

ANESTHESIOLOGY™ 2014

OCTOBER 11-15 | NEW ORLEANS, LA

Session: L088
Session: L113

This Epidural Catheter Is Not Working Well. What Should I Do?

Miguel A. Cruz, M.D.
Cleveland Clinic Foundation, Cleveland, OH

Disclosures: This presenter has no financial relationships with commercial interests

Stem Case and Key Questions Content

A 77-year-old female ASA 2 is scheduled for a left total knee replacement. Past medical history includes HTN, negative adenosine stress test, and tachycardia of unknown etiology, well controlled with metoprolol.

1) Discuss anesthetic and monitoring options and defend your plan by describing advantages and disadvantages for regional versus general anesthesia

The patient underwent an otherwise uneventful total knee replacement (TKR) under epidural anesthesia with lidocaine 200 mgs and fentanyl 50 mcgs in fractionated doses. During the closing period the patient complained of pain and a bolus of 5 ml of ropivacaine 0.2% was given, followed by a continuous epidural infusion of 5ml/hour.

2) Describe the differential diagnosis in a situation where a previously working epidural catheter does not cover the pain anymore.

Upon arrival to the PACU, the patient is alert, and stable with an adequate sensory block at L1-2. After a couple of hours the patient is sent to a regular nursing floor and has some dinner. She now complains of persistent pain in the left lower extremity. The surgery resident gives 100mcg of fentanyl which seems to help the pain for about 20 minutes; however the pain returns and this time it is more severe. The nurse is worried and calls the resident again who decides to call you to control the pain.

3) What is your differential diagnosis now?

4) Discuss the options of failed epidural analgesia. What is your response to the surgical resident who asks, "What other kind of a block can you do now?"

The physical examination reveals a cold and a pale left foot with some numbness, associated with loss of the pedal pulse and lack of DP and PT Doppler signals.

5) Discuss the importance of communicating with the surgical team. Would you do any other stat consult?

6) Discuss the steps you can do to confirm your diagnosis.

7) What can you do to improve the outcome?

No improvement was observed with the removal of the surgical dressing. You have consulted the orthopedic and vascular surgery teams. The vascular surgeon has recommended an

ANESTHESIOLOGY™ 2014

OCTOBER 11-15 | NEW ORLEANS, LA

emergent angiogram for possible vascular compromise. The on call anesthesiologist mentions that the patient has a full stomach.

8) What is your response? Discuss the anesthetic options now.

You do a rapid sequence induction of general anesthesia but notice significant hypotension after induction.

9) Discuss the differential diagnosis of this hypotension.

10) What do you expect an arterial blood gas will show?

The angiogram shows a popliteal vein injury below the knee with some hematoma. Drainage of a popliteal hematoma with repair of the left below-the-knee popliteal artery and vein injury with lateral fasciotomy is done. The patient tolerates this well and after emergence and extubation is taken to the PACU. The surgeon orders a heparin bolus and infusion.

11) Does this change your plan for further analgesia and why?

12) Name ASRA recommendations for continuous epidural analgesia and anticoagulation?

Model Discussion Content

Ongoing severe postoperative pain is a demanding scenario for the patient, the anesthesiologist, the surgeons and the post anesthesia care team. Despite improvement in use regional techniques and better pharmacotherapy, moderate to severe postoperative pain in the post anesthesia care unit is still unacceptably high. Patients' suffering and dissatisfaction impair the delivery of a good outcome and the CMS metric - good practice evaluation.

The accuracy of postoperative pain assessment is complex and requires a great degree of suspicion and more than merely addressing the pain intensity but also understanding its nature and character.

There are five well-accepted types of pain: nociceptive, neuropathic, psychogenic, mixed and idiopathic. Poorly controlled, postoperative nociceptive pain is assumed to be the source of suffering in the majority of our patients and initially demands a progressive titration of painkillers to catch up with relief. When a continuous regional analgesia is on board a first presumption is under-medication of analgesics. Less commonly epidural failure should be considered if a effective analgesic method was previously documented.

Contrary to the general belief, the epidural failure rate is about 30% (32% for thoracic and 27% for lumbar). Epidural catheters can be placed incorrectly, or turn out to be dislodged during the course of management. In obstetric patients, failure of epidural analgesia after initial success is observed in 6.8%.

Another group of rare but potentially disastrous causes of ongoing pain is related to anesthetic (malpositioning, neural injury during axial or peripheral nerve blocks) or surgical (injury of the proximity structures during the course of a procedure) mishaps.

Compartment syndrome is an important diagnosis in differential when the patient complains of a tourniquet like pain and altered sensation in a well defined extremity that has undergone an

ANESTHESIOLOGY™ 2014

OCTOBER 11-15 | NEW ORLEANS, LA

anesthetic or surgical procedure. The so called classic “5 Ps”: pain, pallor, paresthesia, paralysis and pulselessness are strongly suggestive of this situation.

Compartment syndrome is an infrequent but potentially devastating complication of any limb trauma such as crush syndrome, coagulopathic state, snakebite or even orthopedic or vascular surgery. Extremities have a low-pressure muscular compartments, divided by inextensible fascia with nerves and vessels inside, allowing venous blood return. An increase in its internal pressure caused by muscle necrosis or intra-compartmental injection of large volume of fluids, tissue edema, and hematoma, or by external compression by tight wound dressing or cast can compromise venous return and ultimately arterial perfusion.

Pain is the first symptom. Its management is not discretionary but mandatory for medical reasons and the cause of the pain demands an etiopathological understanding by the treating clinicians. Close communication with the patient is imperative. An individually addressed analgesia technique which provides comfort to the patient - without hiding the ongoing pathologic condition - is necessary.

In the pediatric population the use of continuous epidural analgesia after orthopedic surgery is a matter of ongoing debate in the setting of compartmental syndrome. The use of low concentration mix of bupivacaine 0.1% plus fentanyl has shown not delay in its diagnosis. As inferred from the discussion above, the most sensitive clinical indicator of the development of a compartment syndrome is an increase in the requirement for pain medication. Pain has been considered the cardinal diagnostic sign and indeed the choice of the analgesic technique has significant implications. It antedates other clinical symptoms by an average of 7.3 hours. Intense analgesic therapy and post-anesthetic sedation, without serious thought of the cause of increasing analgesic requirements or failure to reach an acceptable pain control, have been implicated as reasons for diagnostic delays leading to unfortunate outcomes. Therefore the diagnosis must be considered when usual doses of opioids or local anesthesia infusion do not relieve the pain or are no longer effective. The clinical evaluation of distal perfusion and tissue oxygenation of the limb is then mandatory.

Delays in the appropriate management can result in serious disabilities such as neurological deficits, amputations, muscle necrosis and even death.

Disastrous outcomes have occurred when fasciotomies were delayed for 12 hours; on the other hand, a full recovery can be expected if decompression is done within 6 hours.

Peripheral nerve blocks, femoral and sciatic or epidural analgesic infusions are helpful for TKR. They have shown to reduce postoperative pain, opioid consumption and its related adverse effects, shortened in-hospital stay and improved rehabilitation. In the sensory range without a motor block, these are valuable tools in the accurate and prompt diagnosis of complications. The ASRA 2010 recommendations for the use of regional anesthesia and anticoagulation with heparin are:

Combining neuroaxial techniques with intraoperative anticoagulation with heparin during vascular surgery is acceptable with the following recommendations (Grade 1A)

- Avoid the technique in patients with other coagulopathies.
- Delay heparin administration for 1 hr after needle placement.

ANESTHESIOLOGY™ 2014

OCTOBER 11-15 | NEW ORLEANS, LA

- Remove indwelling neuroaxial catheters 2 to 4 hrs after the last heparin dose and assess the patient's coagulation status; re-heparin 1 hr after catheter removal.

Currently, insufficient data and experience are available to determine if the risk of neuroaxial hematoma is increased when combining neuroaxial techniques with the full anticoagulation of cardiac surgery.

We suggest postoperative monitoring of neurologic function and selection of neuroaxial solutions that minimize sensory and motor block to facilitate detection of new/progressive neurologic deficits (Grade 2C).

Monitor the patient postoperatively to provide early detection of motor blockade and consider use of minimal concentration of local anesthetics to enhance the early detection of a spinal hematoma. Although the occurrence of a bloody or difficult neuroaxial needle placement may increase risk, there are no data to support mandatory cancellation of a case. Direct communication with the surgeon and a specific risk-benefit decision about proceeding in each case is warranted.

Acute postoperative pain is still frequent and demands our best effort to prevent patient suffering and improve peri-operative satisfaction.

Pain deserves our attention, and not just quantification but characterization depending on the magnitude of the lesions, anesthesia technique and corresponding state of consciousness of the patient. The patient's entire clinical condition has to be continuously reviewed in the peri-operative period.

Some relatively uncommon, but devastating, complications related with the anesthesia or surgical procedures require a high level of suspicion. It is necessary to expedite treatment to prevent further complications and improve outcomes.

Compartment syndrome is one such dreadful complication in the postoperative setting. Pain is the first symptom and precedes clinical findings by hours. Therefore close communication with the patient is imperative. Individually addressed analgesic techniques that provide comfort to the patient should be initiated but they should not potentially mask an ongoing pathological condition. Early recognition of the compartment syndrome and the execution of extensive fasciotomies as soon as possible in order to restore the blood supply to the compromised extremity is the pillar of the management.

Postoperative analgesia is paramount in modern anesthesia management. Regional analgesia is becoming an integral part of orthopedic anesthesia practice due to its low risk of complications and its potential advantages.

This PBLD stresses the importance of maintaining a high index of suspicion in the prompt and accurate diagnosis of compartment syndrome.

References

- 1- Apfelbaum JL, et al. Postoperative pain experience: results from a national survey suggest postoperative pain continues to be under managed. *Anesth Analg* 2003; 97:534-40.
- 2- Gandhi, K. Acute pain management in PACU. *Anesthesiology Clinics* Volume: 30 Issue: 3 (2012-09-01) p. e1-15. ISSN: 1932-2275.
- 3- Hermanides, J et al. Failed epidural: causes and management *British Journal of Anaesthesia* 109 (2): 144-54 (2012)
- 4- Elliott KG, Johnstone A. Diagnosing acute compartment syndrome. *J Bone Joint Surg Br* 2003;85:625-32
- 5- Mar GJ, Barrington MJ and McGuirk BR. Acute compartment syndrome of the lower limb and the effect of postoperative analgesia on diagnosis. *Br J Anaesth* 2009;102: 3-11
- 6- Macfarlane AJR, Prasad GA, Chan VWS, Brull R. Does Regional Anesthesia Improve Outcome After Total Knee Arthroplasty? *Clin Orthop Relat Res* on line 07 January 2009.
- 7- Dalens B. Some current controversies in paediatric regional anaesthesia *Current Opinion in Anaesthesiology* 2006, 19:301-308
- 8- Dunwoody JM, et al. Compartment syndrome associated with bupivacaine and fentanyl epidural analgesia in pediatric orthopaedics. *J Pediatr Orthop* 1997; 17:285-288.
- 9- Manion S, Capdevilla X. Acute Compartment Syndrome and the role of Regional Anesthesia *Int Anest Clinics* 2010 vol48(4)85-105.
- 10- Abbal B, Capdevilla X, Jomha N, Menon M. Pro-Con Regional Anesthesia in the Patient at risk for Acute Compartment Syndrome *ASRA News* May 2013: 4-8
- 11- Horlocker T, et al. Regional Anesthesia in the Patient Receiving Antithrombotic or Thrombolytic Therapy: American Society of Regional Anesthesia and Pain Medicine Evidence-Based Guidelines (Third Edition) *Regional Anesthesia & Pain Medicine*: January/February 2010 - Volume 35 - Issue 1 - pp 64-101