Renal Trauma
EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
1. Ramchandani P, Buckler PM. Imaging of genitourinary trauma. *AJR* 2009; 192(6):1514-1523.	Review/Other -Dx	N/A	To describe and illustrate the spectrum of injuries that can occur in the genitourinary system in order to facilitate accurate and rapid recognition of the significant injuries.	Imaging plays a crucial role in the evaluation of the genitourinary tract in a patient who has suffered either blunt or penetrating trauma because multiorgan injury is common in such patients. Contrast-enhanced CT is the primary imaging technique used to evaluate the upper and lower urinary tract for trauma. Cystography and urethrography remain useful techniques in the initial evaluation and follow-up of trauma to the urinary bladder and urethra.	4
2. Kansas BT, Eddy MJ, Mydlo JH, Uzzo RG. Incidence and management of penetrating renal trauma in patients with multiorgan injury: extended experience at an inner city trauma center. *J Urol* 2004; 172(4 Pt 1):1355-1360.	Review/Other -Dx	93 trauma cases	To review the incidence and management of penetrating renal injuries in patients with multiorgan trauma during a 6-year period.	Isolated penetrating trauma to the kidney is rare. Most patients with penetrating renal trauma have associated adjacent organ injuries that may complicate treatment. In the absence of an expanding hematoma with hemodynamic instability, associated multiorgan injuries did not increase the risk of nephrectomy.	4
3. Santucci RA, Wessells H, Bartsch G, et al. Evaluation and management of renal injuries: consensus statement of the renal trauma subcommittee. *BJU Int* 2004; 93(7):937-954.	Review/Other -Dx	N/A	Expert panel consensus statement on issues in diagnosis and management of renal injuries. Literature search was performed to make evidence-based recommendations, which was based on a 5 point scale.	There were many level 3 and 4 citations, few level 2, and one level 1 which supported clinical practice patterns. Findings of nearly 200 reviewed citations are summarized. Authors recommend prospective trials to improve the quality of evidence.	4
4. Shariat SF, Jenkins A, Roehrborn CG, Karam JA, Stage KH, Karakiewicz PI. Features and outcomes of patients with grade IV renal injury. *BJU Int* 2008; 102(6):728-733; discussion 733.	Observational -Dx	77 patients	To evaluate the clinical features and outcomes of patients who presented with grade IV renal trauma to our urban level I trauma hospital and to further refine the absolute indications for exploration and determine the outcomes of conservative management.	36% of patients required surgical exploration to treat associated non-urological injuries. Of the 32 patients who underwent renal exploration, 63% (20/32) underwent renorrhaphy and 37% (12/32) underwent nephrectomy. Patients with no renal injuries and/or haemodynamic instability are more likely to require exploration. Rate of complications was not statistically different according to management type (conservative vs renal exploration).	3

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5. Cass AS, Luxenberg M, Gleich P, Smith CS. Clinical indications for radiographic evaluation of blunt renal trauma. *J Urol* 1986; 136(2):370-371.	Review/Other -Dx	831 patients	Review records of patients with hematuria following blunt renal trauma to determine whether renal contusion can be diagnosed clinically without radiographic evaluation. The association of microhematuria without shock and renal trauma was evaluated.	Microscopic hematuria without shock was found in 160/241 patients without and 33/590 with associated injuries. 159/160 had renal contusion and one had a renal laceration. 329/334 had renal contusion, three had renal laceration, one had renal rupture and one had a pedicle injury. Avoiding a radiographic evaluation in patients with blunt renal trauma plus microhematuria and no shock would miss a few cases of severe renal injury.	4
6. Moore EE, Shackford SR, Pachter HL, et al. Organ injury scaling: spleen, liver, and kidney. *J Trauma* 1989; 29(12):1664-1666.	Review/Other -Dx	N/A	Review organ injury scaling (O.I.S) for spleen, liver, and kidney.	Abdominal Trauma Index and other similar indices using organ injury scoring can be easily modified by replacing older scores with the O.I.S.'s.	4
7. Carroll PR, McAninch JW, Klosterman P, Greenblatt M. Renovascular trauma: risk assessment, surgical management, and outcome. *J Trauma* 1990; 30(5):547-552; discussion 553-544.	Review/Other -Dx	36 patients and 37 renovascular injuries	To better define the indications for renovascular repair, risk factors for renal loss, and eventual patient outcome.	Compared to 78 patients with only parenchymal injuries, those with renovascular injuries were more severely injured as assessed by nephrectomy rate, Injury Severity Score, transfusion requirement, number of major complications, and death. Fifteen patients sustained main renal artery injuries of whom six underwent immediate nephrectomy. Nine attempts at repair were performed. Six patients had either persistent thrombosis or preservation of only marginal function. One patient died in the immediate postoperative period of associated injuries. Complete renal preservation was achieved in only two kidneys (14%). Nephrectomy was required for the management of three of 12 main renal vein injuries, but in none of ten patients with segmental vascular injuries.	4

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8. Nicolaisen GS, McAninch JW, Marshall GA, Bluth RF, Jr., Carroll PR. Renal trauma: re-evaluation of the indications for radiographic assessment. *J Urol* 1985; 133(2):183-187.	Observational -Dx	359 consecutive patients Group 1: 85 patients with gross or microscopic hematuria/shock. Group 2: 221 patients with microscopic hematuria/no shock. Group 3: 53 patients with penetrating trauma.	Prospective study to refine the indications for radiographic assessment in patients with blunt (306) or penetrating (53) renal trauma.	Radiographic evaluation is necessary in those with penetrating trauma or blunt trauma with gross or micro hematuria and shock.	3
9. Herschorn S, Radomski SB, Shoskes DA, Mahoney J, Hirshberg E, Klotz L. Evaluation and treatment of blunt renal trauma. *J Urol* 1991; 146(2):274-276; discussion 276-277.	Observational -Dx	126 patients	Retrospective study to determine the criteria for radiological investigations and the imaging study of choice in patients with blunt renal trauma.	Radiological investigations are not necessary in those with blunt trauma, micro hematuria and no shock. CT is recommended when radiological investigations are indicated.	4
10. McAndrew JD, Corriere JN, Jr. Radiographic evaluation of renal trauma: evaluation of 1103 consecutive patients. *Br J Urol* 1994; 73(4):352-354.	Observational -Dx	1,103 consecutive patients	Retrospective study to determine whether radiographic evaluation is necessary in all trauma patients with hematuria.	Radiographic evaluation is necessary for all patients with penetrating trauma and any degree of haematuria, but only for patients with blunt trauma if associated with gross haematuria, microscopic haematuria and hypotension, or microscopic haematuria and significant associated injuries.	4
11. Mee SL, McAninch JW, Robinson AL, Auerbach PS, Carroll PR. Radiographic assessment of renal trauma: a 10-year prospective study of patient selection. *J Urol* 1989; 141(5):1095-1098.	Observational -Dx	1,146 patients	10-year prospective study to determine if radiographic staging is necessary in patients with renal trauma.	No significant renal injuries in 812 patients with blunt trauma and microhematuria without shock. Radiographic staging is compulsory in patients with penetrating trauma to the flank or abdomen and in patients with blunt trauma associated with either gross or microscopic hematuria and shock.	4
12. Brandes SB, McAninch JW. Urban free falls and patterns of renal injury: a 20-year experience with 396 cases. *J Trauma* 1999; 47(4):643-649; discussion 649-650.	Observational -Dx	396 patients	To determine the distribution and stage of renal injuries from free falls and appropriate method for evaluation and management.	Height of fall cannot reliably predict degree of renal injury. Renal imaging is recommended in vertical deceleration injuries, especially those associated with multiple-system injuries and/or physical signs of potential renal injury.	3

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13. Knudson MM, Harrison PB, Hoyt DB, et al. Outcome after major renovascular injuries: a Western trauma association multicenter report. *J Trauma* 2000; 49(6):1116-1122.	Observational -Dx	89 patients	Retrospective, multicenter study to describe the factors leading to outcome after major renovascular trauma. Study determined whether the highest percentage of renal salvage would be achieved by reducing the time from injury to repair.	Factors are blunt trauma, the presence of a grade V injury, and an attempted arterial repair. Patients with blunt major vascular injuries (grade V) are likely to have associated major parenchymal disruption. Immediate nephrectomy is recommended in these patients. Neither the time to definitive surgery nor the operating surgeon's specialty significantly affected outcome.	3
14. Lynch TH, Martinez-Pineiro L, Plas E, et al. EAU guidelines on urological trauma. *Eur Urol* 2005; 47(1):1-15.	Review/Other -Dx	N/A	A summary of literature review by a consensus committee to determine the diagnosis and treatment of genitourinary trauma.	350 citations were reviewed. Literature is based on expert opinion and single-institution retrospective series. Prospective trials are needed.	4
15. Fang JF, Wong YC, Lin BC, Hsu YP, Chen MF. Usefulness of multidetector computed tomography for the initial assessment of blunt abdominal trauma patients. *World J Surg* 2006; 30(2):176-182.	Observational -Dx	252 patients	Prospective enrollment of patients with blunt abdominal trauma to evaluate the usefulness of MDCT as an initial assessment tool.	Sensitivity, specificity, and accuracy of MDCT in identifying patients with active bleeding were all 100%. MDCT is recommended as a second line initial assessment tool.	3
16. Bretan PN, Jr., McAninch JW, Federle MP, Jeffrey RB, Jr. Computerized tomographic staging of renal trauma: 85 consecutive cases. *J Urol* 1986; 136(3):561-565.	Observational -Dx	85 consecutive patients	To evaluate the usage of CT in the staging of renal trauma.	In contrast, the most common finding on excretory urography, diminished opacification (17/53 patients), was found to have no correlation with the severity of renal injury as assessed by computerized tomography or laparotomy. Angiography appreciably understaged 1 of 5 cases by failing to show extracapsular extravasation with parenchymal disruption. All findings on angiography were depicted by CT. We conclude that CT staging for renal trauma is more sensitive and specific than excretory urography, nephrotomography and angiography, and that it should be used primarily when multiple traumatic injuries are suspected, when excretory urography suggests major trauma or is nonspecific and when clinical evidence of major trauma exists, regardless of what excretory urography shows.	3
17. Jansen JO, Yule SR, Loudon MA. Investigation of blunt abdominal trauma. *BMJ* 2008; 336(7650):938-942.	Review/Other -Dx	N/A	To investigate blunt abdominal trauma in adults using evidence based approach.	US is recommended in haemodynamically unstable patients. CT is recommended in haemodynamically stable patients.	4

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18. Santucci RA, Fisher MB. The literature increasingly supports expectant (conservative) management of renal trauma--a systematic review. *J Trauma* 2005; 59(2):493-503.	Review/Other -Dx	110 citations	Systematic review of literature to determine the level of support for expectant management of renal injury.	Most papers support the wider use of nonoperative therapy of renal injuries, although this approach is not widely accepted.	4
19. Erturk E, Sheinfeld J, DiMarco PL, Cockett AT. Renal trauma: evaluation by computerized tomography. *J Urol* 1985; 133(6):946-949.	Observational -Dx	22 patients	To describe the use of CT to guide conservative therapy of renal injuries.	17/22 was successfully managed with conservative therapy and 5 underwent surgical exploration. CT is recommended in patients suspected of sustaining major renal injury and/or other organ injuries.	3
20. Bozeman C, Carver B, Zabari G, Caldito G, Venable D. Selective operative management of major blunt renal trauma. *J Trauma* 2004; 57(2):305-309.	Observational -Dx	26 patients	Retrospective study to determine if surgery is necessary in stable patients with grade IV or V injuries.	46% required surgery; 54% managed conservatively. Conservative management is recommended in hemodynamically stable patients.	4
21. Sangthong B, Demetriades D, Martin M, et al. Management and hospital outcomes of blunt renal artery injuries: analysis of 517 patients from the National Trauma Data Bank. *J Am Coll Surg* 2006; 203(5):612-617.	Observational -Dx	517 patients	To assess the incidence of renal artery injuries, evaluate current therapeutic approaches and effect of various therapeutic modalities on hospital outcomes.	Patients who had surgical revascularization had a considerably longer intensive care unit and hospital stay than observed patients. Patients who had nephrectomy had a considerably longer hospital stay than observed patients. Blunt renal artery injury is rare. Nonoperative management is recommended.	3
22. Broghammer JA, Fisher MB, Santucci RA. Conservative management of renal trauma: a review. *Urology* 2007; 70(4):623-629.	Review/Other -Dx	N/A	Review patient selection, complication management, and operative criteria to assess costs and benefits of conservative management renal trauma.	Authors believe published data support increasing conservative attempts in the hemodynamically stable patient.	4
23. Alonso RC, Nacenta SB, Martinez PD, Guerrero AS, Fuentes CG. Kidney in danger: CT findings of blunt and penetrating renal trauma. *Radiographics* 2009; 29(7):2033-2053.	Review/Other -Dx	N/A	To describe the mechanisms and clinical features of renal injury, indications for genitourinary imaging, and imaging techniques and protocol, specifically the spectrum of CT findings.	CT is the imaging modality of choice in the evaluation and management of renal trauma.	4

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24. Santucci RA, Bartley JM. Urologic trauma guidelines: a 21st century update. *Nat Rev Urol* 2010; 7(9):510-519.	Review/Other -Dx	N/A	To review and discuss recommendations for the evaluation, diagnosis and management of genitourinary trauma.	While stabilization of life-threatening injuries is the primary goal in the evaluation of all trauma patients, subsequent diagnosis and treatment of secondary injuries are requirements for good trauma care. The genitourinary system is involved in 10% of trauma cases, and these injuries can be associated with considerable morbidity and mortality. Accordingly, physicians involved in the initial evaluation and subsequent management of trauma patients should be aware of the diagnosis and treatment of injuries that can occur in the genitourinary system.	4
25. Himmelman RG, Martin M, Gilkey S, Barrett JA. Triple-contrast CT scans in penetrating back and flank trauma. *J Trauma* 1991; 31(6):852-855.	Observational -Dx	88 patients	Prospective study to determine whether CT with oral, rectal and IV contrast could predict injury in penetrating back or flank trauma.	Scans were classified according to risk of injury requiring repair. CT had NPV of 100% ± 11%.	3
26. Ekeh AP, Saxe J, Walusimbi M, et al. Diagnosis of blunt intestinal and mesenteric injury in the era of multidetector CT technology--are results better? *J Trauma* 2008; 65(2):354-359.	Observational -Dx	57 patients had CT	To determine if multislice CT has resulted in a change in the diagnosis of blunt intestinal and mesenteric injury.	46 patients (80.7%) had findings indicating possible blunt intestinal and mesenteric injury. Missed injuries remain common in blunt intestinal and mesenteric injury even with multislice CT. Free fluid without solid organ injury continues to be an important finding.	3
27. Sirlin CB, Brown MA, Andrade-Barreto OA, et al. Blunt abdominal trauma: clinical value of negative screening US scans. *Radiology* 2004; 230(3):661-668.	Observational -Dx	3,679 patients	Retrospective review to assess accuracy of negative screening US scans in blunt abdominal trauma.	99.9% with negative US were true negative. 93.65% of the patients with true-negative findings (3,641) required no additional tests and 6.4% (n=234) had CT or other tests. 38 patients had false-negative US findings for abdominal injury. Combination of negative US findings and negative clinical observation eliminate abdominal injury in patients who are admitted and observed for at least 12-24 hours.	3
28. Sirlin CB, Brown MA, Deutsch R, et al. Screening US for blunt abdominal trauma: objective predictors of false-negative findings and missed injuries. *Radiology* 2003; 229(3):766-774.	Observational -Dx	3,679 patients	Retrospective study to classify patients with negative US into high-risk and low-risk categories.	High-risk patients 24 times more likely to have missed abdominal injury. Hematuria in fractures of lumbar spine and pelvis most common by high risk findings.	3

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29. Lee BC, Ormsby EL, McGahan JP, Melendres GM, Richards JR. The utility of sonography for the triage of blunt abdominal trauma patients to exploratory laparotomy. *AJR* 2007; 188(2):415-421.	Observational -Dx	4,029 patients	Retrospective study to assess the value of FAST in the triage of hypotensive and normotensive blunt abdominal trauma patients to exploratory laparotomy.	In predicting the need for therapeutic laparotomy in hypotensive patients, sensitivity of FAST was 85%, specificity was 60%, and accuracy was 77%. Of 3,907 normotensive patients, 3,584 had negative FAST findings, 323 had positive FAST findings. In normotensive patients, the sensitivity of FAST was 85%, specificity 96%, and accuracy 96%. In both hypotensive and normotensive patients, 4,029 patients with blunt abdominal trauma underwent US: 3,619 had negative and 410 had positive FAST findings. In all patients regardless of blood pressure, the sensitivity of FAST was 85%, specificity was 96%, and accuracy was 95%.	4
30. Hoffman L, Pierce D, Puumala S. Clinical predictors of injuries not identified by focused abdominal sonogram for trauma (FAST) examinations. *J Emerg Med* 2009; 36(3):271-279.	Observational -Dx	458 patients had FAST and CT	Retrospective chart review to identify clinical characteristics of blunt traumatic injury that increased the risk of peritoneal or pericardial fluid collections and abdominal organ injuries not identified by a bedside FAST examination.	Significant predictors were the presence of a radiographically proven pelvic fracture (OR 3.459; 95% CI: 1.308-9.157) and a radiographically or operatively proven renal injury (OR 3.667; 95% CI: 1.013-13.275). The presence of a pelvic fracture or renal injury in adult victims of blunt abdominal trauma increases the likelihood of a US-/Conf+ examination. Patients with negative FAST and pelvic fracture may benefit from additional radiographic or operative evaluations for occult injuries.	3

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31. Natarajan B, Gupta PK, Cemaj S, Sorensen M, Hatzoudis GI, Forse RA. FAST scan: is it worth doing in hemodynamically stable blunt trauma patients? *Surgery* 2010; 148(4):695-700; discussion 700-691.	Observational -Dx	2,130 patients	To evaluate the results of focused assessment with US for trauma in hemodynamically stable blunt trauma patients and to determine its role in the diagnostic evaluation of these patients.	In all, 118 false negative focused assessment with US for trauma were performed, of which 44 (37.3%) subsequently required exploratory laparotomy. Five patients had false positive focused assessment with US for trauma scans. Focused assessment with US for trauma scan had an overall sensitivity of 43%, a specificity of 99%, and PPV and NPV of 95% and 94%, respectively. Accuracy was 94.1%. In the hemodynamically stable blunt trauma group, there were 60 patients with true positive focused assessment with US for trauma examinations and 87 patients with false negative focused assessment with US for trauma examinations. In this group of patients, focused assessment with US for trauma had a sensitivity of 41%, specificity of 99%, and positive and NPV of 94% and 95%, respectively. The overall accuracy was 95%.	3
32. McGahan JP, Richards JR, Jones CD, Gerscovich EO. Use of ultrasonography in the patient with acute renal trauma. *J Ultrasound Med* 1999; 18(3):207-213; quiz 215-206.	Observational -Dx	32 patients 37 renal injuries	Retrospective study to identify number of patients in which US detected free fluid or a renal parenchymal abnormality.	7/20 patients with isolated renal injuries had free fluid in the abdomen (35%), while 13/20 patients (65%) had no evidence of free fluid. Renal parenchymal abnormalities were identified on US in 8/37 (22%) of injured kidneys. The abnormalities were prevalent in cases of severe injury (60%).	4
33. Valentino M, Serra C, Zironi G, De Luca C, Pavlica P, Barozzi L. Blunt abdominal trauma: emergency contrast-enhanced sonography for detection of solid organ injuries. *AJR* 2006; 186(5):1361-1367.	Observational -Dx	69 nonconsecutive patients	Prospective study to compare the diagnostic value of US and contrast-enhanced US with CT for the detection of solid organ injuries in blunt abdominal trauma patients.	US had sensitivity 45.7%, specificity 91.8%, PPV 84.2%, NPV 64.1%. Contrast-enhanced US had a sensitivity 91.4%, specificity 100%, PPV 100% and NPV 92.5%. Contrast-enhanced US is recommended in the assessment of blunt abdominal trauma.	3
34. Stevenson J, Battistella FD. The 'one-shot' intravenous pyelogram: is it indicated in unstable trauma patients before celiotomy? *J Trauma* 1994; 36(6):828-833; discussion 833-824.	Observational -Dx	926 IVP's	Retrospective review to assess the value of "one-shot" IVP in unstable patients.	239 preoperative "one-shot" IVP were identified: 53 had abnormal findings and 183 had normal findings. 8% of patients with normal IVP had had renal injuries not detected by "one-shot" IVP; 26% with abnormal studies had no intraoperative evidence of abnormality.	4

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35. Demetriades D, Hadjizacharia P, Constantinou C, et al. Selective nonoperative management of penetrating abdominal solid organ injuries. *Ann Surg* 2006; 244(4):620-628.	Observational -Dx	152 patients 185 injuries	Prospective study to assess the role of selective nonoperative management in penetrating abdominal solid organ injuries.	41 patients (27.0%), including 18 cases with grade III to V injuries, were successfully managed without a laparotomy and without any abdominal complication. 28.4% of all liver, 14.9% of kidney, and 3.5% of splenic injuries were successfully managed nonoperatively. Selective nonoperative management is successful in the right environment.	3
36. Alsikafi NF, McAninch JW, Elliott SP, Garcia M. Nonoperative management outcomes of isolated urinary extravasation following renal lacerations due to external trauma. *J Urol* 2006; 176(6 Pt 1):2494-2497.	Observational -Dx	61 patients	Retrospective review of data on nonoperative management outcomes of isolated urinary extravasation following renal lacerations due to external trauma.	27 (44%) of 61 were treated operatively. Open surgical exploration resulted in nephrectomy in 5/27 (19%) patients. Of 34 (56%) patients treated nonoperatively 3 (9%) had persistent, nonprogressing urinary extravasation by CT. All 3 (100%) had uncomplicated endoscopic ureteral stent placement followed by complete resolution of urinary extravasation. Nonoperative management is safe and results in resolution in more than 90%.	3
37. Cheng DL, Lazan D, Stone N. Conservative treatment of type III renal trauma. *J Trauma* 1994; 36(4):491-494.	Observational -Dx	71 patients	Retrospective review to determine if CT diagnosed of deep cortical lacerations could be managed without surgery.	81% successfully managed. CT allows confident conservative therapy for even severe renal injuries.	4
38. Matthews LA, Smith EM, Spirnak JP. Nonoperative treatment of major blunt renal lacerations with urinary extravasation. *J Urol* 1997; 157(6):2056-2058.	Observational -Dx	46 patients	Retrospective review to determine whether nonoperative treatment of major renal lacerations with urinary extravasation has a negative impact on patient outcome.	Extravasation resolved spontaneously in 87.1%. 12.9% required stent placement. Nonoperative treatment is safe and effective.	4
39. Sofocleous CT, Hinrichs C, Hubbi B, et al. Angiographic findings and embolotherapy in renal arterial trauma. *Cardiovasc Intervent Radiol* 2005; 28(1):39-47.	Observational -Dx	22 patients	Retrospective review to evaluate angiographic findings and embolotherapy in renal arterial trauma.	Two initial technical failures were treated with repeat arteriography and embolization. There was no procedure-related death. There was no non-target embolization. One episode of renal abscess after embolization was treated by nephrectomy and 3 patients underwent elective post-embolization nephrectomy to prevent infection. Follow-up ranged from 1 month to 7 years (mean 31 months). No procedure-related or delayed onset of renal insufficiency occurred. Selective and super-selective embolization is recommended in hemodynamically stable and controlled patients.	3

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40. Sarani B, Powell E, Taddeo J, et al. Contemporary comparison of surgical and interventional arteriography management of blunt renal injury. *J Vasc Interv Radiol* 2011; 22(5):723-728.	Observational -Dx	69 patients	To compare surgical and interventional arteriography management of blunt renal trauma.	The surgical cohort had a higher injury severity score (39.6 vs 24.2; P<.01), but there was no difference in renal injury grade (P=.9). The arteriography cohort received significantly more contrast medium (P<.001). Contrast agent extravasation was confirmed angiographically in 6/12 patients who had this finding on CT, and embolotherapy controlled bleeding in all six. No significant difference was noted in transfusion need, recurrent hemorrhage, and creatinine level at discharge, glomerular filtration rate, or length of stay (P>.4 for each endpoint). There was a trend toward a longer stay in the intensive care unit in the surgical cohort and a higher likelihood of discharge to home in the arteriography group (P=.08 for each endpoint).	3

Evidence Table Key

Study Quality Category Definitions

- *Category 1* The study is well-designed and accounts for common biases.
- *Category 2* The study is moderately well-designed and accounts for most common biases.
- *Category 3* There are important study design limitations.
- *Category 4* The study is not useful as primary evidence. The article may not be a clinical study or the study design is invalid, or conclusions are based on expert consensus. For example:
  a) the study does not meet the criteria for or is not a hypothesis-based clinical study (e.g., a book chapter or case report or case series description);
  b) the study may synthesize and draw conclusions about several studies such as a literature review article or book chapter but is not primary evidence;
  c) the study is an expert opinion or consensus document.

Dx = Diagnostic

Tx = Treatment

Abbreviations Key

CI = Confidence interval

CT = Computed tomography

FAST = Focused abdominal sonography for trauma

IVP = Intravenous pyelogram

MDCT = Multidetector computed tomography

NPV = Negative predictive value

OR = Odds ratio

PPV = Positive predictive value

US = Ultrasound