



Problem Based Learning Discussion (PBLD): Answers to the Questions

90 year old lady with femur fracture aortic stenosis and coumadin therapy

CASE DETAILS: A lady of 90 years of age has a pole fall onto her thigh, and she acquires an open distal femur fracture. The surgeons, would ideally like to washout, reduce and plate the fracture. The lady is in pain. Prior to the injury she was ambulatory and lived at home with her family. She was orientated previously and knew her great grand children's names. She walked about the house. Her medical records state she had a severe aortic stenosis with a loud mid-systolic murmur, and for a long time according to her daughter. She is on coumadin therapy "because of her heart". Her granddaughter is her legal guardian. Assume all other health aspects are normal for age or not significantly deranged.

DISCUSSION QUESTIONS;

1. Would anybody recommend surgery for this lady or alternatively recommend no treatment and only provide analgesia? Motivate the answer that you choose.
 - In general if a patient enjoyed a good quality of life and "was a joy unto others, and others were a joy unto her" one should very strongly consider doing all reasonable things to restore them to that former state of good life quality life.
 - In general if a patient was bed ridden living a lonely life in a facility and the patient had no interaction of value with anyone she could love or who loved them, then palliative care or "comfort care" is advised. There is little to argue for making big efforts to extend suffering.
 - This lady is good candidate to attempt relatively small surgery which should have a relatively fast good outcome.
2. What are the risks to the patient of being operated?
 - Her advanced agedness suggests she has all the well-known problems of aging; namely diminished renal function, diminished cardiac output, impaired ability to mount a sympathetic response to blood loss, high risk of developing postoperative cognitive dysfunction, hepatic dysfunction affecting liver dependent drugs (muscle relaxants, digoxin, antibiotics), risk of subclinical hypothyroidism.
 - Her anti-coagulation increases the risk for surgical bleeding and neuraxial bleeding with neuraxial regional anesthesia. Normalizing her coagulation causes delays in her surgery.
 - Delays in surgery increase her risk to develop pneumonia and DVT.
 - The severe aortic stenosis makes her intolerant of sudden severe loss of peripheral vascular resistance, like with a spinal anesthetic. She has a fixed cardiac output state that will be very pre-load dependent.
 - The foremost operation risk to inform the family is that she could die under surgery or soon after that. Estimate **5% death chance**.
3. What are the risks to the patient of not being operated?
 - Not being operated commits her to being bed ridden, and particularly immobile due to her leg pain. She will be at risk of DVT, pneumonia, and substantial loss of cognitive dysfunction and death within 4 to 6 weeks if left unoperated and only given analgesia. She would never walk independently again. Estimate **40% death risk in 1 month** and 90% death risk in 12 months.



4. Assuming one proceeds to surgery, tabulate the foremost anesthesia challenges.
 - The foremost challenges are; (1) to make surgery possible, (ii) to avoid severe and sudden leg vasodilation or cardiac afterload reduction (avoid spinal anesthesia), (iii) avoid myocardial depression (propofol induction and volatile based anesthesia), (iv) avoid liver and renal dependent muscle relaxants.
5. Discuss separately, the anesthesia management options and concerns for each anesthesia challenge in general.
 - Liver impaired drug clearance; Use cisatracurium for long acting muscle relaxant, Succinylcholine is OK, if needed. Avoid sustained dosing of large doses of β -blockers, long acting opiates, and infusions of local anesthetics.
 - Beware of suggamadex allergic response.
 - Endocrine system; beware that opiates may induce severe respiratory depression and delayed recovery.
 - Renal system; A normal creatinine may conceal a 75% loss of renal function. Beware renal cleared muscle relaxants, and some antibiotics.
 - Respiratory system; they are more prone to post-operative hypoxia due to increased V/Q mismatch and lower closing volumes. They eliminate volatile gasses very slowly.
 - Reduced cardiac output from aging as well as from severe aortic stenosis; avoid spinal anesthesia. Avoid volatile anesthesia. Avoid propofol.
 - Anticoagulation; avoid neuraxial nerve blocks. Attempt to improve INR before surgery. Stop coumadin, administer fresh frozen plasma. Aim for an INR under 1.5 and absolutely under 2.0. Peripheral nerve blocks can be done in the presence of mild to minimal anticoagulation, including psoas compartment blocks.
6. Choose your personal complete anesthesia plan for this lady.
 - Would your plan change were she not anticoagulated? ANSWER = The absence of coagulation disturbance makes spinal anesthesia safe, generally, but in this case the problem of severe aortic stenosis, (assuming the diagnosis is correct) still contra-indicates spinal anesthesia. Segmental epidural anesthesia is arguably a possibility in expert hands. QUESTION; What dermatomes will need to be blocked, and how should the epidural be done?
 - Use isobaric, not hyperbaric drugs.
 - Would your plan change if you discovered she had never had angiography of her heart nor ultrasound examination? ANSWER = In the advanced aged it is not uncommon for patients to have **aortic sclerosis** which produces loud cardiac murmurs, but with minimal blood flow impairment. Supporting this possibility is the fact the aortic stenosis has never been verified with any special examination, and this ladies long survival. Her murmur has been known to exist for approaching 20 years. If she demonstrates good exercise tolerance like ability to walk up one flight of stairs however slowly, then one could take a cautious risk and perform spinal anesthesia, but with heightened monitoring (arterial line), prophylactic vasoconstrictors and very attentive blood pressure and fluid management. Very bad prognostic signs would be (A) known evidence of aortic valve cross sectional areas or 1.0 cm^2 and much less like under 0.6 cm^2 . In that case spinal anesthesia would be swiftly lethal. The risks of aortic stenosis are even greater in an aged person due to their additional aging induced loss of contractility impairing the ability to increase cardiac and also from their loss of sympathetic reflexes. In Addition (B) any current signs of cardiac failure, or history of cardiac failure in the recent year are bad prognostic signs for person with aortic stenosis. Persons with severe aortic stenosis seldom live longer than 2 years after the first signs of cardiac failure appear.



- What are the regional anesthesia options one could consider for this lady? *ANSWER = Neuraxial blocks are contra-indicated due to the warfarin therapy. The surgery can be done under peripheral nerve blocks. There are two options; (A) PERIPHERAL SPECIFIC NERVE BLOCKS ONLY; High grade femoral nerve block (e.g. 15 ml of 0.75% ropivacaine, high grade lateral cutaneous nerve of thigh (LCNT) block (10 ml of 0.75% ropivacaine), medium grade sciatic nerve { GT-IT line} block (10 ml of 0.4% ropivacaine) and medium grade obturator nerve block (5 ml of 0.4% ropivacaine) , or (B) Psoas compartment block (= femoral, obturator, LCNT) (25 ml 0.75% ropivacaine) and sciatic parasacral sciatic nerve block (10 ml 0.4% ropivacaine). The psoas compartment block sets up slowly and a soak time of over 35 minutes is needed before preparation for surgery can start.*
 - How would you do general anesthesia for this lady? *ANSWER = The only justification for general anesthesia is that there is no one available with regional anesthesia skills nor is there an option of timely referral to person and places with such skills. Induction should be with etomidate and maintenance be an opiate dominant anesthetic, like remifentanyl in anesthesia doses (> 0.1 microgram/kg/min).*
 - What special monitoring would you use during the anesthetic? *Added special monitoring should include an arterial line, inserted before induction of anesthesia if possible, and urine output.*
7. Would you ever consider referring her to another colleague for anesthesia care or to another center for anesthesia and surgery care?
- *We have an insufficient culture of referring patients in anesthesiology to another colleague with a special anesthesia skill, perhaps best needed by a particular patient. In a large institutional department it is a bit easier, but definitely not entirely so. Such referrals are also much harder to do at night or on weekends. At the least "share" the case with a colleague by consulting and seeking advice, or partial help. This especially applies when peripheral regional anesthesia is inarguably best for a particular patient.*
8. You discover, during a ward round, on the morning before surgery that a grandson of the lady, whom you have not met yet, is asking her to sign an updated will. Does this concern you and do you act in any way?
- *This is not an uncommon event, where a greedy family member tries to steal an inheritance via a last-minute change in the will of a person about to die or likely to die.*
 - *Consider administering, assuming surgical consent is already obtained, a very small dose of benzodiazepine, e.g. 1 mg, to the patient. Then tell this grandson that the patient will be per definition not legally fit to sign their own medical consent and any other legal documents.*
 - *Eject the person from the ward under guide of needing to care for the patient and notify (i) the guardian of the patient, and (ii) the institutional legal advisors.*
 - *It is only your own personal decision whether to care or not about this dilemma. It is only your own personal decision whether to take any actions or not.*

Causes of fixed cardiac output states;

1. Severe aortic valve stenosis
2. Severe mitral valve stenosis
3. Pericardial effusion / tamponade