

This month, I've selected a variety of topics of interest to a wide swath of trauma professionals. I've entitled it "Potpourri", even though some of the articles might not smell so good. I'll touch on some issues of interest to prehospital providers, physicians, nurses, and even pharmacists.

Prehospital Lactate Levels: The Data

A few months ago, I started to notice a new piece of information coming across on my trauma activation pages: **point of care lactate level**. I had heard nothing about this prior to these notifications, and was curious to know whether this was a new policy/practice, or some study that was in progress. So, of course, I had to do a little bit of reading to find out what was up with that.

Serum lactate has been used since forever in the inpatient setting, especially in the ICU. It is used as a measure of tissue hypoxia and/or metabolic acidosis. A number of studies have found that hypoperfusion is frequently underappreciated in the trauma bay, since we tend to use crude vital signs (BP and pulse) which may look normal in early hypovolemia. Serum lactate-guided therapy has been shown to improve survival in some studies, and can indicate that resuscitation is proceeding appropriately. Patients who do not show early improvement in their lactate levels are more likely to be refractory to resuscitation, and have higher mortality.

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TRAUMA CALENDAR OF EVENTS

WESTERN TRAUMA ASSOCIATION

LOCATION: CLIFF LODGE & SPA, SNOWBIRD UT

MARCH 5-10, 2017

TRAUMA, CRITICAL CARE & ACUTE CARE SURGERY

LOCATION: CAESAR'S PALACE, LAS VEGAS NV

MARCH 20-22, 2017

So it would make sense that if prehospital trauma professionals could identify occult tissue hypoperfusion in the field, appropriate resuscitation could start earlier. And nowadays, one can find a point of care device to measure just about anything. Thus, the extra tidbit of information on my trauma pages was finally explained

But remember, **just because something makes sense doesn't mean that it actually works**. Thus, a group at the University of Birmingham (in the UK) did a systematic review of the literature through 2015, looking specifically at lactate levels obtained in the prehospital setting.

Here are the factoids:

- Of the 2,415 articles screened, **only 7 were suitable for analysis**
- These studies were judged to be of **"low" or "very low" quality**
- The methods by which the lactate levels were obtained (venous vs capillary), timing, and documentation were highly variable
- The authors concluded that **there is not yet enough data to support point of care lactate in the field**

Bottom line: Point of care lactate drawn in the field would seem to be a good idea. Unfortunately-

ly, there aren't any studies yet that are good enough to make this a standard practice. As with any new technique, if there's no data then you **MUST participate in a well-designed study so it can be shown, yea or nay, that the practice is a good one and worth the additional time and money. So join up!**

Reference: Prehospital point-of-care lactate following trauma: a systematic review. J Trauma 81(4):748-755, 2016.

Aspirin For DVT Prophylaxis In Trauma

The use of mechanical and pharmacologic prophylaxis for prevention of deep venous thrombosis (DVT) and venous thromboembolism (VTE) in trauma patients is nearly universal. But, no matter how closely we adhere to existing guidelines, some patients will develop these conditions anyway. Indeed, about 80% of patient who suffer some type of VTE event were receiving prophylaxis at the time.

Trauma is a major factor in causing hypercoagulability. Although current chemoprophylaxis focuses on clotting factors, platelets play a big part in the clot formation process. Our usual drugs, though (various flavors of heparin), have no effect on them.

What about adding aspirin to the regimen? My orthopedic colleagues have been requesting this for years. There is a reasonable amount of data in their literature that it is effective in preventing DVT **in patients with knee arthroplasty only**. As usual, it is misguided to try to generalize management based on experience from one specific body region or operation.

A single Level I trauma center reviewed its data on aspirin prophylaxis for trauma patients. They reviewed their registry data from 2006 to 2011. A total of 172 trauma patients with duplex ultrasound proven DVT were identified. These patients were matched with 1,901 control patients who underwent at least one duplex and never developed DVT. Matching was performed carefully to ensure that age, probability of death, number of DVT risk factors, and presence of TBI were similar. **The total number of matched patients studied was 110.**

And here are the factoids:

- About 7% of patients with DVT were on aspirin at the time of their injury, vs 14% of the matched controls
- 7% were also taking warfarin, and 4% were taking clopidogrel
- Analysis showed that **patients taking aspirin had a significantly decreased chance of DVT after injury**
- On further analysis, it was found that **this effect was only significant if some form of heparin was given** for prophylaxis as well.

Bottom line: So before you run off and start giving your patients aspirin, think about what this study said. Patients taking aspirin before their injury and coupled with heparin after their injury have a lower rate of DVT. It gives us no guidance as to whether adding aspirin after the fact, or using aspirin alone, are useful. And we still don't know if any of this decreases pulmonary embolism or mortality rates.

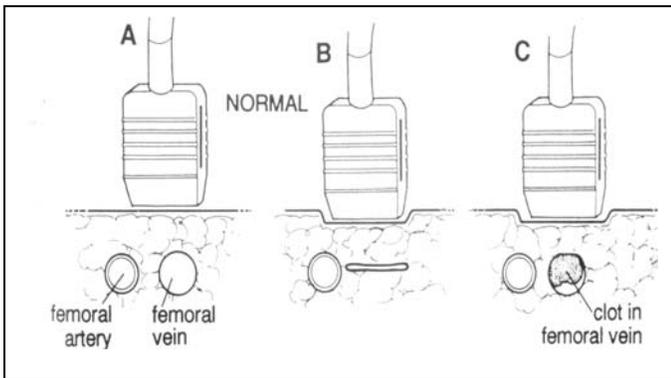
Reference: Aspirin as added prophylaxis for deep vein thrombosis in trauma: a retrospective case-control study. J Trauma 80(4):625-30, 2016.

Duplex Ultrasound For DVT: How Does It Work?

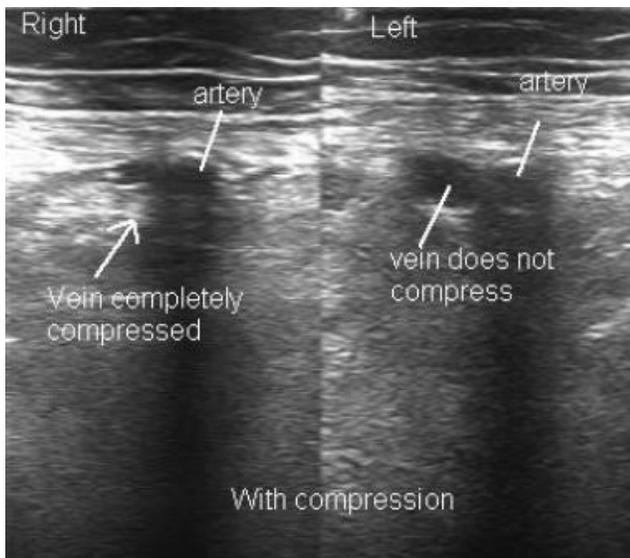
Admit it. You're curious. You order this test for your trauma patients all the time but you've never seen it done. It's simple and noninvasive, but it does require physical access to all areas to be evaluated. This means that extremities that are casted or splinted, or that have extensive dressings in place may be incompletely evaluated.

The study is called "**duplex**" because it makes use of **two modalities**: traditional ultrasound and Doppler ultrasound. Traditional ultrasound is used to view the compressibility of the veins of interest at a number of locations. Doppler measures the speed of blood flow under the probe, and can show areas of sluggish flow.

The following diagram shows the traditional ultrasound technique being used to compress the vein of interest (femoral, popliteal, etc.). Panel A shows the probe gently resting over the vessels. Panel B shows a fully compressible vein (normal), and Panel C shows partial compression due to the presence of thrombus.



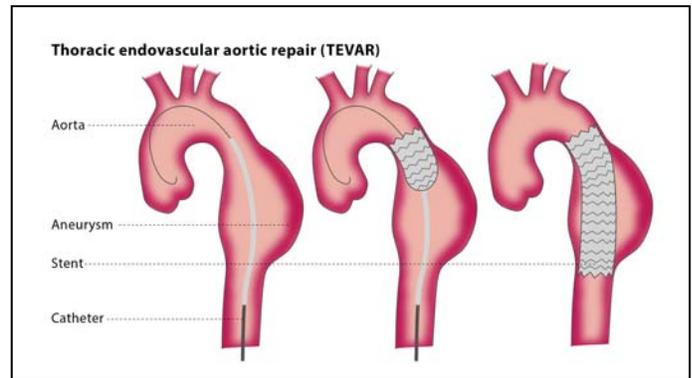
The following image shows what the actual ultrasound study looks like. The right side is normal, but the left side shows a venous thrombosis.



Long Term Experience With Endovascular Aortic Repair

For decades, the treatment of blunt injury to the thoracic aorta was open repair. The big debate at the time was use of cardiac bypass vs fast clamp and sew. But starting in 1997 with the introduction of thoracic endovascular aortic repair (TEVAR) of this injury, we have rapidly moved to the point where most traumatic aortic injuries are repaired using this technique.

A report that was written nearly a decade ago indicated a relatively high complication rate for the procedure. Graft complications were reported in 18% of patients, with 14% showing endoleaks. Stroke and left arm ischemia were also reported.



The diagram above shows insertion for management of an aneurysm, but the technique is similar for trauma. Blunt aortic injury occurs closer to the left subclavian artery and care must be taken to place the endograft closer to but not covering its orifice.

As the insertion systems and stents improved, short term events have been on the decline. Unfortunately, long term followup data has been hard to come by.

Until now. An article that is not yet in print reports 11 years of experience and followup with patient undergoing TEVAR at the ShockTrauma center in Baltimore.

Here are the factoids:

- 88 patients underwent TEVAR during the study period, all from blunt trauma
- Average ISS was 38, showing these patients were severely injured
- Overall mortality was 7%, but **none was due to the TEVAR procedure**
- **TEVAR-related complication rate was 9%**
- Endoleaks at the ends of the graft occurred in 4 patients, and all required repair. There were 4 other minor leaks that resolved on their own.
- 26 had all or part of the left subclavian orifice covered at initial operation. None developed ischemia, although 2 had a prophylactic carotid-subclavian bypass before TEVAR.
- The longest followup imaging occurred 8 years after the procedure. No long-term complications were noted.

Bottom line: TEVAR has essentially replaced open repair of the aorta, except in special cases. We continue to learn from our experience, and the

complication rate is still falling. Other than endoleaks recognized in the postop period, most other complications rarely occur. Long term followup is poor, but in the patients who do return, there were no complications. But remember, this is an expected sampling bias. If the patient had major problems and/or died, they would just be lost to followup. We would never know.

Reference: Long-term outcomes of thoracic endovascular aortic repair (TEVAR): a single institution's 11-year experience.

Do We Need Cervical MRI Scans If The CT Is Negative?

The debate on how to clear the cervical spine just never ends. We have finally come to some degree of agreement that certain patients (awake, alert, not impaired or head injured, without distracting injury) can undergo clinical clearance alone.

But if those criteria are not met, what next? Universally, adults receive a CT scan of the cervical spine. In the majority of centers, this is coupled with a good clinical examination. And if both are negative, the collar can be removed.

But recent literature suggest that a good, high-quality cervical CT read by a skilled neuroradiologist may be good enough. This has been demonstrated in several papers involving patients who are comatose or otherwise unable to participate with a clinical exam.

Many centers and trauma professionals are still reluctant to remove the cervical collar without that clinical examination. A new study asked the question: **would an MRI provide additional, significant information over and above the CT scan** in those patients who could not be examined or had persistent neck pain?

A consortium of 8 Level I and II trauma centers in New England participated in this study coordinated by Yale. Blunt trauma patients who underwent MRI after negative cervical CT were considered for the study. On further review, if they received the scan because they could not be clinically evaluated, or if they had complaints of persistent neck pain, they were enrolled. CT scanners with

at least 64-slice capabilities were required. There was no mention of the qualifications or special experience of the radiologists reading the images at each center.

Here are the factoids:

- 767 patients were enrolled in this 30-month study. A total of 43% were for persistent neck pain, 44% for inability to examine, and 9% for both.
- Nearly a quarter had an abnormal MRI scan:
 - 17% ligamentous injury
 - 4% soft tissue swelling
 - 1% disk injury
 - 1% dural hematoma
- The collar was removed in most (88%) patients with a normal MRI, but in only 13% with abnormal MRI
- 11 patients underwent a surgical procedure and half had neurologic signs or symptoms. 10 of them had ligamentous injury, 1 had dural hematoma, and 1 had both

Bottom line: Looks almost compelling, right? One would think that we had better get an MRI on all of these patients! But read more closely, please. Yes, injuries were found. But did they really "require" an intervention? For some injuries, it's a chip shot. A three column ligamentous injury equals stabilization in any textbook. But management of lesser injuries is less clear. And could some of these injuries have been recognized by a skilled neuroradiologist reading the CT image?

So what to do? There is not enough data for a universal protocol yet. Unfortunately, you will need to develop your own institutional policy based on the experience and opinions of your spine and neurosurgeons. They are the ones who will have to deal with the decision making during and after these studies. Until the definitive study comes along.

Reference: Cervical spine MRI in patients with negative CT: A prospective, multicenter study of the Research Consortium of New England Centers for Trauma (ReCONNECT). J Trauma 82(2):263-269, 2017.



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