

PRACTICE GUIDELINES: MANAGEMENT OF KIDNEY AND BLADDER INJURIES

OBJECTIVE:

Provide guidelines for the management of renal contusions, renal fractures, renal-vascular injuries and bladder perforations.

DEFINITIONS:

Renal contusions: Defect(s) in perfusion of the kidney on CT or IVP that is consistent with a parenchymal contusion.

Renal fracture: A parenchymal defect of the kidney associated with hematoma or urinoma around the kidney.

Reno-vascular injuries: Occlusion(s) of the renal artery as evidenced by lack of perfusion to a kidney on CT, IVP or angiogram.

Bladder perforation: Extravasation of contrast from the bladder on CT, IVP or cystogram. Extraperitoneal perforations are contained in the retroperitoneal space around the bladder. Intraperitoneal perforation is associated with contrast in the peritoneal cavity that outlines bowel.

GUIDELINES:

1. Evaluation:
 - a. Consider renal injury with any injury associated with hematuria (see Guideline for hematuria).
 - b. Consider renal injury with penetrating abdominal injury (see Guideline for evaluation of penetrating abdominal trauma).
 - c. Consider bladder injury when there is significant hematuria with a pelvic fracture or lower abdominal pain (see Guideline for cystogram).
2. Penetrating Injuries:
 - a. All gunshot wounds to the kidney require exploration for the possibility of associated injuries. Obtain one-shot IVP (or, in the stable patient, a CT scan) prior to surgery or intra-operatively to determine presence of contralateral kidney.
 - b. All stab wounds to the kidney require specific evaluation:
 - i. If kidney is injured from anterior stab wound, exploration is required because of the possibility of associated intra-abdominal injuries.
 - ii. If kidney is injured from a flank wound, CT must show that the wound is limited to the kidney with minimal blood in the perirenal space. If urine is present around the kidney, consider exploration for disrupted collecting system or ureter.
3. Blunt Injuries:
 - a. Renal contusion:
 - i. Diagnosed as a perfusion defect on CT or IVP.
 - ii. No definitive treatment necessary.
 - iii. Follow-up urinalysis every day until RBC <50/HPF.
 - iv. May discharge if still has hematuria; follow-up urinalysis at clinic visit one to two weeks after discharge.
 - b. Renal fracture: rarely requires surgical intervention.

- i. Diagnosed on CT scan as parenchymal defect with surrounding hematoma and possible urinoma.
 - ii. If hemodynamically unstable, consider angiogram.
 - a) If angiogram shows active arterial extravasation, consider embolization.
 - b) If angiogram shows occluded main renal artery, nothing more needs to be done as long as contralateral kidney is present.
 - c) If angiogram shows active extravasation and embolization cannot be accomplished, patient should be taken to surgery. Nephrectomy will probably be required. If there is venous extravasation, anticipate spontaneous resolution of bleeding as long as clotting factors are normal.
 - iii. If hemodynamically normal without evidence of ongoing bleeding, treat non-operatively.
 - a) Obtain urology consult.
 - b) Keep in monitored setting (ICU, I/O or step down bed) until hematocrit stable.
 - c) Foley to remain in place until hematuria substantially clears.
 - d) Bed rest for three days, then mobilize in hospital on day 4 and discharge on day 5.
 - e) Serial hematocrits every 6 hours until repeated values are within 2%, then daily hematocrits for 3 days.
 - f) Antibiotics unnecessary unless there is documented positive urine culture that should be treated appropriately.
 - g) Expect abdominal and flank discomfort, fevers and mild ileus for 3-4 days.
 - h) The presence of a urinoma does not necessarily require operative intervention.
 - i) Follow-up routinely in clinic 10-14 days after discharge. Follow-up CT is unnecessary.
 - j) Out of school or work 10-14 days after discharge. Avoid contact sports activities for three months.
 - k) Discuss with the patient the meaning of hypertension in the follow-up period.
 - l) ALL Patients receive a **SOLID ORGAN INJURY** Card
- c. Renovascular injury:
- i. Usually discovered in patient with poor visualization of kidney on contrasted CT scan or non-visualized kidney on IVP.
 - ii. Order STAT renal angiogram.
 - a) If there is active extravasation, attempt embolization. If embolization is unsuccessful, perform laparotomy. Gain arterial inflow control at the aorta as first step.
 - b) If there is occlusion, most likely explanation is intimal flap from partial thickness vessel disruption from traction injury.
 - c) With occlusion, consider the amount of time from the injury.
 - i) Less than six hours: consider revascularization although the outcome is poor.
 - ii) Greater than six hours: observe. The chances of kidney survival are slim.
4. Bladder and urethral injury:
- a. Consider bladder injury in patient with the following:
 - i. Gross hematuria (i.e., real bloody).
 - ii. Severe displaced pelvic fracture.
 - iii. Lower abdominal pain with hematuria.
 - iv. Extravasation seen on CT scan of pelvis.
 - b. In male, consider urethral injury with the following:

- i. Displaced severe anterior pelvic fracture (i.e., open book fracture).
- ii. Blood at the meatus.
- iii. Perineal and scrotal hematoma.
- iv. High riding or boggy prostate gland.
- c. For possible urethral injury, perform a urethrogram (see Guideline: X-rays on Trauma Patients).
 - i. If positive, do not try and place Foley catheter. Consult urology.
 - ii. If negative, insert Foley catheter if indicated.
- d. For possible bladder injury, insert Foley catheter and perform retrograde cystogram. If there is a bladder injury, determine whether it is extra-peritoneal or intra-peritoneal.
 - i. Extra-peritoneal bladder rupture: contrast flows from bladder but is confined in the extra-peritoneal space around the bladder.
 - a) Consult urology.
 - b) Usually treated with bladder drainage for 7-10 days.
 - c) After that time, obtain cystogram and if bladder is intact, may remove catheter. Antibiotics generally not needed.
 - ii. Intra-peritoneal bladder rupture: contrast flows from the bladder into the peritoneal cavity. Bowel is outlined.
 - a) Consult urology.
 - b) Usually treated with exploratory laparotomy and bladder closure. Cystostomy in this situation is controversial.
 - c) May be treated without laparotomy and repair if there are no signs of peritoneal irritation suggesting an associated injury. In this case, treatment is the same as for extraperitoneal rupture.
 - d) Bladder drainage used for 7-10 days, at which time a cystogram is obtained. If bladder is intact, catheter may be removed.