23 Genitourinary Tract Trauma

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23.1 Introduction

Trauma is the most common cause of morbidity and mortality in the pediatric population beyond 1 year of age (Stein et al. 1994; McAleer and Kaplan 1995). In children with multiple injuries, genitourinary tract trauma is second in frequency only to central nervous system trauma (Currarino et al. 1993). In children with genitourinary tract trauma, renal parenchymal lesions are the most prevalent injuries. Blunt abdominal trauma affects the liver and the spleen more often than the kidney (McCarty 1996; Taylor 1999). Renal injuries are more often due to blunt than to penetrating trauma and are caused by motor vehicle accidents, falls, and reckless play or sport activities (Mandour et al. 1981; Currarino et al. 1993). Rarely, the kidney may be injured by child abuse or renal biopsy (Perale 1992). Fortunately, the great majority (up to 95%) of renal injuries (Novelline et al. 1999) are minor lesions such as contusions or cortical lacerations that do not require surgical repair (Novelline et al. 1999), but can be treated conservatively. The current tendency is to manage even major lesions conservatively in stable patients because they tend to heal uneventfully in nearly all cases (Smith et al. 1993; Matthews and Spirnak 1995; Morey et al. 1996).

Imaging renal trauma in children is a complex topic, because which different imaging modalities should be employed, and when, remains a matter of debate. A previously reported study revealed that in stable patients with no clinical evidence of associated injuries, the emergency radiographic evaluation of minor renal lesions does not fundamentally affect the therapeutic approach and the prediction of outcome (Morey et al. 1996). Moreover, clinical criteria such as hematuria or hypotension that guide flow charts for diagnostic imaging in adults do not apply to children (Taylor et al. 1988; Stein et al. 1994; McAleer and Kaplan 1995; Abou-Jaoude et al. 1996; Morey et al. 1996). Imaging renal trauma in children has its greatest effect in reducing the intensity of therapeutic intervention, whereas in adults it is performed to search for significant bleeding and indication for surgical intervention (Grasso et al. 1998). This is the rationale behind using accurate diagnostic imaging modalities as fast and with as little risk as possible.

This chapter reviews different diagnostic imaging methods and findings for genitourinary tract injuries classified by anatomical level, and reports on current opinions on the application of different imaging modalities according to their clinical, technical, and economical arguments.

References
Conclusion

The most relevant reason for radiographic evaluation in children with renal trauma is not to search for surgical indications but to reduce the length and intensity of care, as the great majority of renal injuries do not require surgical repair.

23.2 Renal Trauma

23.2.1 Introduction

Renal injuries are traditionally divided into those resulting from blunt trauma and those resulting from penetrating trauma (MENDEZ 1977). In children, renal injuries are due to blunt abdominal trauma in 60%-90% of cases (McALEER and KAPLAN 1995; MIRVIS 1996). It has been reported that the incidence of renal trauma in the pediatric population has increased over the last decade due to the increasing number of traffic and sport accidents; however, the overall incidence of non-penetrating renal injuries in the general population has not yet been clarified and that of renal trauma in children varies in different studies (MENDEZ 1977; CASS 1983; FILIATRAULT et al. 1987; McALEER et al. 1993; MOREY et al. 1996). MAYOR et al. (1995) reported that renal parenchymal injuries occur in 1.2%-15% of all cases of pediatric trauma.

In adults, as well as in children, there is a slightly higher prevalence of renal injuries in male patients than in female patients. Moreover, children are more susceptible to renal trauma than adults for anatomical reasons, such as lack of muscle strength, a less rigid thoracic cage, and the poorly developed perirenal fat, together providing less protection. In addition, the kidney in children has a proportionally greater size (CURRARINO et al. 1993; MOREY et al. 1996). The left kidney is reported to be injured more often than the right one (CARROLL et al. 1990; FEDERLE and BROOKE 1994). An already diseased kidney is more susceptible to traumatic injuries, even in the setting of relatively minor trauma (MENDEZ 1977; CASS 1983; POLLACK and WEIN 1989). A recent study demonstrated that kidneys affected by ureteropelvic junction obstruction are particularly prone to disruption of the dilated renal pelvis due to its altered position within the body cavity and its lower ability to withstand an external force (SEBASTIÀ et al. 1999). Renal trauma is often associated with other injuries, particularly head and abdominal injuries and bone fractures (McALEER et al. 1993; MAYOR et al. 1995).

The majority of blunt trauma in children results from motor vehicle accidents when the child is a passenger, a pedestrian, or a cyclist. McALEER et al. (1993) found that 41 of 45 injured children were unrestrained passengers in cars and that all motor vehicle deaths and severe bone fractures were observed in unrestrained children. In contrast, penetrating injuries are mostly due to gun shots and to stabblings (FEDERLE et al. 1987; McALEER and KAPLAN 1995).

Mechanisms of trauma can be direct or indirect. Direct trauma happens when the kidney and the Gerota fascia are crushed against the lower ribs and the lumbar spine or are penetrated by bone fragments originating from rib or vertebral fractures. Indirect trauma lesions, on the other hand, are caused by deceleration forces and subsequent rotation of the kidney around its fixed vascular pedicle. This results in subintimal tears in the renal artery and vein walls and consequently in vascular spasm or thrombotic occlusion, or in ureteropelvic junction (UPJ) disruption or avulsion, particularly in hydronephrotic kidneys (FEDERLE and BROOKE 1994; SEBASTIÀ et al. 1999).

Conclusion

Children are more susceptible to renal trauma than adults and most injuries result from blunt trauma caused by motor vehicle accidents. Already diseased kidneys are more prone to serious injuries even in the setting of minor trauma.

23.2.2 Classification of Renal Injuries

The classification of renal injuries aims to identify the appropriate therapeutic approach, conservative or surgical, and may refer to clinical, etiological, or radiological clues. One of the most widely accepted classifications is that proposed by FEDERLE and BROOKE (1994), which divides renal injuries into four categories: Category I includes contusions and small corticomedullary lacerations. Category II