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European Association of Urology

Guidelines

Review of the Current Management of Upper Urinary Tract Injuries by the EAU Trauma Guidelines Panel

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Abstract

Context: The most recent European Association of Urology (EAU) guidelines on urological trauma were published in 2014.
Objective: To present a summary of the 2014 version of the EAU guidelines on upper urinary tract injuries with the emphasis upon diagnosis and treatment.
Evidence acquisition: The EAU trauma guidelines panel reviewed literature by a Medline search on upper urinary tract injuries; publication dates up to December 2013 were accepted. The focus was on newer publications and reviews, although older key references could be included.
Evidence synthesis: A full version of the guidelines is available in print and online. Blunt trauma is the main cause of renal injuries. The preferred diagnostic modality of renal trauma is computed tomography (CT) scan. Conservative management is the best approach in stable patients. Angiography and selective embolisation are the first-line treatments. Surgical exploration is primarily for the control of haemorrhage (which may necessitate nephrectomy) and renal salvage. Urinary extravasation is managed with endourologic or percutaneous techniques. Complications may require additional imaging or interventions. Follow-up is focused on renal function and blood pressure. Penetrating trauma is the main cause of noniatrogenic ureteral injuries. The diagnosis is often made by CT scanning or at laparotomy, and the mainstay of treatment is open repair. The type of repair depends upon the severity and location of the injury.
Conclusions: Renal injuries are best managed conservatively or with minimally invasive techniques. Preservation of renal units is feasible in most cases. This review, performed by the EAU trauma guidelines panel, summarises the current management of upper urinary tract injuries.
Patient summary: Patients with trauma benefit from being accurately diagnosed and treated appropriately, according to the nature and severity of their injury.

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1. Introduction

This paper is a comprehensive review of the current methods of diagnosis and treatment of injuries to the upper urinary tract (kidney and ureter). Iatrogenic injuries were covered fully in a previous publication by this group [1] and thus are excluded from this paper.

2. Evidence acquisition

The panel reviewed the English-language literature via a Medline search (publication dates up to December 2013) with the focus on newer publications, although some older key references are included. A full version of the latest European Association of Urology (EAU) guidelines on the management of urologic trauma is available in print [1] and online (www.uroweb.org).

3. Evidence synthesis

3.1. Kidney

3.1.1. Incidence and aetiology

Renal injuries occur in 1–5% of all trauma cases and are classified as blunt (90–95% in rural settings) or penetrating (40% in urban settings) [2]. The kidney is the most commonly injured genitourinary organ at all ages, with a male:female ratio of 3:1 [3]. Mechanisms include road traffic accidents (about 50%), falls (16%), sports (direct blow to the flank or abdomen), and assault. Sudden deceleration or a crash injury may result in contusion and laceration of the parenchyma and/or collecting system or, more rarely, in a vascular injury. Penetrating injuries (eg, gunshot and stab wounds) produce direct tissue disruption and are usually more severe.

The classification system of the American Association for the Surgery of Trauma is recommended [4] (Table 1). It is based on abdominal computed tomography (CT) or direct exploration and is able to predict the need for intervention, morbidity after blunt or penetrating injury, and mortality after blunt injury [5].

Table 1 – American Association for the Surgery of Trauma renal injury grading scale

Grade *	Description of injury
1	Contusion or nonexpanding subcapsular haematoma No laceration
2	Nonexpanding perirenal haematoma Cortical laceration <1 cm deep without extravasation
3	Cortical laceration >1 cm without urinary extravasation
4	Laceration: through corticomedullary junction into collecting system or Vascular: segmental renal artery or vein injury with contained haematoma, or partial vessel laceration, or vessel thrombosis
5	Laceration: shattered kidney or Vascular: renal pedicle or avulsion

* Advance one grade for bilateral injuries up to grade 3.

3.1.2. Diagnosis

Injury should be suspected in a rapid-deceleration event or a direct blow to the flank. Pre-existing disease (eg, hydronephrosis, calculi, cysts, tumours) makes injury more likely [6]. Haemodynamic stability is the basis for management, so vital signs should be monitored. Physical examination may reveal a wound to the lower thoracic back, flanks, and upper abdomen, or bullet entry or exit wounds. Blunt trauma to the back, flank, lower thorax, or upper abdomen with haematuria; pain; ecchymoses; abrasions; fractured ribs; abdominal distension; and/or mass and tenderness are strong indications of injury.

Urinalysis, haematocrit, and baseline creatinine level are necessary tests. Haematuria is an indicator of renal injury but may be due to trauma elsewhere in the urinary tract. Major injury (eg, disruption of the ureteropelvic junction, pedicle injuries, segmental arterial thrombosis, and stab wounds, in approximately 9% of patients) may occur without haematuria. Urine dipstick is a reliable and rapid test. Most patients are evaluated within 1 h of injury, so creatinine measurement reflects renal function prior to the injury [7].

Indications for radiographic evaluation are visible haematuria, nonvisible haematuria with hypotension, or major associated injuries [8]. Patients with a rapid-deceleration injury need immediate imaging to rule out ureteral avulsion or pedicle injury. Stable patients with nonvisible haematuria after blunt trauma have a low likelihood of significant injury [9]. Patients with penetrating trauma to the torso have a high incidence of significant injuries and imaging should be performed regardless of the degree of haematuria.

Ultrasound can identify who requires a more detailed investigation, and it is useful for the follow-up of parenchymal lesions, haematomas, and urinomas but cannot accurately assess renal lacerations [10].

Intravenous pyelography (IVP) is inferior to currently available CT imaging [11]. It may demonstrate nonfunction or extravasation. During emergency laparotomy, a one-shot IVP (bolus intravenous injection of 2 ml/kg contrast followed by a single plain film after 10 min) may provide information on the presence and function of the contralateral kidney [12].

CT scanning is recommended for the assessment of stable patients. It defines the location and severity of renal and associated injuries [11]. Central parahilar haematoma increases the possibility of pedicle injury even if the parenchyma is well enhanced. Excretory phase scans should be performed to rule out injuries to the collecting system. CT imaging is also valuable in patients with gunshot wounds (GSWs) who are being considered for nonoperative management [13].

3.1.3. Treatment

Hospitalisation or prolonged observation after a normal CT scan is unnecessary in most cases, as well as in grade 1 and 2 injuries, whether due to blunt or penetrating trauma. Expectant treatment of grade 3 injuries is strongly recommended [14]. Supportive care with bed rest and observation is the treatment of choice for stable patients and is associated with a lower rate of nephrectomy, without any increase in morbidity.