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Management and Outcomes of Pediatric High Grade Blunt Renal Trauma

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Description

Management of blunt renal trauma has evolved over the last few decades. Goals of management are to preserve renal function and to minimize morbidity. Low grade renal injuries (AAST I-III) have always been managed conservatively with successful outcomes [1,2]. Historically, high grade renal injuries (AAST IV-V) were managed with early surgical intervention with significant morbidity [3], but conservative management is now considered to be standard practice. Several contemporary studies have shown that expectant management in Grade IV renal lacerations has been successful with reduced delayed intervention rates and minimal loss of renal function over time [1,4,5].

Several other studies support this notion. A meta-analysis of non-operative management in Grade IV renal trauma performed by Umbreit et al. revealed that in a cohort of 95 patients 72% patients underwent conservative management and did not require any further intervention. 17% patients underwent endoscopic or percutaneous intervention for urinoma, and 11% underwent surgical exploration for hemodynamic instability. Meta-analysis revealed a 95% preservation rate of renal parenchyma [6]. Thus, conservative management has shown to reduce nephrectomy rates, thereby, reducing the morbidity of major surgery. Jacobs et al. reported 63% nephrectomy rate in Grade IV-V renal injury when open surgical exploration was performed, versus only an 11% nephrectomy rate in those managed conservatively [7].

Not all high grade injuries are appropriate for observation. This begs the question: who needs to be taken to the OR immediately? Absolute indications for intervention in high grade renal trauma have unequivocally been hemodynamic instability from hemorrhage, ureteropelvic junction (UPJ) disruption, and pulsatile retroperitoneal hematoma at time of abdominal exploration [2,4,8]. Relative indications for intervention are more controversial, yielding several studies in the last decade that evaluates radiographic and clinical findings that would better predict need for surgical intervention. Studies performed by Cannon et al. and Rogers et al. suggest that wide separation of renal fragments, multiple areas of urine extravasation and need for transfusion increase intervention rate [9,10]. In the Cannon et al. study, surgical intervention rates were up to 40-45% if above findings was noted [9]. In order to properly select the surgical candidates with AAST IV injuries, Chiron et al. proposed a sub-classification of the existing 2011 AAST grading scale. Presence of perirenal hematoma >3.5 cm, intravascular contrast extravasation and medial renal laceration were predictive of surgical intervention [11].

At our institution, conservative management in high grade renal trauma is favored, and our outcomes have been similar to what is published in literature. We performed a retrospective review in 26 children with AAST Grade IV blunt renal trauma. Our study looked at time to intervention and risk factors that predict intervention [12]. 16 cases (62%) were managed conservatively, and 7 of those patients (44%) required intervention, with mean time to intervention of 11 days. Our statistical analyses revealed that collecting system clot burden ($p = 0.01$) and larger urinoma size significantly predicted the need for delayed intervention. Mean urinoma size was 1.45 cm in successfully conservatively managed patients versus 4.29 cm in the failed group ($p < 0.01$). We also found that dissociated renal fragments, interpolar contrast extravasation, mean LOS, and transfusion rates were increased in the early intervention group as compared to conservatively managed group ($p > 0.05$). Although limited by sample size, our data suggests that relative indications for intervention should include collecting system clot burden which has not been widely followed in the past. Our data also supports previously published data for larger urinoma size, multiple areas of contrast extravasation and dissociation of renal fragments as solid indications for intervention [12].

In another study, we retrospectively reviewed patient in a statewide trauma database that mandates collection and maintenance of trauma patient data. 228 patients with blunt renal trauma were evaluated for demographics, mechanism of injury, and management. Interestingly, younger patients (1-6 years) had fewer renal injuries and, of those injuries, the majority were low grade (AAST I-III) as compared to older population (>7 years), $p = 0.003$. Of the high grade renal injuries, we found only 1.4% nephrectomy rate and 2.8% endoscopic or percutaneous intervention rate in those initially managed conservatively [13].

Aside from initial management, long term outcome of renal trauma is another issue that we face. Long term sequelae include decline in renal function and hypertension. Pereira et al. followed 31 patients with AAST Grade III-V blunt renal trauma who were managed conservatively. Follow-up was an average of 6.4 years, and all patients had normal renal function at initial follow-up. Reduction of renal function on DMSA correlated with severity of injury, and approximately 19.4% patients had >30% reduction of renal function by DMSA. These patients had Grade IV vascular injuries or Grade V trauma [14]. Overall, literature supports that renal function loss is minimal with conservative management, and really only associated with severe renal injury [14,15].

In reviewing contemporary literature, conservative management for most blunt renal trauma will be successful and reduce morbidity in children. There are absolute and relative indications for intervention that can be assessed clinically and radiographically that can help to steer our clinical pathway in management of these patients. A formal consensus or guidelines are warranted and we have strong evidence that our current practice patterns for pediatric blunt renal trauma are safe, effective and durable.

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