

91.3% for MRI. Sensitivity and specificity for definite classification of the lesions were 93.8% and 68.4% for MDCT and 93.8% and 71.4% for MRI.

Conclusion: Both MDCT and MRI are excellent for differentiating surgical from nonsurgical kidney lesions. Both methods have low specificity for the differentiation of benign from malignant lesions.

Editorial Comment

In this interesting original study, the authors compared the performance of state of the art, 16 channel-MDCT and 1.5 T MRI in the characterization of renal lesions previously detected by ultrasound in the same patient group. Due the presence of artifacts on MR examinations, MDCT proved superior to MRI with regard to image quality. Both MDCT and MRI however proved excellent for differentiating surgical from nonsurgical kidney lesions (sensitivity and specificity of 92.3% and 96.3% for MDCT and 92.3% and 91.3% for MRI). It is also interesting to note that both MDCT and MRI correctly depicted 15 of 16 renal cell carcinomas (sensitivity, 93.3%) but both technique had similar limitation for depiction of benign lesions (specificity, 68.4% and 71.4% respectively). This occurred because both methods were unable to differentiate between oncocytoma and renal cell carcinoma. This study confirms the classic limitation of imaging methods regarding the criteria for identification of enlarged lymph node as metastatic disease from renal cancer. In this series the authors reports that both MDCT and MRI interpretation led to overstaging 3 and 4 lesions respectively, due to the presence of enlarged lymph node(> 15 mm), currently criteria for interpreting as malignant but with reactive changes at histological examination. In our experience, MDCT and fast MR imaging has similar specificity for the detection, characterization and staging of solid renal masses larger than 1.0 cm in diameter. Similarly to the authors' experience, we consider MDCT superior for the detection of very small solid renal lesions (< 1.0 cm), but fast MRI and sometimes high-resolution ultrasound, are in some cases superior for the evaluation of complicated renal cystic masses. MRI and occasionally ultrasound better demonstrates internal septations, thickening of the cyst wall and/or septa. MRI better demonstrates areas of abnormal enhancement. In both situations, these additional findings will transform a nonsurgical into a surgical cystic mass (1).

Reference

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UROGENITAL TRAUMA

Predictors of the Need for Nephrectomy after Renal Trauma

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Background: Initial management of solid organ injuries in hemodynamically stable patients is nonoperative. Therefore, early identification of those injuries likely to require surgical intervention is key. We sought to identify factors predictive of the need for nephrectomy after trauma.

Methods: This is a retrospective review of renal injuries admitted over a 12-year period to a Level I trauma center.

Results: Ninety-seven patients (73% male) sustained a kidney injury (mean age, 27 +/- 16; mean Injury Severity Score, 13 +/- 10). Of the 72 blunt trauma patients, 5 patients (7%) underwent urgent nephrectomy, 3 (4%) had repair and/or stenting, and 89% were observed despite a 29% laparotomy rate for associated intraabdominal injuries in this group. Twenty-five patients with penetrating trauma underwent eight nephrectomies (31%), one partial nephrectomy, and two renal repairs. Regardless of the mechanism of injury, patients requiring nephrectomy were in shock, had a higher 24-hour transfusion requirement, and were more likely to have a high-grade renal laceration (all $p < 0.05$). Bluntly injured patients requiring nephrectomy had more concurrent intraabdominal injuries ($p < 0.0001$). Overall, patients after penetrating trauma were more severely injured, had higher 24-hour transfusion requirements, and a higher nephrectomy rate (all $p < 0.05$). Despite a higher injury severity in the penetrating group, however, mortality was higher in the bluntly injured group ($p < 0.0001$). Univariate predictors for nephrectomy included: revised trauma score, injury severity score, Glasgow Coma Scale score, shock on presentation, renal injury grade, and 24-hour transfusion requirement. No patient with a mild or moderate renal injury required nephrectomy, whereas 6 of 12 (50%) grade 4 injuries and 7 of 8 (88%) grade 5 injuries required nephrectomy. Multiple logistic regression analysis confirmed penetrating injury, renal injury grade, and Glasgow Coma Scale score as predictive of nephrectomy.

Conclusion: Overall, injury severity, severity of renal injury grade, hemodynamic instability, and transfusion requirements are predictive of nephrectomy after both blunt and penetrating trauma. Nephrectomy is more likely after penetrating injury.

Editorial Comment

This study confirms the well-established concept that most renal injuries are AAST grade 1-3, and can be safely managed non-operatively. Predictors for nephrectomy were shock, higher AAST grade of renal injury (4 - 5), ongoing transfusion requirement, and associated intraabdominal injuries. Grade 5 injuries, by definition are potentially life-threatening with avulsion of the renal hilum or a completely shattered kidney. That the nephrectomy rate in this study for Grade 5 kidney injuries approached 90% is not surprising. In unstable kidney trauma patients with ongoing blood loss, nephrectomy is part of a “damage control” approach to stabilize the patient, get them off the OR table, and quickly into the ICU for resuscitation.

Clearly, opening up Gerota’s fascia and releasing the tamponade effect of the retroperitoneal hematoma may result in uncontrollable bleeding and subsequent nephrectomy. Thus, there are 2 main ways to avoid unnecessary nephrectomy: 1) For the stable trauma patient, image the abdomen with CT with delayed images in order to properly stage the kidney injury. With an accurate kidney injury stage and location of the retroperitoneal hematoma, patients can then be selected for surgery or expectant management. 2) Retroperitoneal hematomas that are not zone 1, stable, non-expanding, non-pulsatile, and contained do not demand exploration. Zone 1 hematomas, namely midline supramesocolic or midline inframesocolic, from a blunt or penetrating mechanism demand exploration. Zone 2, lateral perinephric hematomas should be selectively explored for penetrating trauma, and typically observed for blunt trauma (1).

In Davis et al, half of Grade 4 injuries ended up with nephrectomy. This is higher than prior reports, but again nephrectomy may have been performed as “damage control” in the face of instability and associated injuries. Prior reports, however, have demonstrated that most Grade 4 renal injuries can be managed expectantly, with the kidney being re-imaged by CT with intravenous contrast and delayed images (3 to 5 days after initial

injury) to assess for persistent urinary leakage. Worsened or unimproved leak warrants ureteral stent placement of urinoma drain placement.

Reference

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Damage Control Management of Experimental Grade 5 Renal Injuries: Further Evaluation of FloSeal Gelatin Matrix

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Background: We developed a porcine grade 5 renal laceration damage control model to evaluate the hemostatic efficacy of FloSeal gelatin matrix (Baxter Healthcare, Corp., Deerfield, Ill).

Methods: Ten commercial swine underwent celiotomy, contralateral nephrectomy, and cooling to 32 degrees C after a well-established hypothermia protocol to simulate a damage control scenario. Following prospective randomization, a complex grade 5 renal injury was uniformly produced on the remaining kidney. Control animals (group 1, n = 5) were treated with direct manual compression with a gelatin sponge. Experimental animals (group 2, n = 5) were treated by application of FloSeal gelatin matrix followed by direct compression with a gelatin sponge. Operative blood loss and efficacy of hemostasis were compared. Creatinine levels were obtained daily until postoperative day 7. Abdominal computed tomography was performed at 10 days.

Results: Use of FloSeal gelatin matrix hemostatic sealant resulted in significantly less mean blood loss than gelatin sponge bolster compression alone (202.4 mL vs. 540.4 mL, respectively, p = 0.016). Hemostasis was complete in 60% (three out of five) of experimental animals after 2 minutes, but was incomplete in all control animals. After an initial increase, serum creatinine approached baseline by postoperative day 7 in all animals. Axial imaging 10 days postoperatively revealed no evidence of significant delayed perirenal hemorrhage.

Conclusions: FloSeal gelatin matrix performed well as a rapidly deployable, effective hemostatic agent in a hypothermic grade 5 renal injury damage control model. The absence of delayed bleeding and nephrotoxicity suggests a possible increased role for FloSeal in the treatment of devastating renal injuries in damage control surgery.

Editorial Comment

This article illustrates nicely the concept of damage control and the use of a pig model. Damage control is the concept that an abdominal trauma surgery is abbreviated to control hemorrhage and fecal and urinary contamination, to not perform the definitive repair until a planned staged re-operation improves survival, and to resuscitate the patient in the ICU before any prolonged reconstructive surgery. Such a policy of staged, abbreviated operations, has clearly been shown to improve overall survival, and helps to avoid the lethal triad of cold (body temperature), coagulopathy and acidosis.

The use of fibrin sealants in urology has been particularly popular recently, due to its use in laparoscopic kidney surgery. With the expanding role of laparoscopy for partial nephrectomy, methods to better control urinary leak or bleeding have been explored. Aside from direct suturing of the collecting system and vessels, fibrin sealants have been the “suspenders” to the “belts” of suturing. The current commercially available sealants are Tisseel “fibrin sealant”, (by Baxter, a mix of fibrinogen aprotinin solution, Factor XIII, and human derived thrombin), FloSeal “gelatin matrix” (by Baxter, a mix of human derived thrombin and bovine derived gelatin matrix), and BioGlue “surgical adhesive” (by Cryolife, a mix of bovine serum albumin and gluteraldehyde).

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PATHOLOGY

Xp11.2 Translocation Renal Cell Carcinoma with Very Aggressive Course in Five Adult Patients

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Background: Renal cell carcinomas (RCC) associated with Xp11.2 translocations (TFE3 gene fusions) are rare tumors occurring predominantly in children and young adults. Although, thus far, only limited data is available, these tumors are believed to be rather indolent even when diagnosed at advanced stages.

Design: Five cases of TFE3-RCC were evaluated in patients aged 18 or older (mean age 31). Diagnosis was confirmed by IHC detection of increased TFE3 fusion protein. Morphology was examined by HE, IHC and electron microscopy (EM) and correlated with clinical picture.

Results: HE showed clear cells, arranged in a pseudopapillary architecture, with retention of morphology in the metastatic tumor deposits. By IHC there was strong nuclear positivity for TFE3 in all cases and focal stain for AE3 and vimentin; stains for HMB45, calretinin, pankeratin and AE1 were all negative. By EM (2/5 cases examined) there were junctional complexes and rudimentary microvilli. In one case there were abundant lipid droplets and glycogen; in a second case, rare rhomboid crystals, similar to those seen in alveolar soft part sarcoma, were present. All patients (3 Caucasian, 2 Hispanic) presented with innocuous complaints, abdominal/flank pain and hematuria, and lacked any significant prior history. All but one patient presented with distant metastases at the time of diagnosis, and all patients were diagnosed with additional metastases or tumor recurrence within 5 months of presentation. Treatments included tumor resection, interleukin-2 therapy, combination chemotherapy, and radiation therapy, all with minimal success. Patients followed a rapidly terminal course, with a mean survival of 15 months post-diagnosis (range 10-20 months). One patient is currently undergoing chemotherapy at 13 months post-diagnosis (with brain metastasis), and another patient is alive at 6 months post-diagnosis, with metastases.

Conclusions: The patients presented here were older than typically described for TFE3-RCC. Although tumor morphology was similar to pediatric patients, these adult patients had a very aggressive clinical course compared to pediatric TFE3-RCC and even to conventional, adult-type RCC. Consistent use of antibodies against TFE3 in all tumors, regardless of patient age, may expand the spectrum of Xp11.2 translocation RCC with respect to age, clinical behavior and molecular abnormalities.