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UROGENITAL TRAUMA

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Radiographic predictors of need for angiographic embolization after traumatic renal injury

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Background: Although the American Association of the Surgery for Trauma Organ Injury Scale is the gold standard for staging renal trauma, it does not address characteristics of perirenal hematomas that may indicate significant hemorrhage. Angiographic embolization has become well established as an effective method for achieving hemostasis. We evaluated two novel radiographic indicators--perirenal hematoma size and intravascular contrast extravasation (ICE)--to test their association with subsequent angiographic embolization.
Methods: Among 194 patients with renal trauma between 1999 and 2004, 52 having a grade 3 (n = 33) or grade 4 (n = 19) renal laceration were identified. Computed tomography scans were reviewed by a staff radiologist and urologist blinded to outcomes. ICE was defined as contrast within the perirenal hematoma during the portal venous phase having signal density matching contrast in the renal artery. Hematoma size was determined in four ways: hematoma area (HA), hematoma to kidney area ratio (HKR), difference between hematoma and kidney area (HKD), and perirenal hematoma rim distance (PRD).
Results: Of the 52 patients, 8 had ICE and 4 of these (50%) required embolization, whereas none of the 42 (0%) patients without ICE needed embolization (p = 0.001). Likewise, all four measures of perirenal hematoma size assessed were significantly greater in patients receiving embolization [HA (128.3 vs. 75.4 cm, p = 0.009), HKR (2.75 vs. 1.65, p = 0.008), HKD (76.5 vs. 30.2 cm, p = 0.006), and PRD (4.0 vs. 2.5 cm, p = 0.041)].
Conclusion: Perirenal hematoma size and ICE are readily detectible radiographic features and are associated with the need for angiographic embolization.

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Minimally invasive endovascular techniques to treat acute renal hemorrhage

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Purpose: We evaluated the effectiveness of endovascular therapy for severe renal hemorrhage.
Materials and Methods: We retrospectively reviewed cases compiled from the trauma database, billing records and interventional radiology logs at our institution from 1990 to 2007. Technical success was defined as the

cessation of bleeding after angiographic embolization. Clinical success was defined as the absence of recurrent hematuria without the need for additional embolization.
Results: A total of 26 patients underwent angiography and endovascular treatment for renal hemorrhage. Mean patient age was 42 years (median 37, range 7 to 70). There were 20 males and 6 females. Mean clinical followup was 11.7 months. The mechanisms of injury were iatrogenic in 6 cases (renal biopsy in 5 and post-percutaneous nephrostomy placement in 1), trauma in 16 (blunt in 10 and penetrating in 6) and spontaneous rupture of a renal mass in 4. At presentation 16 patients (62%) were hemodynamically stable, while 10 (38%) were in shock. A total of 11 patients (42%) presented with gross hematuria, 7 (27%) had microscopic hematuria and 8 (31%) had no evidence of hematuria. A total of 16 patients (62%) had kidney injuries alone, while 10 (38%) also had significant concurrent injuries. Treatment failed in all 5 grade 5 acute renal injuries (100%) caused by external trauma. Technical and clinical success was achieved in 22 (85%) and 17 patients (65%), respectively.
Conclusions: Superselective embolization therapy for renal trauma provides an effective and minimally invasive means to stop bleeding. Overall our complication rate was minimal. Most renal traumas, including most grade 4 injuries, were effectively managed by conservative therapy. Embolization proved effective for grade 4 renal trauma for which conservative therapy failed. In our series embolization failed when applied to grade 5 injuries.

Editorial Comment

The concept on controlling arterial renal bleeding with transcatheter embolization is a concept that has been around since the 1970s. However, over the years the technical skills of interventional radiologists, imaging equipment and their ability to perform superselective embolization of even the smallest vessels has gradually improved. In general, renal injuries that do not involve avulsion of the renal hilum can typically be managed nonoperatively. The assumption is that nearly 85-90% of Grade 3 and 4 renal injuries will have venous bleeds (or very small arterial bleeds) that will fill the confined space of Gerota's fascia and tamponade. When the bleeds are arterial, and if they involve larger segmental vessels, the bleeding will not tamponade and thus require subsequent embolization. The key is how do we predict who will not stop bleeding and need either a surgical exploration or transcatheter embolization? Can we tell by signs on the CT?

The San Francisco General and the Parkland Hospital Groups advocate an early and aggressive policy of embolization for renal injuries. As an out growth of the success of selective embolization has had with blunt splenic injuries over the years, where signs like the presence of a vascular blush suggested a significant bleed – embolization can equally be used for the blunt kidney injury. In general I feel we under utilize angiography and selective embolization for our major blunt renal trauma patients.

Embolization coils that are in common use today are made of platinum and highly radio-opaque. Platinum is a softer metal so the coils can be tighter packed and cause less vessel wall injury. Each coil also has multiple Dacron side fibers which markedly increase thrombogenicity. The coils are 0.018", 0.035" and 0.038" in diameter and thus can typically be deployed via a 5Fr Angiocath.

The San Francisco General Group addresses more the patient who you admit and follow conservatively and who do you decide to send to interventional radiology in a delayed fashion. Most delayed renal bleeding occurs after 5 or more days as it takes time for the tamponaded hematoma to start to lyse and then release some of the tamponade effect. When the delayed bleed is from an arterial injury it typically is a pseudo-aneurysm. Breyer et al. concluded that potential criteria for angiography are persistent bleeding from segmental artery with or without parenchymal laceration, an unstable patient with Grade 3 or 4 injury, persistent and significant gross hematuria, or a rapidly declining HCT – needing > 2 u pRBC transfused in 24 hours. In our experience at Barnes Hospital experience, we use > 3 u RBC/ 24 hr transfused period to decide on further renal intervention. However, these are not hard fast rules just guidelines for intervention.

They further state that Grade 5 renal injuries, main renal artery or vein avulsion injuries - which by definition are life-threatening injuries should not be managed by an attempt at embolization but rather prompt

surgery. The Parkland Group addresses more the acute CT findings and need for embolization. Just as with blunt splenic injuries, the presence of intravascular contrast extravasation ("a contrast blush") on the arterial phase of a CT scan and the presence of a large perirenal hematoma (> 4 cm from renal capsule to hematoma edge) greatly predicted the likelihood for persistent bleeding and thus a significant vascular injury. The Parkland group argues that the AAST injury grading scale for major renal injuries should be subclassified into Grade 4, A = low risk and G4 B = High Risk, where a blush and large hematoma were present. I think that such a suggestion is a good one and would help to better guide therapy. Overall, I think we need to be more vigilant about identifying early signs of significant arterial renal injuries and early and quickly sending these patients to the interventional radiologist for super selective embolization.

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PATHOLOGY

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The significance of a positive bladder neck margin after radical prostatectomy: The American Joint Committee on Cancer pathological stage T4 designation is not warranted

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Purpose: The American Joint Committee on Cancer currently designates invasion of the bladder neck as a pT4 lesion. However, retrospective analyses have not demonstrated biochemical recurrence-free survival after radical prostatectomy to be consistent with other T4 lesions. We examined biochemical recurrence-free survival and cancer specific survival in men with a positive bladder neck margin.
Materials and Methods: Of nearly 17,000 patients in the Johns Hopkins Institutional radical prostatectomy database (1982 to 2008) 198 (1.2%) were identified with a positive bladder neck margin. Kaplan-Meier analyses were used to evaluate biochemical recurrence-free survival and cancer specific survival. A multivariate proportional hazards model predicting biochemical recurrence-free survival and cancer specific survival was fit with prostate specific antigen, Gleason sum and pathological stage to determine the significance of a positive bladder neck margin.
Results: Of the 198 men with a positive bladder neck margin 79 had an isolated bladder neck margin without seminal vesicle or lymph node involvement. The 12-year biochemical recurrence-free survival of men with organ confined disease, extraprostatic extension, seminal vesicle invasion and lymph node involvement without a positive bladder neck margin was 91.1%, 61.1%, 24.5% and 8.1%, respectively. For men with a positive bladder neck margin and those with an isolated positive bladder neck margin biochemical recurrence-free survival was 16.8% and 37.1%, respectively. The 12-year cancer specific survival for men with organ confined disease, extraprostatic extension, seminal vesicle invasion and lymph node involvement without a positive bladder neck margin was 93.5%, 89.0%, 77.0% and 66.8%, respectively. For men with a positive bladder neck margin and