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UROTRAUMA GUIDELINE 2020: AUA Guideline

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MeSH terms: Urologic injuries, urotrauma

ABBREVIATIONS

AUA	American Urological Association
PFUI	Pelvic Fracture Urethral Injury
SPT	Suprapubic Tube
MRI	Magnetic Resonance Imaging

ABSTRACT

Purpose: The authors of this guideline reviewed the urologic trauma literature to guide clinicians in the appropriate methods of evaluation and management of genitourinary injuries.

Materials and Methods: The Panel amended the Guideline in 2020 to reflect additional literature published through February 2020. When sufficient evidence existed, the Panel assigned the body of evidence a strength rating of A (high), B (moderate), or C (low) for support of Strong, Moderate, or Conditional Recommendations. In the absence of sufficient evidence, the Panel provided additional information as Clinical Principles and Expert Opinions (See Table 1).

Results: The Panel updated a total of six existing statements on renal, ureteral, bladder, urethra, and genital trauma. Additionally, four new statements were added based on literature released since the 2017 amendment. Statement 5b was added based on new evidence for treatment of hemodynamically unstable patients with renal trauma. Statement 20b was added based on new literature for percutaneous or open suprapubic tube placement following pelvic fracture urethral injury. Statements 30a and 30b were also added to provide guidance on ultrasonography for blunt scrotal injuries suggestive of testicular rupture and for performing surgical exploration with repair or orchiectomy for penetrating scrotal injuries respectively.

Conclusions: These evidence-based updates to the AUA Guidelines further inform the treatment of urotrauma.

BACKGROUND

Trauma refers to injury caused by external force from a variety of mechanisms, including traffic- or transportation-related injuries, falls, assault (e.g., blunt weapon, stabbing, gunshot), explosions, etc. Injuries are frequently referred to as being either blunt or penetrating injuries as these different basic mechanisms have implications for management and outcomes. Blast injuries may have features of both penetrating and blunt trauma, and are most common in settings of war or violent conflict.

Traumatic injuries are the leading cause of death in the United States for people ages 1-44 years, and a significant cause of morbidity and loss of productive life across all ages.[1] Worldwide, traumatic injuries are the sixth leading cause of death and the fifth leading cause of moderate and severe disability.[2] Young males ages 15-24 have the greatest burden of injury.[3] Isolated urologic injuries are uncommon in major trauma as the kidneys, ureters, and bladder are well protected within the abdomen and pelvis, and the penis and testes are physically mobile. Urologic injuries are more common in the multiply-injured patient, and urologic organs are involved in approximately 10% of abdominal traumas.[4]

In April 2020, the Urotrauma guideline was updated through the AUA amendment process in which newly published literature is reviewed and integrated into previously published guidelines in an effort to maintain currency. The amendment allowed for the incorporation of additional literature released since the initial publication of this guideline in 2014 and built on the updated literature review conducted in 2017. Comprehensive searches of several databases from August 2016 to February 2020 were conducted. The search strategy was designed and conducted by an experienced librarian with input from the study's principle investigator. Controlled vocabulary supplemented with keywords was used to search for studies on treatment and management of urotrauma.

The search yielded 6,241 references, of which 5,670 were excluded after a first pass abstract and title review. A second pass of the abstracts and titles excluded an additional 490 studies. Eventually, 81 studies provided relevant data on the specific treatment for urotrauma. Based on these 81 studies plus 41 studies identified by the amendment process in 2017, seven proposed recommendation changes were further investigated. Full text review was conducted on 84 studies that potentially informed on the seven statement changes. Following review, the evidence base consisted of 31 studies, which underwent quality assessment using validated study-type specific risk of bias tools (systematic reviews, AMSTAR ; cohort studies, ROBINS-I). The certainty of the evidence base informing each statement alteration was assessed using GRADE and then translated into the AUA 3-tiered strength of evidence grading system.

GUIDELINE STATEMENTS

Renal Trauma

Guideline Statement 4.

4. **In hemodynamically stable patients with renal injury, clinicians should use non-invasive management strategies. (Standard; Evidence Strength: Grade B)**

Statement 4 was edited to define the patient population more clearly by stating "in hemodynamically stable patients with renal injury." The supporting text to this statement did not change.

Guideline Statement 5a.

5a. **In hemodynamically unstable patients with no or transient response to resuscitation, the surgical team must perform immediate intervention (surgery or angioembolization in selected situations). (Standard; Evidence Strength: Grade B)**

Statement 5a was edited to define the patient population more clearly by stating "in hemodynamically unstable patients." The supporting text to this statement did not change.

Guideline Statement 5b.

5b. **For hemodynamically unstable patients with radiographic findings of large perirenal hematoma (> 4 cm) and/or vascular contrast extravasation in the setting of deep or complex renal laceration (AAST Grade 3-5), surgeons should perform immediate intervention (angioembolization or surgery). (Recommendation; Evidence Strength; Grade C)**

Statement 5b was added based on new evidence.

Perinephric hematoma size provides a rough radiographic estimate of the magnitude of renal bleeding, and increasing hematoma size has been incrementally associated with higher intervention rates. For a 4 cm hematoma, the rate of intervention is elevated roughly 10 times (from 1.7 to 16.2%), and for a 6 cm perinephric hematoma, the rate of intervention rises roughly 20 times (to 31.1%). Intravascular contrast extravasation is another common radiographic indicator of active bleeding at various intra-abdominal sites.[5,6]

Ureteral Trauma

Guideline Statement 11c.

Clinicians should initially manage patients with ureterovaginal fistula using stent placement when possible. In the event of stent failure, clinicians may pursue additional surgical intervention. (Recommendation; Evidence Strength; Grade C)

Statement 11c was edited and supporting text was added based on stent failure. This statement also upgraded from an Expert Opinion to an evidence-based statement.

In women who undergo vaginal surgery (such as hysterectomy) or sustain penetrating pelvic trauma involving the vagina, an initially unrecognized ureteral injury can present in a delayed manner as a ureterovaginal fistula. Patients with ureterovaginal fistula should be initially managed with ureteral stent insertion, and ureteral reimplantation can be pursued if stent placement fails. Recent studies of patients with ureterovaginal fistula who are initially managed with ureteral stent placement report success rates of 64%-100% in six series ranging from 11 to 46 patients.[7-12] Patients who failed with ureteral stent insertion went on to undergo ureteral reimplantation with or without Boari flap or psoas hitch, or transureteroureterostomy with success rates approaching 100%.[7-12]

Bladder Trauma

Guideline Statement 16.

Clinicians should perform catheter drainage as treatment for patients with uncomplicated extraperitoneal bladder injuries. (Recommendation; Evidence Strength: Grade C)

Supporting text for statement 16 was edited to include new evidence.

Uncomplicated extraperitoneal bladder injuries can be managed using urethral catheter drainage with the expectation that the injury will heal with conservative management.[13-20] Leaving the catheter in place two to three weeks is standard as most uncomplicated bladder injuries will heal within that time frame. Significant concurrent injuries may delay catheter removal due to patient condition. Follow-up cystography should be used to confirm that the extraperitoneal bladder injury has healed after treatment with catheter drainage.[18] Strong consideration for open repair is appropriate in those patients with non-healing bladder injuries who are unresponsive to catheter drainage greater than four weeks.

Urethral Trauma

Guideline Statement 20b.

Clinicians should perform percutaneous or open suprapubic tube (SPT) placement as preferred initial management for most pelvic fracture urethral injury (PFUI) cases. (Recommendation; Evidence Strength: Grade C)

Statement 20b was added based on new evidence.

In the setting of pelvic fracture-associated urethral disruption, SPT remains the gold standard for urinary drainage.[21-24] Suprapubic tube (SPT) placement facilitates the treatment of PFUI as the first step for both delayed, definitive urethroplasty and primary endoscopic realignment. SPT may be placed percutaneously or via open technique, and a Foley latex catheter 14 Fr or larger is preferred due to ease of exchange at the bedside. Small caliber percutaneous catheters 12 Fr or less often require replacement or upsizing in the setting of hematuria, prolonged use, or in anticipation for future definitive surgical repair. Bladder localization techniques such as aspiration with an 18 G spinal needle or imaging with ultrasound or fluoroscopy may facilitate percutaneous SPT insertion if the bladder is displaced due to pelvic hematoma. Most PFUI patients will develop obliterative strictures which are amenable to open posterior urethroplasty which has a high probability of success at most referral centers. Primary endoscopic realignment has been associated with a longer clinical course due to multiple procedures required for recurrent obstruction over an extended timeline.[24,25]

Genital Trauma

Guideline Statement 28.

Clinicians may perform ultrasound in patients with equivocal signs and symptoms of penile fracture. (Recommendation; Evidence Strength: Grade C)

Supporting text on ultrasound and magnetic resonance imaging (MRI) was added to statement 28. This statement also upgraded from an Expert Opinion to an evidence-based statement.

Patients with equivocal signs of penile fracture may undergo imaging as an adjunct study to assist with confirmation or exclusion of the diagnosis of penile fracture.[26,27] Ultrasound is the most commonly used imaging modality due to wide availability, low cost, and rapid examination times.[28,29] Routine ultrasound is not necessary in penile fracture cases when the diagnosis is clear. MRI can be considered alternatively in cases when ultrasound proves to be equivocal or unavailable.[30,31] If imaging is equivocal or diagnosis remains in doubt, surgical exploration should be performed.

Guideline Statement 30a.

For blunt scrotal injuries, clinicians should perform scrotal ultrasonography for most patients having findings suggestive of testicular rupture. (Recommendation; Evidence Strength: Grade C)

Statements 30a and 30b are new statements based on recently released literature.

Clinical examination of the scrotum following trauma can be limited due to significant scrotal swelling and patient discomfort. Scrotal ultrasound can reliably diagnose testicular rupture with a high level of accuracy in the setting of blunt scrotal trauma.[32,33] The most specific findings on ultrasonography are loss of testicular contour and heterogeneous echotexture of parenchyma, which should prompt testicular

repair.[32] Prompt surgical exploration is indicated with sonographic findings of testicular rupture, equivocal imaging, large hematoma, or clear physical findings of testicular rupture, which results in testicular salvage rates of 80–90%.[32,34]

Guideline Statement 30b.

For most penetrating scrotal injuries, clinicians should perform prompt surgical exploration with repair or orchiectomy (when non-salvageable) given the high rate of testicular injury and limited sensitivity of ultrasound in this setting (Recommendation; Evidence Strength: Grade C)

Penetrating injuries to the scrotum require prompt exploration with debridement and primary repair of the tunica albuginea or orchiectomy, as series demonstrate a > 50% rate of testicular injury.[35,36] Clinicians should maintain a high level of clinical suspicion for concomitant injury to the spermatic cord structures, contralateral testicle, penile corporal bodies, and urethra.[35] The utility of scrotal ultrasound for the evaluation of testicular rupture in the setting of penetrating scrotal trauma is limited.[37]

Guideline Statement 30c.

Surgeons should perform scrotal exploration and debridement with tunical closure (when possible) or orchiectomy (when non-salvageable) in patients with suspected testicular rupture. (Standard; Evidence Strength: Grade B)

Statement 30c remained the same but the supporting text was updated.

Testicular rupture after blunt or penetrating scrotal injuries may be suggested by scrotal ecchymosis and swelling or difficulty in identifying the contours of the testicle on physical exam. Early exploration and repair may prevent complications, such as ischemic atrophy of the testis and infection. Repair of the ruptured testis by debriding non-viable tissue and closing the tunica albuginea is preferred when possible. Tunica vaginalis flap or graft may be used to provide closure when the tunica albuginea cannot be closed primarily.[38]

FUTURE DIRECTIONS

As the field of genitourinary reconstruction continues to evolve, clinicians must strive to approach clinical problems in a creative, multi-disciplinary, evidence-based manner to ensure optimal outcomes. Further research is needed to clarify which radiographic indicators of renal injuries can be used to facilitate selection of appropriate candidates for angiographic embolization. Complex ureteral defects are increasingly amenable to robotic repair, and further study is needed to clarify the role of classic reconstructive techniques, such as Boari flap, ileal ureter, and downward nephropexy in the robotic era. Evaluation of the existing literature does not demonstrate conclusively whether or when PR of urethral disruption injuries is advantageous over initial SP urinary diversion alone followed by definitive delayed urethroplasty. Similarly, the role of SPT placement remains controversial in pelvic fracture urethral injury patients who are candidates for internal pubic fixation procedures. Genital injuries are rarely life

threatening, but they often become the male trauma patient's chief concern once acute issues are resolved. Plastic surgical principles offer an important guide for optimal genital cosmesis and function. Further study is needed in the areas of tissue engineering, tissue glues, and wound healing biology to optimize outcomes.

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TABLE 1: AUA Nomenclature Linking Statement Type to Level of Certainty, Magnitude of Benefit or Risk/Burden, and Body of Evidence Strength

	Evidence Strength A (High Certainty)	Evidence Strength B (Moderate Certainty)	Evidence Strength C (Low Certainty)

Strong Recommendation (Net benefit or harm substantial)	Benefits > Risks/Burdens (or vice versa) Net benefit (or net harm) is substantial Applies to most patients in most circumstances and future research is unlikely to change confidence	Benefits > Risks/Burdens (or vice versa) Net benefit (or net harm) is substantial Applies to most patients in most circumstances but better evidence could change confidence	Benefits > Risks/Burdens (or vice versa) Net benefit (or net harm) appears substantial Applies to most patients in most circumstances but better evidence is likely to change confidence (rarely used to support a Strong Recommendation)
Moderate Recommendation (Net benefit or harm moderate)	Benefits > Risks/Burdens (or vice versa) Net benefit (or net harm) is moderate Applies to most patients in most circumstances and future research is unlikely to change confidence	Benefits > Risks/Burdens (or vice versa) Net benefit (or net harm) is moderate Applies to most patients in most circumstances but better evidence could change confidence	Benefits > Risks/Burdens (or vice versa) Net benefit (or net harm) appears moderate Applies to most patients in most circumstances but better evidence is likely to change confidence

Conditional Recommendation (No apparent net benefit or harm)	Benefits = Risks/Burdens Best action depends on individual patient circumstances Future research unlikely to change confidence	Benefits = Risks/Burdens Best action appears to depend on individual patient circumstances Better evidence could change confidence	Balance between Benefits & Risks/Burdens unclear Alternative strategies may be equally reasonable Better evidence likely to change confidence
Clinical Principle	A statement about a component of clinical care that is widely agreed upon by urologists or other clinicians for which there may or may not be evidence in the medical literature		
Expert Opinion	A statement, achieved by consensus of the Panel, that is based on members clinical training, experience, knowledge, and judgment for which there is no evidence		