

Case 1: Title - Patient Decline after Stellate Ganglion Block

Patient Name: Oliver Cleveland

Rationale:

Stellate Ganglion blocks are commonly used to treat patients with upper extremity Complex Regional Pain Syndrome (CRPS) type II. These blocks are performed at the level of the neck. Thus, the risks associated with this procedure include intravascular injection (namely into the vertebral artery, causing a grand-mal seizure and/or cardiovascular collapse), pneumothorax, intrathecal injection total spinal anesthesia, and vasovagal reactions to the procedure. Therefore, it is important for the Pain Medicine physician to readily diagnose and treat of each of these potential complications, as well as be able to communicate with the Pain Medicine team in the event of these crises, and follow ACLS guidelines should the patient require resuscitation.

Guided Study Questions:

- Describe stellate ganglion block.
- Discuss the indications and technique for a stellate ganglion block.

-Discuss potential complications associated with stellate ganglion block,¹

-What are the signs, symptoms, and treatment for each complication?

-List the important steps for patient resuscitation in the case of an arrest.

Case Stem:

The subject is Pain Medicine Physician at a teaching institution in which the subject supervises trainees. The patient, a 50-year-old man, has a typical chronic right hand pain secondary to CRPS type II. A stellate block performed in the Pain Medicine Center appears to be an appropriate therapy for him.

The patient is positioned supine on the procedure table, draped, monitored, and prepped by the aide. Fluoroscopy is not available. The Pain Medicine team, consisting of a trainee (actor), a Pain Medicine Nurse or Aide (actor) and a Pain Medicine Physician (subject) will be conducting the procedure. The trainee injects the local anesthetic and the patient's status begins to decline.

Roles:

(1) Pain Medicine Physician (subject): The subject can be an anesthesiologist, neurologist, physiatrist, or other physician who might supervise a trainee. They could be a Pain Fellow asked to be in a supervisory role.

(2) Pain Medicine Trainee (actor): The trainee will conduct the procedure under the supervision of the subject. He or she should be reasonably competent, but inexperienced with this procedure. He or she will look to the subject for guidance during the resuscitation and perform tasks effectively as directed.

(3) Patient Voice of Mannequin: The patient feels well initially and is fully cooperative. When the trainee begins placing the needle, the patient remarks that he is feeling “a little anxious” and that his palms feel “sweaty.”

During injection of local anesthetic the patients reports becoming dizzy, lightheaded, and nauseated.

If the scenario involves systemic local anesthetic toxicity, the patient will also state that “my lips feel numb” and that “there’s a funny taste to my tongue,” as well as “there’s some ringing in my ears.”

After the injection, the patient becomes unresponsive and his vital signs start to deteriorate, depending on the complication and associated

physiology. The patient does not respond to the team again unless resuscitated from a vasovagal reaction.

(4) The Pain Medicine Nurse (actor): The nurse assists with the procedure. He or she can be used as a valuable resource to the subject as he or she can gather any supplies, help with patient records, perform tasks such as chest compressions, and obtain further help for the subject, when given specific instruction.

Plot:

The trainee eagerly moves up to the patient's head on the right side. The patient is given 50 mcg fentanyl intravenously for the procedure.

Palpation of trachea to the right-sided crevice as per the paratracheal approach for a stellate block is performed. Then a ready 22-gauge needle connected via tubing to a 20 cc syringe is inserted perpendicular to the plane of the patient. The needle points directly to the back at the level of C6, or few mm below the level of the cricoid cartilage, medial to the sterno-cleidomastoid muscle. The trainee advances the needle until they report "feeling the C6 transverse process" and pulls back 2-3 mm. The trainee quickly injects 20 ml of 1% lidocaine, without aspirating first. As the trainee injects, the patient complains of feeling ill, depending on the

complication being simulated. Upon completion of the injection, the patient becomes unresponsive.

Physiology:

Patient is initially be awake, alert, and oriented at the beginning of the case. The vital signs are stable (VSS). There is a non-invasive blood pressure (NIBP) cuff on the upper extremity, EKG leads and pulse oximeter (S_pO_2) for monitoring.

Initial Vital Signs: heart rate 60-70 bpm; NIBP 120-130/70-80 mmHg; respiratory rate 12 bpm; S_pO_2 , 98%.

After 50 mcg of fentanyl is given the patient becomes slightly sedated. The respiratory decreases to 8, but is still awake and able to answer questions.

When junior trainee begins needle insertion, the heart rate increases to 90-100 bpm, NIBP rises to 140-150/80 mmHg, and respiratory rate increases to 25-30 bpm.

After the 20 ml injection of lidocaine, the following complications may be simulated. The degree of physiologic derangement is dependent on the speed and appropriateness of the Pain Medicine team interventions:

1. Intravascular injection leading to seizure: The patient immediately becomes unresponsive and shakes to simulate a grand-mal seizure, depending on mannequin capabilities. The EKG shows sinus tachycardia, the heart rate increases to 100-120 bpm, the NIBP increased to 150/90 mmHg, the respiratory rate decreases to 0-4 bpm, and the S_pO_2 slowly declines. Resolution occurs with airway protection, ACLS protocol and administration of anti-seizure medication.
2. Intravascular injection leading to dysrhythmia: The patient abruptly becomes unresponsive and asystolic. The blood pressure declines dramatically, the S_pO_2 reveals desaturation and the patient becomes apneic. Resolution occurs with ACLS protocol for asystole, including advanced airway management, CPR and administration of vasopressors. Resolution will also require administration of lipid rescue, request for immediate cardiac surgery consult to institute cardiopulmonary bypass, and transfer to an ICU with an appropriate diagnosis.

3. Intrathecal injection/High Spinal Anesthesia: The patient becomes unresponsive, sinus bradycardia to 30-40 bpm, the NIBP declines to 50-70/20-30 mmHg, S_pO_2 declines, and the patient becomes apneic. Resolution is dependent on ACLS protocol and administration of atropine, epinephrine or ephedrine for the bradycardia, fluid administration, airway management, and transfer to an ICU with an appropriate diagnosis.
4. Vaso-vagal Reaction: The patient states pre-dromal symptoms, such as sweating, dizziness and nausea. Patient then becomes unresponsive, bradycardic to 30-50 bpm with sinus pauses, hypotensive (70-80 mmHg systolic), shallow breathing pattern with respiratory rate <10 bpm, and desaturation ensues. Resolution occurs with administration of ephedrine or atropine, IV fluids, bilateral leg raises, and supplemental oxygen. If epinephrine is given, the patient will experience hypertension and tachycardia. The patient will resume normal vital signs after the vagal episode and proper management. The Pain Medicine team may request hospital admission for overnight observation with an appropriate diagnosis.
5. Pneumothorax: The patient states that he feels short of breath, then immediately becomes unresponsive. The vital signs change and reveal hypotension (60/30 mmHg), tachycardia (120-150 bpm), shallow breathing and high respiratory rate (30-40 bpm) and S_pO_2 (<90%). The

right side of the mannequin's chest will not rise during respiration, and breath sounds will be absent on the right. The trainee will state that the trachea is deviated to the right. Resolution will occur following advanced airway management, ACLS resuscitative support, and placement of a needle/catheter on the right hemi-thorax at the level of the second rib located on the mid-axillary line. The Pain Medicine team should also request a surgeon to come and place a chest tube, or else the pneumothorax will re-expand.

Patient Record:

History of Present Illness

Mr. Cleveland is a 50-year-old male with hypertension (HTN), hypercholesterolemia, and ankylosing spondylitis who arrives in the Pain Medicine Clinic 1 year after a motor vehicle accident (MVA), complaining of chronic right hand pain. The pain is not helped by anti-inflammatory therapy, physical therapy, or by other pain medications. The MVA involved a low speed head to head collision between his truck and a SUV. He was a restrained driver and the air bags were deployed. He sustained no major injuries and was able to walk away from the accident. He reports having paresthesias in his right hand that he describes as "tingling" in his fingers, and complains of "heat" and sweating of his hand. Sometimes he notices blotchy, purple patches to his hand and

forearm. At times, he drops objects from “weakness” in his hand. He denies any vision changes, diplopia, vertigo, or recent headaches. An evaluation by a neurologist diagnosed his ailment as complex regional pain syndrome type II. It has been refractory to 6 months of physical therapy. There is no surgical alternative. The patient is on disability from his construction job but drives a taxi-cab part time to help with bills. He complains that his hand pain is also interfering with this job.

Past Medical History

HTN – well controlled on his medication

Hypercholesterolemia

Ankylosing Spondylitis

Past Surgical History

s/p appendectomy at age 18 years

s/p cholecystectomy at age 27 years

Medications

Atenolol 25 mg QD, Atorvastatin 10 mg QD, Acetaminophen /

Oxycodone 1-2 tabs q6h PRN pain, Ibuprofen 600 mg TID PRN pain

Allergies

No Known Drug Allergies

Social History

Significant for 15 pack-year history of smoking, he currently does not smoke. Uses Ethanol occasionally. Denies using any other drugs. Prior construction worker on disability who works part-time as taxicab driver to supplement his income.

Physical Examination

Vital Signs: temperature 98.5 degrees F; heart rate 64 bpm; NIBP 138/84 mmHg; respiratory rate 11 bpm; S_pO₂ 98%

General: Well nourished middle aged gentleman, NAD

Neuro/HEENT: AAOx3, PERRLA, EMOI, cranial nerves intact, oropharynx clear. 3/5 weakness in right hand strength, dysesthesia with light touch of R fingers; other extremities have normal sensation, strength and motion; normal gait.

NECK: good carotid pulses b/l, no bruits, trachea mid-line, no thyromegaly;

CV: RRR, S1 S2, no murmurs or gallops

Lungs: CTA b/l, no wheezing or crackles

ABD: soft, NT, ND, normal bowel sounds

EXT: R hand diaphoresis and discoloration, increased warmth compared to left hand. Notable increased hair growth on fingers.

Laboratory / Radiology / Other Data

CBC: WBC 10.5, HgB 13.4, Platelets 378

Coags: INR 1.2, PT 13.8, PTT 29.7

MRI of the Neck: No evidence of disc or cervical pathology

Assessment and Plan of Care

Mr. Cleveland is a 50-year-old male with hypertension, hypercholesterolemia, and ankylosing spondylitis presenting with CRPS type II.

- (1) Perform (R) Stellate Ganglion Block
- (2) Reassess symptoms at 1 week

References:

¹ Saxena AK, Saxena N, Aggarwal B, Sethi AK. An unusual complication of sinus arrest following right-sided stellate ganglion block: a case report. *Pain Pract*. 2004, 4(3):245-8.

Case 2: Title - Treatment of Anaphylactic Shock in the Pain Medicine

Clinic

Patient Name: Margaret Washington

Rationale:

Anaphylaxis is a life threatening allergic reaction to a foreign antigen. Managing these reactions can be very challenging, and requires prompt diagnosis and treatment, as well as adequate communication amongst members of the care team. Anaphylaxis in the interventional Pain Medicine Clinic presents additional challenges to the Pain Medicine physician—the patients are often placed in prone position, and access to the airway obscured by fluoroscopy equipment. The present simulation course will challenge the Pain Medicine physician to diagnose and resuscitate a Pain Medicine Clinic patient experiencing anaphylaxis in the prone position.

Guided Study Questions:

- What are the signs, symptoms, and treatment of anaphylaxis?
- What are the potential complications associated with positioning a patient prone for a pain procedure?
- State the ACLS algorithm for patient resuscitation?

Case Stem:

The scenario takes place at a teaching institution in the Pain Medicine Clinic. This patient, a 48-year-old female paraplegic, requires an Epidural Steroid Injection (ESI) for severe back pain. Since the patient is an inpatient she will be brought to the Pain Medicine Clinic with her inpatient medications still running. During her hospital course, she was administered Ampicillin / Sulbactam, and had an apparent allergic reaction which was documented in her chart. However, the medical service caring for the patient felt this reaction was merely an infiltrated IV line. A new infusion of Ampicillin / Sulbactam has just been started prior to her transport down to the Pain Medicine Clinic. The patient is prepped in a sterile fashion, and placed in prone position for an ESI.

After administering a sedative to the patient, the subject begins injecting the ESI.

Just prior to the ESI procedure the patient becomes bronchospastic, tachycardic and hypotensive. The patient is experiencing anaphylactic shock from administration of the Ampicillin / Sulbactam. The subject will need to diagnose and resuscitate the patient.

Roles:

(1) Pain Medicine Physician (subject): The subject will be asked to conduct the ESI procedure, without fluoroscopy, and then have to diagnose and treat anaphylaxis.

(2) Pain Medicine Nurse (actor): The Pain Medicine Clinic nurse or aide (actor) will report that the patient is prone and ready procedure, as well as mention that the floor nurse placed a new IV and restarted the patient's medications. The aide will assist the subject with basic tasks, such as handing him instruments. When the crisis occurs, the aide will know where the resuscitation equipment is, as well as be able to turn the patient

prone to supine. He or she can also perform basic tasks such as chest compressions if specifically instructed.

(3) Patient Voice of Mannequin: The patient is a middle aged female with paraplegic who is about to undergo an ESI for severe back pain. She had a local reaction to Ampicillin / Sulbactam at the IV site earlier during her hospitalization which may have been an allergy or infiltrated IV line. She was restarted on the Ampicillin / Sulbactam just prior to her arrival in the Pain Medicine Clinic. The patient will experience anaphylaxis from her antibiotics while in the prone position.

Plot:

The patient has been brought to the Pain Medicine Clinic and placed in a prone position. There is no fluoroscopy for this procedure. The patient has just been started on a bag of Ampicillin / Sulbactam infused through her left upper extremity IV line. The patient has been connected to vital sign monitors—NIBP, EKG, and SpO₂ monitors. The vital signs are within normal limits at the onset of the simulation. The Pain Medicine team will be brought in to conduct the procedure, and the patient will begin complaining about her back pain. She states “will this really help my back pain? I really hope so, because I’m miserable. I’m tired of taking

pain pills.” She will also remark on feeling anxiety about the procedure.

The attending offers some reassurance and then administers 0.5 mg of midazolam IV to the patient.

The nurse/aide will report that the patient is ready and prepped in a sterile fashion for the ESI procedure. The aide will mention to the subject that the floor nurse placed a new IV and just restarted the patient’s medications.

The subject will begin the ESI. The aide will assist the subject by handing him equipment such as syringes. The patient soon becomes short of breath. She will say that she cannot breathe and feeling very warm in the face. She then begins to loudly wheeze and her vital signs start to deteriorate. She becomes tachycardic, hypotensive and her S_pO_2 declines as she enters into anaphylactic shock. After a few minutes, she becomes apneic and unresponsive.

When this occurs, the subject should recognize that there is a crisis and begin to manage the patient. Resolution of the crisis will occur if the subject: calls for help, stops the Ampicillin / Sulbactam infusion, uses the nurse/aide to flip the patient supine, utilizes ACLS protocol, administers epinephrine (possibly diphenhydramine and steroids), and controls the airway and ventilation.

Patient Record:

History of Present Illness

Ms. Washington is a 48-year-old paraplegic female s/p a motor vehicle accident 5 years ago with a T10 spinal cord injury, admitted for intravenous antibiotic treatment of chronic foot cellulitis. The patient is also a type-II diabetic, recently placed on insulin therapy. She reports that she had developed a pressure sore on the sole of her left foot several months ago that was not cared for immediately. The sore eroded further and became infected with MRSA. She was started on intravenous antibiotic therapy that appeared to improve the infection. Since then, she has had repeated episodes of cellulitis at the same site, requiring further intravenous antibiotic treatments. The last treatment was over 1 month ago. Two weeks ago, she noticed redness and swelling around the same area and called her family physician, who placed her on oral antibiotics. The infection did not appear to respond. She returns to Harvard Hospital for intravenous antibiotic treatment, since current nursing shortages have abolished home nursing support services for home administration near her residence. She is afebrile, denies any upper respiratory infection symptoms or recent chills or rigors.

Her other major admitting complaint is severe chronic low back pain that the level of T10, refractory to physical therapy. She is reluctant to continue her current pain regimen for fear of narcotic dependence, and she is seeking other avenues of treatment on this admission. She denies any other neurologic problems such as vision changes, paresthesias, seizures, or headaches. The patient self-catherizes herself for micturation, and is able to use a bedpan for defecation.

Past Medical History

Paraplegia status post motor vehicle accident 5 years ago after Spinal Cord Injury at T10

Chronic Lower Extremity Cellulitis

Type II Diabetes Mellitus.

Chronic Low Back Pain

Depression

Past Surgical History:

s/p Appendectomy, 20 years ago

s/p Maxillary and Facial Reconstructive Surgery – 4-5 years ago

s/p Varicose Vein Stripping – 10 years ago

s/p B/L Breast Augmentation – 11 years ago

Medications

Acetaminophen / Oxycodone 2 tabs q4-6hrs PRN

Oxycodone time release 20mg BID

Amoxicillin and Clavulanate 500mg q8h for 14 more days

Insulin 5U NPH QAM

Insulin 5U NPH QPM

Citalopram 20mg QD

Ibuprofen 600mg TID PRN

Allergies

Morphine

Iodinated contrast dye

Clindamycin

Social History

Denies smoking cigarettes. Drinks occasional 1-2 glasses of wine. Denies illicit drug use. The patient lives at home and is able to complete activities of daily living with minimal assistance. She is divorced and has 2 children which currently with their father.

Physical Examination

Vital Signs: temperature, 98.8 F; heart Rate 78 bpm; NIBP 118/74 mmHg; respiratory rate 18 bpm; S_pO₂ 98% breathing room air.

General: Well nourished middle aged woman, in wheelchair

Neuro/HEENT: AAOx3, PERRLA, EMOI, cranial nerves intact, upper extremities have good peripheral sensation, no sensation from dermatome level L1 down, paraplegic – unable to move either leg extremity to any degree, reduced rectal tone. No erythema observed lower back, no pain with palpation, no mobility of spinous process.

NECK: good carotid pulses b/l, no bruits, trachea mid-line, no thyromegaly;

CV: RRR, S1 S2 distinct, no murmurs or gallops appreciated

Lungs: CTAB, no wheezing or crackles

ABD: soft, NT, ND, no HSM, mildly obese

EXT: good cap refill in all extremities, L foot sole w/ mild swelling and edema around central lesion – mild yellow crusting of lesion, no pain response.

Laboratory / Radiology / Other Data

CBC, Chem-7, Coagulation Profile: Within normal limits.

CXR: Normal cardiac silhouette, clear lungs, no evidence of cardiopulmonary disease

Left Foot Films: Evidence of soft tissue edema and swelling. No involvement of bone, and no evidence of osteomyelitis

Assessment and Plan of Care

Ms. Washington is a 48 year old paraplegic female with type II DM and chronic left foot cellulitis, presenting with new swelling and erythema of the left foot, which likely represents a recurrence of her lower extremity cellulitis. Initial treatment plan includes:

- Admit to floor for IV placement and fluid hydration
- Draw Blood cultures x2, start IV Ampicillin / Sulbactam 3 grams q8h
- Consult nursing wound care service
- Continue anti-depression medications
- Insulin SS BID
- Diabetic diet
- Consult orthopedics or the neurospine service for evaluation of back pain

Neurospine Consult

Our service was called to consult on Ms. Washington, who is a 48 year old patient with Type II DM s/p MVA with L2 cord injury and paraplegia now complaining of LBP. After talking to the patient, this pain is chronic in nature, and very persistent. There is no tenderness on palpation or signs of infection on physical exam. Neurologic exam of her lower extremities is limited. Previous films including CT and MRI note poorly healed lumbar vertebrae with cord transection, mainly at L2-4 levels. The patient appears to have some nerve impingement with a herniated disk at T10 to L1. The surrounding pathology secondary to her accident makes it very difficult to assess whether surgery will be able to help her pain. In this case she will need further w/u, but this can be done on an outpatient basis.

Since she is very uncomfortable, I think we can try an epidural steroid injection to help her pain. Given that she is afebrile and receiving antibiotics with good results, I think it will be safe to give a single dose of epidural steroid. I have already spoken with the Pain Medicine Service attending and the Medicine attending who agree with this plan. The Pain Medicine Service will see her this afternoon in the Clinic.

Primary Covering Service Note

We were called to the patient's bedside for a possible allergic reaction to IV Ampicillin / Sulbactam. The patient was complaining of a painful, swollen IV site at the time the Ampicillin / Sulbactam was started. We do

not believe this is an allergic reaction at this time. We will have the IV team change her IV, and will restart her IV Ampicillin / Sulbactam.

Case 3: Title - Peripheral Nerve Catheter Complications

(Pneumothorax)

Patient Name: Winston Roosevelt

Rationale:

Interscalene and other peripheral nerve catheters are commonly placed for post-operative pain control for orthopedic surgical procedures.

Interscalene catheters are performed at the level of the neck, and potential complications associated with these catheters is directly linked to the regional anatomy. Examples include accidental placement into the pleural space, leading to a tension pneumothorax. Thus, it is important for the Pain Medicine physician to readily diagnose complications related to interscalene catheters, as well as be able to communicate with the Pain Medicine team in the event of these crises, and follow ACLS guidelines should the patient require resuscitation.

Guided Study Questions:

- What are the indications for an interscalene catheter?
- Describe the technique for placing an interscalene catheter.

- What are the potential complications and their signs and symptoms?
- What is the treatment of each of these complications?
- State the ACLS algorithm for patient resuscitation.

Case Stem:

The subject is a Pain Medicine physician at a teaching institution in which the subject supervises trainees. This scenario takes place in the same day surgery recovery area. The patient is a 22-year-old male with a history of anxiety and depression, presenting for right shoulder capsular release from a previous sports injury. Originally, the patient was to undergo an arthroscopic capsular release of the right shoulder. He was seen and consented by the anesthesia department for an interscalene block and catheter. The block and catheter were placed with some difficulty. Some mild bleeding was noted during the placement. However, the block appeared successful. The patient was sedated for the procedure, then taken into the OR. The surgeon, unfortunately, began having chest pain and diaphoresis. The anesthesiologist did a 12-lead EKG which showed ST segment elevations. The surgical case was cancelled, as were all his cases for the week, and the surgeon was taken to the intensive care unit. The patient was taken back to the post anesthesia recovery room. The nurse has called the subject to remove the catheter.

When the subject arrives in the recovery room to remove the catheter the nurse will give a brief history of the events above. The patient's sedation is wearing off, and he is becoming very anxious and angry because he no one has talked to him about why the surgery was not completed. At this time the patient's IV has infiltrated and his left arm is swollen, causing him irritation. The nurse has not been able to place another IV. The patient begins to complain of nausea, sweating, and lightheadedness. He begins to become tachypneic and complain of upper chest/neck pain around the catheter insertion site. Several minutes lapse and the patient then becomes tachycardic, hypotensive, and moderately hypoxic, as an occult pneumothorax progresses into a tension pneumothorax.

Roles:

(1) Pain Medicine Physician (subject): The subject can be an anesthesiologist, neurologist, physiatrist, or other physician who might cover the acute pain service in an emergency. Additional course participants can be subjects available to help out during the resuscitation, should the subject ask for back-up assistance.

(2) PACU Nurse (actor): The PACU nurse calls the Pain Medicine team to the recovery area to pull the catheter, as the anesthesiologist is taking the surgeon to the CCU. The PACU nurse has placed a new IV (although it is not functional). The PACU nurse is behaves disinterested and distracted during the crisis, however he or she does know where the resuscitation equipment is, and he or she is ACLS trained. He or she can perform

ACLS related tasks, other than airway management, when specifically asked by the subject.

(3) Patient Voice of Mannequin: The patient is a very anxious young man. The block and catheter placement was difficult and he had a bad experience. All he can recall is that he was taken to the OR under sedation and then brought out. He is confused, and no one has explained to him what has transpired. He is angry and worried that something went wrong with his operation. In addition, his right chest is hurting, and he feels nauseous and dizzy.

Plot:

The patient is just waking up from sedation, and he notices that his shoulder still hurts. He realizes the surgery was not done and is angry that nobody is discussing with him what has happened. A subject will enter the PACU and begin talking to the patient, who responds angrily. He says to the subject, “what’s going on? Why wasn’t my surgery done?” The patient then sees his left arm and starts yelling, “What’s wrong with my left hand?” The patient becomes tachycardic, and appears to be more frightened. After a few minutes of talking with the subject, the patient states, “My right chest aches near that catheter. I’m feeling pretty nauseous.” The patient then becomes vasovagal, leading to bradycardia and hypotension.

The subject comes to see the patient at the request of the PACU Nurse. He or she must deal with the patient’s current anxiety and anger

toward them, and then remove the catheter. The subject needs to try to explain what happened to the patient as the only physician who is aware of what has happened.

The patient will experience a vaso-vagal reaction.

Once the subject observes this and treats the vagal reaction by placing a new IV and administering fluids, as well as ephedrine, atropine, or epinephrine, the patient's vital signs normalize. The subject is then instructed to removed the block catheter. One to two minutes after the subject pulls the catheter, the vital signs worsen precipitously and the patient reports, "I'm having trouble breathing." He becomes hypoxic, tachycardic and hypotensive. There are now no breath sounds or chest movement on the right, and there is poor compliance with ventilation—the patient has a tension pneumothorax. The patient's condition will only improve with intubation, IV fluids, ACLS protocol, and finally needle decompression of the right chest or placement of a chest tube.

The PACU nurse is initially a disinterested observer. However, once the patient becomes bradycardic, she becomes frantic. She denies any blame in the circumstance and her responses are reflective of such. She states, "It's not my fault, I didn't do it." Once the subject establishes rapport and establishes authority to enlist the nurse's help, he or she will be useful in most aspects of treating the patient, including gathering requested equipment and supplies.

To complete the scenario successfully, the subject must: establish rapport with patient, call for help, obtain functional IV access, diagnose and appropriately treat a vaso-vagal reaction, and finally diagnose and treat tension pneumothorax.

Physiology:

Initially the patient should have near normal vital signs, with slight hypertension and tachycardia from anxiety and anger.

During the vaso-vagal reaction, after the patient complains of feeling dizzy and nauseous, the HR goes up to 110 bpm initially, and then after 1-2 minutes, the patient becomes bradycardic to 35 bpm, with concomitant drop in blood pressure. The patient will be confused and respond to voice, but not follow commands. The episode will resolve with functional IV access established by the subject, and administration of ephedrine, atropine, or epinephrine.

The tension pneumothorax will occur after the vaso-vagal event. The patient will complain of chest pain, and report shortness of breath. The patient becomes unresponsive as the NIBP declines. He also becomes tachycardic to the 120-130 bpm, and hypoxic with S_pO_2 to 75%. Drugs, such as phenylephrine, norepinephrine, epinephrine, or ephedrine, or IV fluids, will improve the blood pressure and heart rate, transiently.

However, the patient must be intubated and undergo needle decompression of the right chest to resolve this scenario.

Patient Record:

History of Present Illness

Mr. Roosevelt is a 22 year-old male with a history of anxiety and depression, presenting for a right shoulder capsular release from a previous sports injury. The patient has had persistent aching pain in his right shoulder and decreased mobility after hyperextension and abduction of his shoulder during a game of football 7 months ago. He has severely decreased range of motion of his shoulder joint that has improved minimally with physical therapy. Other than his anxiousness about surgical intervention, he has no other major medical issues.

Past Medical History

Anxiety

Depression

R shoulder pain s/p sports injury

Past Surgical History

Tonsils and adenoids

Wisdom teeth removal under oral surgery – general anesthesia

Medications

Acetimenophen / Oxycodone 2 tabs q4h PRN

Ibuprofen 600 mg TID

Cyclobenzaprine 5 mg TID

Citalopram 40 mg QD

Alprazolam 0.5 mg TID

Allergies

Penicillin – rash

Social History

Smoking: Denies

Alcohol: Socially

Denies IV drug abuse

Recently graduated from college, currently unemployed, living with parents.

Physical Examination

Vital Signs: temperature, 98.5 F; heart rate, 64 bpm; NIBP, 138/84

mmHg; respiratory rate, 14 bpm; S_pO₂, 98 % breathing room air.

General: NAD, healthy appearing male

Neuro/HEENT: AAOx3, PERRLA, EMOI, cranial nerves intact, good peripheral sensation, normal gait. Oropharynx clear.

NECK: good carotid pulses b/l, no bruits, trachea mid-line, no thyromegaly.

CV: RRR, S1 S2 distinct, no murmurs or gallops appreciated

Lungs: CTA B/L

ABD: soft, NT, ND, +BS

EXT: no c/c/e, good cap refill

Assessment and Plan of Care

Healthy young adult male with right shoulder capsular freeze presenting for arthroscopic release surgery.

(1) Same day surgery admission

(2) NPO p MD

(3) Chem 7, CBC, Coags

(4) Hold medications on the morning of surgery

(5) Anesthesia will consent will be obtained on the day of surgery. Patient may require intrascapular block and catheter for post-operative pain.

Case 4: Title - DNR/DNI and Resuscitation for Iatrogenic Crisis.

Patient Name: Aurora Fieldman

Rationale:

Do not resuscitate (DNR) and do not intubate (DNI) requests are common among geriatric patients, and those with terminal conditions. The Pain Medicine Physician frequently encounters these populations of patients. However, DNR and DNI orders can be a source of confusion for physicians. DNR and DNI orders may change over time, or within different contexts (e.g. operating room versus intensive care unit). They are also sometimes waived in cases where the cause of the patient's decline is easily reversible. The present case will challenge the subject to consider how DNR and DNI orders change the management of a Pain Medicine patient in iatrogenic crisis.

Guided Study Questions:

- Describe how and why a DNR/DNI status each may change given the clinical context (e.g. operating room versus inpatient unit versus ICU).
- Does a DNR/DNI order over-rule an easily reversible crisis situation?
- State the ACLS algorithm for patient resuscitation?
- What are the signs and symptoms of local anesthetic toxicity?
- What is the treatment (including lipid rescue)?

Case Stem:

The subject is Pain Medicine physician at a teaching institution in which the subject supervises trainees. The patient, a 63 year old female, is receiving an MRI of the abdomen and pelvis due to recent, progressive abdominal pain. She has a history of stage IV uterine leiomyosarcoma eight years ago, s/p TAH/BSO/pelvis node dissection as well as chemotherapy and radiation therapy. The surgical oncologists are concerned for recurrence—they have admitted her to the hospital and ordered today's MRI.

The patient was seen by the Pain Medicine service because of the potential for surgical management, as per the surgical oncology service. The Pain Medicine team placed a low thoracic epidural for acute pain and anticipated peri-operative management earlier in the day. The epidural was placed under sterile conditions. No CSF, blood, or parasthesias were noted. The procedure was well tolerated and there were no complications. 0.125% bupivacaine and fentanyl (10mcg/ml) were started at rate of 9cc/hr via infusion pump. The management of the epidural on the hospital wards was discussed with the nursing staff—they were instructed not to change the infusion rate, but to call the Pain Medicine service to assist with epidural dosing.

The patient is lying supine in a recovery bed after having received her imaging study. The MRI tech notes that after 40 minutes of recovery, the patient is acting strangely, and appears ill. Because she has an epidural infusion, the tech pages the Pain Medicine service to come and evaluate the patient. The subject enters the room to find a patient who is unresponsive with declining vital signs.

Roles:

- (1) Pain Medicine Physician (subject): The subject can be an anesthesiologist, neurologist, physiatrist, or other physician who might respond to a pain patient's emergency.
- (2) Patient (mannequin): The patient is in the MRI suite recovery area with a radiology tech, having completed her study some 30 minutes prior. She has an IV line and epidural catheter, each with fluids and medications being delivered by an infusion pump. The patient was initially well and is fully cooperative, but is now ill appearing and unarousable.
- (3) MRI Technician (actor): The MRI tech calls the Pain Medicine team to evaluate the patient because he does not know what happened and has never managed an epidural infusion.
- (4) Intensivist (actor): An intensivist should enter the scene after the patient is being resuscitated. The intensivist should be helpful, but not take over leadership.

Plot:

The subject enters the recovery area of the MRI suite to find the patient supine on a stretcher. She has just undergone an MRI study with contrast and has been recovering for 30 minutes. The MRI technician (actor) observes that the patient is ill appearing and unarousable. The technician pages Pain Medicine team to help manage the patient. The tech is confused regarding epidural infusions. The technician states “the floor nurse left her with me. I disconnected her infusion pumps and did the study following administration of gadolinium contrast. Following the study, I hooked her back to her pumps and moved her to the recovery area. I checked her every ten minutes and she was fine. This time, though, she did not respond to me and I called for help.”

When the subject approaches the patient, she is unresponsive to questions/commands and is apneic. She is bradycardic (heart rate 40 bpm) and S_pO_2 60%.

The MRI tech, being unfamiliar with clinical crises, is somewhat upset and flustered. When he or she receives a specific task from the subject, he or she accomplishes them with competence. Appropriate tasks include gathering equipment and supplies, IV placement, ACLS activities except administering medications, and obtaining more help. He or she is not able to manage the airway. As the crisis progresses, the subject will be able to get help from the other course participants.

As mentioned above, the epidural and IV fluid infusion rates are switched, leading to an empty bag of medication and resulting in opioid overdose and local anesthetic toxicity.

An intensivist (actor), having heard that a resuscitation was underway, enters the room intending to help. The intensivist will find the infusion rate error if it has not been discovered and look to the Pain Medicine physicians to suggest a treatment. The intensivist will then find the patient's valid dated and signed DNR/DNI documents. The intensivist will allow the team to make a decision as to whether to continue or desist. If the decision is reached to continue, the intensivist will enumerate the reasons to stop (e.g. The patient's wishes must be respected, performing a procedure against a patient's wishes is considered an assault, this is against the families expectations). If the decision is reached to desist, the intensivist will raise the issues for continuing (e.g. Shouldn't one continue if this occurs during a procedure, what about the iatrogenicity? Can't the decision to discontinue treatment be made later?). After some time of resuscitation, debate, and decision making the case will be ended.

Physiology :

The patient is initially unresponsive and apneic.

Initial Vital Signs: heart rate 40-50 bpm; NIBP 70-80 / 50 mmHg; S_pO₂, 60%.

Within a few minutes, the patient experiences complete decompensation and ventricular fibrillation. The blood pressure declines dramatically, and the S_pO₂ shows further desaturation. Complete treatment would also require administration of lipid rescue, request for immediate cardiac surgery consult to consider instituting cardiopulmonary bypass, and transfer to an ICU with an appropriate diagnosis.

Patient Record:

Chief Complaint

Progressive severe abdominal pain for one month.

History of Present Illness

63 year-old female diagnosed with stage IV uterine leiomyosarcoma 8 years ago s/p subsequent TAH/BSO/pelvic node dissection as well as chemo-radiation therapy doing well until the onset of progressive, severe abdominal pain for the past one month. She was admitted yesterday by the surgical oncology service for management of pain and suspected recurrence. She will possibly require a palliative operation for the management of her pain.

Past Medical History

Dilated Cardiomyopathy secondary to Adriamycin (Echo 6 months ago is significant for a moderately decreased ejection fraction of 35-40%)

NYHA class III heart failure

Past Surgical History

s/p TAH/BSO/pelvic node dissection with general anesthesia and epidural placement, no anesthesia or surgical complications or problems

Medications

Imatinib, Digoxin, Atenolol, Lisinopril, Furosemide

Allergies:

No known drug allergies

Social History

The patient denies smoking or drinking alcohol. She is a widow, and has two nearby daughters who help with her care. She resides in a living facility, and is a retired nurse.

Physical Examination

Vital Signs: temperature 98.0 F, heart rate 78 bpm, NIBP 102/72 mmHg, respiratory rate 6 bpm, S_pO₂ 99% RA

Neuro: AAOx3, follows all commands, 5/5 strength b/l LEs, normal sensation

HEENT: EOMI/PERRLA, no nodes palpable

CV: RRR S1S2, no murmurs, rubs or gallops

Pulmonary: CTA B/L, no crackles, rales or wheezes

Abdomen: Hypoactive bowel sounds, soft, slight tenderness in all quadrants

Limbs: slight pitting edema in b/l LEs

Laboratory / Radiology / Other Data

CBC: WBC 4.1, HgB 11.3, Platelets 192

Coags: INR 0.9, PT 12.5, PTT 26.7

CHEM-7: Na 138, K 4.1, Cl 107, CO₂ 25.1, BUN 8, Cr 0.7, Glucose 92

Assessment and Plan of Care

Middle age female with a history of uterine leiomyosarcoma now with severe abdominal pain. There is suspicion for tumor recurrence. She also has well managed dilated cardiomyopathy on her current medical regimen.

- 1) Abdominal MRI to assess for tumor recurrence
- 2) Continue NPO except for meds for potential surgical intervention
- 3) 2 mg intravenous Morphine x 1 now, obtain a Pain Medicine consult
- 4) Continue all pre-admission medications
- 5) Maintenance fluids D5 0.45% normal saline @90cc/hour

Progress Notes:

RN Admit note: Female patient with prior leiomyosarcoma admitted by surgical oncology for pain management and evaluation for recurrence. Pt. continues to complain of severe abdominal pain.

CV – stable no issues

Pain – Pain Medicine consult ordered

Discharge – family meeting planned for tomorrow

RN Note: Pt stable. 2mg intravenous morphine x1 given. Pt. continues to be in pain. Pain Medicine team called and will be here shortly. NIBP 125/82, heart rate 78, temperature 98.7 F, respiratory rate 18. No CV issues currently. MRI later tonight. Daughters at bedside.

RN Note: Pt remains stable. Pain Medicine team placed epidural. See order sheet. Pt. reports 0/10 VAS. NIBP 110/70, heart rate 70,

temperature 98.7 F, respiratory rate 12. No CV issues currently. MRI pending. Daughters heading home.

Pain Medicine Team Note: Chart reviewed and patient known to team for expected pain issues and potential for surgical management as per Surgical Oncology. Will place low thoracic epidural for acute pain and anticipated peri-operative management. Epidural placed under sterile conditions. No CSF, blood, nor parasthesias. Procedure well tolerated without complications. 1/8% Bupivacaine and Fentanyl (10mcg/ml) started at rate of 9cc/hour on infusion pump. Discussed with nursing staff that the epidural dose is not to be changed without paging our team first.

Case 5: Title - Drug Error, Disclosure and Professionalism in the Pain Medicine Clinic

Patient Name: Michael Gould

Rationale:

Medication errors in patient care settings are believed to be frequent. The pain physician routinely and directly handles medications that may look alike, sound alike, and have a narrow margin of safety.

The Pain Medicine physician may encounter patients with certain vulnerabilities or handicaps, such as language barriers, blindness/deafness, cognitive disabilities, or age under 18 years. These patients may require family or other caretakers participate in procedure consents, instructions, etc. When complications and errors happen in vulnerable patients, the Pain Medicine physician should be comfortable including the patient's caretakers in an appropriate fashion.

In the event of complications or errors, the Pain Medicine physician should be familiar with appropriate disclosure techniques, communication skills, professionalism as well as the legalities surrounding these events.

Guided Study Questions:

- What is the staged diagnostic and treatment approach to chronic post inguinal hernia repair pain?
- What are the pharmacologic therapeutic differences between local anesthetics and absolute alcohol?
- What are the risk factors to making medication errors?
- What are the appropriate ethical and professional responses when medical mistakes occur?
- What are the “apology laws” and how do they affect the delivery of bad news?

Case Stem:

The scenario takes place in a Pain Medicine Clinic at a teaching institution. The patient, a 17-year-old male, has been experiencing persistent right pelvic pain after a recent right sided inguinal hernia repair. He presents to the Clinic for a diagnostic inguinal nerve block with local anesthetic. He is a minor, and is accompanied by one of his parents, who will be needed to verify the consents. The patient also has a history of Down's syndrome, with an associated cardiac defect—moderate mitral valve regurgitation, and a ventricular septal defect. The patient also has a cognitive/developmental delay, and requires the parents to be “nearby” to cooperate with the procedure.

The subject will be supervising a trainee (actor) in performing this procedure. At the outset, the patient will have been prepped and draped by the trainee as the subject assumes a supervisory role. The trainee will be getting equipment and medication ready to complete the procedure, which will be done anatomically, without ultrasound or x-rays. The Pain Medicine Nurse (actor) will provide the trainee, under “supervision” of the subject, local anesthetic to be drawn in sterile fashion. Unknown to the subject, the trainee draws absolute alcohol, rather than lidocaine, for the

procedure, as the vials look virtually identical. The subject will excuse the parents from the room after consent is verified. First, the trainee injects 1% lidocaine to make a skin wheel, which is well tolerated by the patient. Next, the “block” is provided, and during the injection, the patient screams, as he experiences excruciating pain, due to iatrogenic neuritis from the alcohol. The parents are very concerned as they hear what has just happened from outside the procedure room. The subject will need to demonstrate clinical judgment and professionalism by stopping the injection, and having to disclose to the family that a medical error has occurred once the trainee discovers and reveals to the subject what has happened.

Roles:

(1) Pain Medicine Physician (subject): The subject is present for the nerve block kit preparation with associated drug draws from the vials, as they are “supervising” the trainee. The patient and parents will provide a distraction to the subject to minimize the chance of double-checking the medication vials.

(2) Pain Medicine Clinic Nurse (actor): The nurse presents the “local anesthetics” to the trainee, under subject “supervision”, to be drawn

sterilely by the trainee for the inguinal nerve block. The nurse first presents 1% lidocaine for the skin wheel. The nurse next accidentally provides absolute alcohol, rather than 2% lidocaine for the block, as the vials look alike. The vial will be presented to the trainee who will quickly glance at it and say “2% lidocaine” while drawing it into a pre-labeled syringe.

(3) Patient Voice of Mannequin: The patient is a 17-year-old minor with Down’s syndrome, requiring his parents to be nearby during his inguinal nerve block. He is cooperative and talkative to the subject before the injections occur. However, once the needle containing alcohol is placed and plunger pushed to provide the block, he screams in unbearable pain. He shakes his leg, cries, and demands the block stops. He feels ‘sick’ from the pain, and a bit SOB. He will develop tachycardia and hypertension. His groin area will remain painful after the needle is removed. After several minutes, once his parents return, his vitals will gradually return to baseline.

(4) Trainee (actor): The trainee is new to the Pain Medicine service, and zealous about doing the procedure. After the patient’s neuritis and negative reaction, the trainee will realize a medication error was made and disclose to the subject, before the parents enter the room.

(5) Parents (actor): One or two parents are present during the preparation, and leave just prior to the beginning of the procedure on the patient's right groin. They are a bit nervous about the injection, as well as potential side effects. They state that their son has been going through "a lot" for his cardiac care, surgical care after the hernia operation, ongoing pain issues, and getting him through school with his cognitive delay. The parent must also verify the consent, as the patient is a minor.

Plot:

The subject enters the room to find the patient's right groin prepped and draped for an inguinal nerve block. The nurse and trainee are drawing up medications and preparing equipment for the block. Specifically, the trainee is sterilely gloved and is drawing-up the medications from the nurse who is non-sterile, as is typical in the Pain Medicine Clinic. The subject should be supervising this, however, is distracted by the parent and patient who are asking many questions and expressing concerns. The medication error, which is made, was described above. The subject is told by the nurse to verify the consent and have the parent wait outside the procedure room. The subject then supervises the trainee, who uses the

landmark technique to complete the nerve block. First, the trainee makes a skin wheel with 1% lidocaine, which is well tolerated by the patient. Then, the trainee places the block needle containing absolute alcohol, rather than 2% lidocaine. The moment the mixture is injected, the patient screams in agony. He also becomes 'sick' and short of breath from discomfort. His vital signs, which were within normal limits, reveal tachycardia and hypertension (HR 120-130 bpm, and NIBP 150-160/85-90 mmHg). There is no local skin or vessel reaction, no bleeding, and no systemic reaction experienced by the patient. The parent hears the screams, and knocks on the door to ask if everything is "ok". The patient shakes his right leg and begs for the nerve block to stop. The nurse and trainee, baffled by what has just happened, realize absolute alcohol was drawn rather than 2% lidocaine, leading to a painful neuritis. They reveal this to the subject.

After the injection and mistake is realized in the procedure room, the parent enters the room. The patient is still having some pain at the site of injection as well as tachycardia, and the parent is very concerned. They want to know what happened. It is up to the subject console the parent and patient. This part of the scenario will end.

The subject is immediately put into a conference room with the parent. Here, they will have a discussion about what had happened. The parent

will go through five stages of receiving bad news: disbelief (e.g., there must be some sort of mistake – this could not have happened here), anger (e.g., how could you do this? Threatening posture, degrading competence), negotiation (e.g., we will not pay for this procedure, can't this be fixed now, call someone competent), depression (e.g., I should never have agreed to this, should I?), and acceptance (e.g., what do we do now?). The subject will be expected to disclose and apologize in a professional manner. Specifically, the subject will be expected to maximize the setting for receiving bad news (seated, eye contact, empathetic non-verbals) and respond to each of their reactions in an appropriate manner. First, they should respond to the parent's disbelief with understanding, active listening and returning the parents to the facts, Second, they should respond to the anger with acknowledgment of the hurt feelings, a sincere apology for what has happened, reluctance to fill in unrequested detail and jargon, and avoidance of saying, "I know how you feel". Third, with respect to bargaining, they should not make commitments that they do not have authority to make. Rather they should offer to be an advocate for the family. Fourth, in response to depression, they should be supportive, acknowledge feelings, and gently offer resources. Finally, in response to acceptance, they should formulate a clear plan to help the family in a responsible manner.

Patient Record:

History of Present Illness

Michael Gould is a 17-year-old male who presents with a 9-month history of groin pain, shortly after undergoing a right-sided open inguinal hernia repair under general anesthesia. No local or regional anesthesia was used for the surgery. The patient reports moderate pain, 8/10, which he describes as tender and pulling at baseline, then with activity (soccer and climbing steps) it becomes shooting and sharp. To touch his right groin feels tender, but at other times may feel numb. The pain is only located over the right groin and does not radiate. He no longer can lift heavy objects. Flexion and recumbence help the symptoms, and he has since gained weight and lost some ability to do the things he enjoys, such as soccer. He is becoming more desperate and frustrated.

Past Medical History

Down's Syndrome

Mild Cognitive Delay

Mitral Valve Regurgitation

Ventro-septal defect

Obesity, Body Mass Index 35

Hypothyroidism

Past Surgical History

Open Inguinal Hernia Repair with Heavy-Weight Mesh, 9 months ago

Medications

Oxycodone and Acetaminophen 5mg/325mg, 1 Tab prn Q6 hours

Amphetamine and Dextroamphetamine extended release 15mg QD

Synthroid 75 mcg QD

Allergies

No Known Drug Allergies

Social History

Tobacco: No

Alcohol: No

Recreational drug uses: No

Lives with: Parents/Family

Occupation: High school student in special needs classes

Out of work: No

Disability: Decreased recreational activities (Soccer)

Retired: No

Any lawsuit involved: No

Psychosocial History

Denies history of emotional or behavioral disorder, however does carry developmental delay with low IQ. He admits to symptoms of depression and a decreased quality of life. Denies suicidal ideation or attempts.

Physical Examination

Vital Signs: temperature, 98.4 F; NIBP 122/65 mmHg; heart rate 78 bpm; respiratory rate 11 bpm; S_pO₂, 97%

General: Appears comfortable, no apparent distress. Alert, oriented x 3. Pleasant.

HEENT: Normocephalic, atraumatic. Extraocular movements intact. Neck veins flat.

Neuro: Follows all commands, 5/5 strength and +2 deep tendon reflexes.

Negative Patrick and Murphy sign. No lumbar spinal tenderness to palpation.

Cardiovascular: regular rate and rhythm. Normal S1 S2, no rubs/gallops, + Holosystolic Murmur

Chest: Regular rate and effort of breathing. Breath sounds clear to auscultation bilaterally, no crackles.

Abdomen: Soft, and nontender, nondistended, + bowel sounds.

Extremities: Warm, well perfused.

Skin: erythema, no rash, no blisters.

Groin: There is slight hyperpigmentation in the affected area—the left groin. Surface is dry, surgical scar noted which is normal in appearance (no keloid, etc...). No recurrent hernias noted. No wound breakdown/dehiscence. There is also hyperalgesia and tactile allodynia of the affected area.

Laboratory / Radiology / Other Data

CBC: WBC, 9.4; HgB, 15.6; Platelets, 302

Chem7: Na⁺, 140; K⁺, 3.8; Cl⁻, 100; Bicarbonate, 23.9; BUN, 18; Cr, 0.7;

Glucose, 119

ABG (RA): pH, 7.36; pCO₂, 44; pO₂, 131

CXR: No lines or tubes appreciated. Normal lung fields, no infiltrates or pulmonary edema. No pleural effusions present. No pneumothorax appreciated. The heart appears slightly enlarged, the mediastinum is not widened. Thoracic spine and ribs are within normal limits, no osteopenia

or fractures noted. Impression: Slightly enlarged cardiac silhouette, otherwise normal exam.

Cervical Spine Radiograph, Flexion-Extension: Vertebral bodies are normal in height, alignment of the C-spine is normal, there are no degenerative disc changes through the c-spine, there is slight loss of disc height and anterior osteophyte formation at C6-C7. There is no evidence of fracture. The prevertebral soft tissues are unremarkable in appearance. Visualized lung apices are unremarkable in appearance. Impression: Normal alignment of the c-spine, small osteophyte noted at C6-C7

Transthoracic Echocardiogram: There is no evidence of mitral valve prolapse. There is moderate mitral regurgitation by color and spectral Doppler. There is no evidence of left atrial dilatation. There is no evidence of valvular aortic stenosis. The aortic valve is tricuspid. There is no evidence of aortic insufficiency by color or spectral Doppler. The aortic diameter at the sinuses of Valsalva is 39 mm (normal < 40mm). The ascending aorta diameter above the sinotubular junction is 34 mm (normal <=36mm). The left ventricular cavity size is normal. The left ventricular systolic function is within normal limits. A moderate sized ventricular septa defect is appreciated. There is no symmetric left ventricular hypertrophy. There are no obvious segmental wall motion abnormalities. The estimated ejection fraction is 63 %. LVEF was

measured by the single dimension method. There is no color or spectral Doppler evidence of tricuspid insufficiency. There is no evidence of trace pulmonary insufficiency by color and spectral Doppler. There is an insufficient tricuspid regurgitation Doppler profile to estimate an RV systolic pressure. The right ventricle is not dilated. In some views there is a suggestion of segmental right ventricular dysfunction involving the RV free wall and apex (119-126 loops), consistent with a ventricular septa defect. The right ventricular systolic function is within normal limits. There is no evidence of pericardial effusion.

Assessment

17-year-old male with h/o Downs Syndrome, s/p inguinal hernia repair presenting with what appears to be neuropathic pain in the area of the left groin. His symptoms seem consistent with mononeuritis of the left ilioinguinal nerve.

Plan of Care

1. Explained to family the nature his pain that may require pharmacological and/or interventional management.
2. Diagnostic inguinal nerve block with local anesthetic is recommended intitally.
3. Patient will follow up in 3 weeks for inguinal nerve block.

