when the patient’s last tetanus booster shot was given; if longer than five years, the patient needs one in the ED. Rabies prophylaxis should be given for bites from animals prone to carrying the disease, and law enforcement should be notified for human bites that may be of a criminal nature.

Conclusion

Renal injuries present distinct challenges to emergency nursing staff. The “characteristic” signs and symptoms of specific injuries are not always present. Knowing the mechanism of injury can facilitate appropriate diagnosis of a genitourinary injury. A patient with renal trauma is often a patient with multisystem trauma who may be critically injured and have life-threatening problems that must be addressed prior to the definitive care of the renal injury. Patients and their loved ones are stressed as well and need astute psychosocial care in addition to expert physical care. Being prepared to respond to the patient with renal trauma greatly enhances the chances for the patient to have a positive outcome.

References


Additional Reading