

This issue of the newsletter provides further evidence for my ADD. It's a collection of random thoughts and articles that I hope you find interesting. Enjoy!

Femoral Traction And Open Fractures

Application of traction splints to the femur can be a bit tricky, mostly because of the various indications and contraindications. The company that makes the Hare traction splint gives the sole indication as a "suspected femur fracture", and the sole contraindication as "an open femur fracture". In my mind, this is a bit too simplistic.

I agree that the traction splint should only be applied on femur fractures, known or suspected. However, there are a few more contraindications:

- **The patient should not have a posterior pelvic fracture.** Unfortunately, prehospital providers don't have xray vision, so they usually can't tell. If there is any suspicion (pelvic instability, deformity), then don't use it.
- **The knee joint must be intact.** Application of a traction splint across a bad knee will distract the tibia and the femur, potentially causing more injury. Take a good look at the knee. If it's edematous or discolored, no traction splint.
- **The tibia must not be fractured.** As in the previous bullet point, the tibial segments will pull apart before the stronger muscles in the thigh allow the femur to reduce.

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SPEAKING ENGAGEMENTS & MEETINGS

TOTALLY TRAUMA SYMPOSIUM

MONTEREY MARRIOTT HOTEL, MONTEREY CA

NOVEMBER 4, 2019

EASTERN ASSOCIATION FOR THE SURGERY OF TRAUMA

LOEWS SAPPHIRE FALLS RESORT, ORLANDO FL

JANUARY 14-18, 2020

What about the open fracture scenario? The concern is that contaminated bone will be pulled back into the wound. It's not really known whether this results in an increased infection rate, but it's better to be safe and not do it. However, there are two scenarios when applying traction to an open femur fracture is warranted:

- **There is significant bleeding from the wound.** Restoring the normal anatomy will create more pressure around the injured tissues and may slow bleeding.
- **The distal pulses are compromised or absent.** Most of the time, this is due to kinking of the vessel, not outright damage to it. Pulling it to length may restore normal flow.

Bottom line: Treat traction splints with respect. Keep these tips in mind, but always adhere to your local protocols and procedures first. However, if it's not covered by them, or you are getting concerned that the patient's (or their leg's) wellbeing is at risk, do the right thing!

Nursing: What To Do When The Doc Won't Listen

"Insanity: doing the same thing over and over again and expecting different results."

- Albert Einstein

This piece applies specifically to nurses. I know it's happened to you. Your patient is having a problem. You do a little troubleshooting, but you feel that a doctor needs to know and possibly take some action. So you page them and duly note it in the medical record. No response. You do it again, and document it. No response. And a third time, with the same result.

And now what? Call someone else? Give up and hope the patient improves?



What if the doctor on call is a known asshole? Are you even reluctant to call in the first place? Do you delay as long as you possibly can?

Believe it or not, I've seen many chart review cases over the years where this situation does arise. And every once in a while, the patient actually dies. Sometimes this is directly related to the lack of intervention, but sometimes it just sets the ball rolling that eventually leads to patient demise days or weeks later.

What's the answer? We all want to provide the best care possible for our patients. But sometimes social factors (or pager malfunctions) just get in the way. Here's how to deal with it.

Every hospital / nursing unit needs to have a procedure for escalating patient care calls to more advanced providers. When one of your patients develops a problem, you usually have a pretty good idea of what the possible solutions are. So call/page the proper person (PA/NP/MD) who can provide that solution. If they don't give you the "right answer", then question it. They are not all-knowing.

If they give you a good explanation, go with it, but keep your eye on your patient's progress. If they can't explain why they are giving you the wrong answer, suggest they check with someone more senior. And if they don't want to, let them know that you will have to. Consider no answer the same as a wrong answer.

Don't stop going up the chain of command until you get that right answer, or an explanation that satisfies you. The hard part here is going up the chain. You may not be comfortable with this. But you do have resources that can help you that have more authority (nurse manager, supervisor, etc). If they, too, are uncomfortable, then your hospital has much bigger problems (unhealthy workplace).

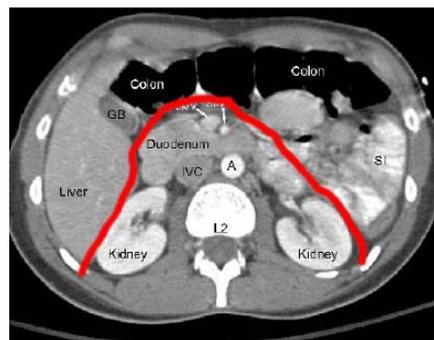
Example: trauma unit nurses at my hospital will call the first-year resident first, then escalate to the junior and/or chief residents. If they don't do the right thing, the in-house trauma attending gets the call. If they don't handle it, then the trauma medical director (me) gets called. And, of course, I always do the right thing (chuckle). And our nurses know that the surgeons support them completely, since this facilitates the best patient care. The residents and APPs are educated about this chain of command when they first start on the trauma service, and it makes them more likely to choose the "right answer" since they know the buck won't stop with them.

Zones Of The Retroperitoneum

Injuries inside the abdominal cavity are common after major blunt and penetrating trauma. We strive to identify these through a combination of physical exam and, in stable patients, CT imaging. But sometimes, patients have immediate indications to proceed directly to the operating room.

Once in the OR, exposure of the intraperitoneal organs is easy. But unfortunately, the structures in the retroperitoneum are hidden from view. It is certainly possible to surgically expose the organs in those areas, but it can be a major undertaking when there is blood suffusing those tissues from the injuries.

Take a look at this slice from a CT scan.



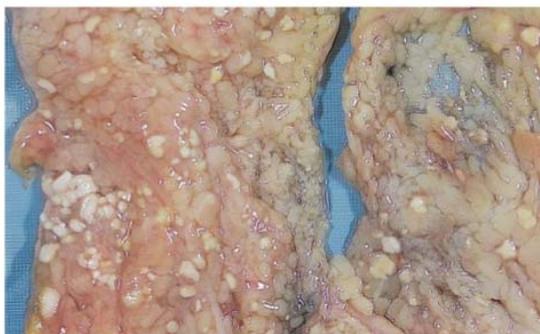
A; aorta, C; splenic flexure of colon, GB; gallbladder, IVC; inferior vena cava, SI; small intestine, SMA; superior mesenteric artery, SMV; superior mesenteric vein.

I've outlined the contents of the retroperitoneum, which lie below the red line. It is surprising to see how much "stuff" is really hidden back there. This includes, the kidneys, pancreas, duodenum, aorta, vena cava, visceral vessels, and ureters. Lots of important things!

Can we be more selective when evaluating the retroperitoneum? Of course! During the surgical exploration, the trauma surgeon is looking at the retroperitoneum to see if there are changes in appearance, both shape and color. Are structures out of place? This suggests that something is occupying space nearby, such as a hematoma or displacement of bones or other tissues by the injury.

The surgeon is also looking for colors that should not be in the retroperitoneum. These are primarily red, white, green, and yellow. Red is obviously blood, which can be dissecting through soft tissues or pooled into a hematoma. We will return to this one shortly.

White may indicate an enzyme leak from the pancreas with saponification. Here's an example:



This finding will require the surgeon to expose the pancreas to search for and deal with an injury.

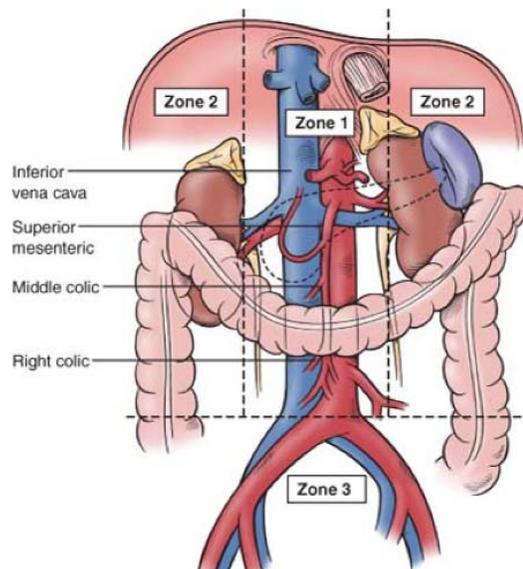
Yellow is typically due to a urine leak. This may be seen with renal and ureteral injuries. The source of the leak must be found and repaired and/or decompressed with a drain or ureteral stent.

Green represents a retroperitoneal bowel injury. This is typically a duodenal injury in the upper abdomen, or a cecal or rectosigmoid injury in the lower.

White, yellow, and green colors require surgical exploration and repair. The injuries causing them will not heal on their own!

But red is different. It means that something has bled, or is bleeding. Differentiating between these two is important. Most things in this area that have bled and stopped will remain that way. Anything that is actively bleeding will continue to do so until your patient dies, so it must be addressed promptly.

To assist in this decision-making process, the retroperitoneum has been divided into zones based on likelihood of ongoing bleeding or injury to a critical vascular structure. Here's a diagram illustrating them:



The retroperitoneum is divided by a horizontal line at the level of the bifurcation of the aorta and vena cava. This also corresponds to the top of the pelvis. Zones I and II are located above the horizontal line, and Zone III is located below.

Zone I: This zone is vertically oriented in the midline and includes the aorta, vena cava, and proximal visceral vessels. **All hematomas in this zone, blunt or penetrating, must be explored.** Injuries in the upper part of this zone may involve the celiac axis, suprarenal aorta, and proximal renal vessels. These are best approached by a left-sided visceral rotation after control of the proximal aorta. Hematomas in the lower portion of this zone typically involve the infrarenal aorta or cava. They are best approached via midline incision of the retroperitoneum over the presumed injury (after clamping the aorta at a higher level, of course).

Zone II: These are located on both sides of Zone I. Hematomas in this zone are usually caused by injuries to renal parenchyma or renal vascular structures. For blunt trauma, they are typically self-limiting and do not require exploration. However, penetrating injuries are different and are more likely to involve vascular structures. For this reason, exploration of penetrating injuries to Zone II is required. One tip: palpate the takeoff of the renal arteries on the involved side and snare both artery and vein with vascular loops **before** opening Gerota's fascia. Failure to do so frequently results in difficult to control bleeding from the kidney and

typically ends with a quick nephrectomy for control.

Zone III: This zone encompasses the entire retroperitoneum below the bifurcation of the aorta and vena cava. Hematomas in this zone are treated differently based on whether they are associated with blunt or penetrating trauma.

Blunt Zone III injuries are usually due to bleeding from pelvic bones, or vessels in a venous plexus. These cannot be easily managed operatively. If the hematoma is stable, no further treatment is usually needed. However, if it is expanding, the pelvis can be packed tightly and the abdomen temporarily closed. If hemodynamic stability can be maintained, the patient can be sent to interventional radiology (or a hybrid OR) for embolization and temporary stabilization of the pelvic fractures.

Penetrating injuries to Zone III are another matter. These frequently involve the iliac vessels or major branches. If the hematoma appears to originate in the vicinity of one of these vessels, it should be explored **after obtaining proximal vascular control**. Failure to do so frequently results in frantic attempts to achieve control after the fact.

If the hematoma from penetrating injury is well away from the vessels in Zone III, it can be ignored.

CT After Laparotomy For Penetrating Trauma

The general rule for penetrating trauma, especially gunshots to the abdomen, is that **you don't need to obtain a CT scan to help you decide to go to the OR**. (Of course, there are a few exceptions.) And the corollary has always been that **you don't need to get a CT scan after you operate for penetrating trauma**.

But the trauma group at UCSF questioned this. They retrospectively looked at 5 years of data on patients who underwent trauma laparotomy without preoperative imaging. They focused on new findings on CT that were not reported during the initial operation.

Here are the factoids:

- 230 of 328 patients undergoing a trauma lap did not have preop imaging
- 85 of the 230 patients (37%) underwent immediate postop CT scan. These patients tended

to have a gunshot mechanism and higher injury severity score.

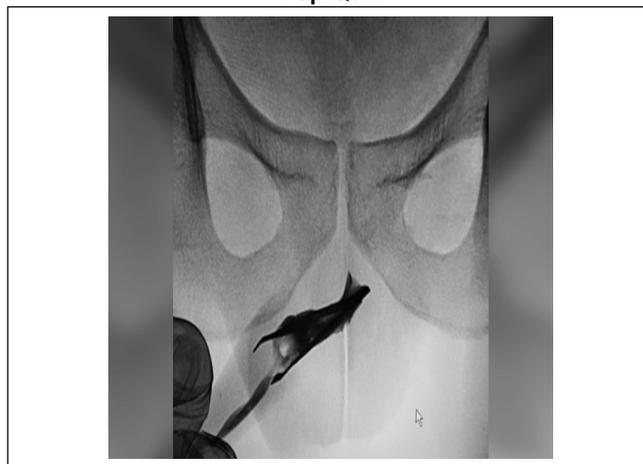
- **Unreported injuries were found in 45% (!)** and tended to be GU and orthopedic in nature
- 47% of those with unreported injuries found required some sort of intervention

Bottom line: This is a very interesting and potentially practice changing study. But it unfortunately never made it through the review process to become a published work. There is some opportunity for bias since only select patients underwent postop scanning, not all of them. Nevertheless, one in five patients who did get a postop scan had an injury that required some sort of intervention. This study begs to be reworked to further support it, and to develop specific criteria for postop scanning.

Having said all that, I think that this could be a valuable best practice in selected patients. I have used it myself on occasion, and have frequently found additional injuries on the scan. Luckily, none to date have mandated a significant change in management (e.g. reoperation). But this technique has the potential to do so and this can only benefit the patient.

Reference: Routine tomography after recent operative exploration for penetrating trauma: what injuries do we miss? Poster #14, EAST Annual Scientific Assembly 2017.

Pop Quiz



Identify the problem. I'll poll the audience on the blog when this is released to all newsletter readers.



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