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Case Discussion: Post-implant infections & explant decision making

Learning objectives:

- Identify patient risk factors for surgical site infections (SSI)
- Discuss preoperative, intraoperative and postoperative measures to reduce the risk of surgical site infections
- Post surgical infection management

Case study:

A 65 year old male with a PMH of HTN, DM, lumbar laminectomy and posterior fusion from L3-S1 and smoking history presents to clinic for a follow up three months post successful spinal cord stimulator implant. He reports adequate pain relief in his lower extremity; however, he states his battery site has been painful of late and notes a yellowish discharge.

He denies any recent weight loss, fever/chills, night sweats, bowel/bladder incontinence, or saddle anesthesia.

Pertinent physical exam findings:

- Vitals stable
- Patient is afebrile
- Paramedian lumbar spinal cord stimulator site is healing appropriately
- IPG site is erythematous and edematous at the edges
- IPG site is tender to touch
- Corner of IPG site is open and dehisced with battery visible
- No focal neurological deficit
- Sensory deficits in L4-L5 dermatomal distribution in bilateral lower extremities
- Motor strength 5/5 in bilateral lower extremities
- DTRs 2+ in bilateral lower extremities

Common signs and symptoms of infection
Pain
Wound erythema
Wound drainage
Wound swelling
Fever
Wound dehiscence
Nausea

Diagnostic imaging and results:

- Complete Blood Count (CBC) with differential:
 - WBC count of 15,000 with 65% neutrophils and 10% bands
- Erythrocyte sedimentation rate (ESR):
 - 40 mm/hr
- C-reactive protein (CRP):
 - 15.0mg/ml

- Wound culture pending
- Blood culture pending
- Urine culture pending

- MRI of lumbar spine:
 - No signs of an epidural abscess
 - No lead migration
 - Status post lumbar laminectomy and fusion
 - No signs of spinal cord compression

Differential Diagnosis:

- Deep wound dehiscence
- Superficial wound dehiscence
- Epidural abscess
- Bacterial Meningitis

Patient risk factors for surgical site infections:

- Uncontrolled diabetes mellitus
- Obesity
- Malignancies
- Untreated infections (e.g., urinary tract infections)
- Staphylococcus aureus carriers
- Tobacco use
- Preoperative steroid or immunosuppressant usage
- Poor nutritional status
- Prior surgical site infections

Common site of infection
IPG pocket
Anchoring site
Lead tip
Blood

Preoperative recommendations:

Optimizing the patient with consideration to:

- Glycemic control
- Smoking cessation
- Tapering or limiting chronic steroid exposure
- Optimizing nutritional status
- Timing of elective procedure with consideration for immunosuppressant therapies or radiation.

Common organisms cultured
Staphylococcus Aureus
Pseudomonas Aeruginosa
Streptococcus species
Serratia marcescens
Mixed flora

Prophylactic Antibiotic Recommendations			
Antibiotic	Indications	Timing prior to incision	Standard Intravenous dosing
Cefazolin	First- line	30-60 mins	1 G < 80 kg
			2 G > 80 kg
			3 G > 120 kg
Clindamycin	Beta-lactam allergy	30-60 mins	
			600 mg < 80 kg

			900 mg > 80 kg
			1200 mg > 120 kg
Vancomycin	Beta-lactam allergy MRSA colonization	120 mins	
			1 G < 80 kg
			2 G > 80 kg
			3 G > 120 kg

Postoperative care:

- Patients should be given careful post-operative care instructions pertaining to the care of their surgical sites and use of the newly implanted spinal cord stimulator device. Patients should also be given education on the signs and symptoms of an emerging surgical site infection (SSI) for early recognition that could alter treatment.
- Recommendations for the use of post-operative antibiotics routinely beyond 24 hours following implants can not be supported.
- Patients should be seen within 14 days to ensure appropriate wound healing.
- Non-absorbable sutures and staples should be removed within 10-14 days.
- Optimization of the patient and their comorbidities should continue in the post operative period. (e.g. glycemic control and smoking cessation)

Infection management:

- When prevention of an infection fails, vigilance and early recognition with appropriate treatment is critical to the management of surgical site infections.
- Laboratory markers of infection such as CBC with differential, CRP, ESR should be ordered and trended.
- Cultures of the wound, blood, common sites of infection (e.g. urine) should be ordered prior to the initiation of antibiotics.
- Imaging with an MRI will aid in determining extent of infection to rule out an epidural abscess.
- If clinical suspicion of an infection is high, broad spectrum antibiotics should be initiated without delay for laboratory markers. Once cultures and sensitivity return, antibiotics can be refined appropriately.
- The extent, progression, and severity of an infection will determine the degree of management.
- The decision for surgical intervention depends on the clinical picture of the patient and extent of the infection.
- Superficial infections confined to the IPG site without involvement of the deeper layers and isolated from the neuraxial entry site may be initially treated with a course of antibiotics, close wound surveillance and trend of infectious laboratory markers.
- The majority of infections with implantable devices are managed with explanation of the device, wound debridement, and a course of antibiotics with recommendations from an infectious disease specialist.
- Re-implantation should only be considered after infection resolution, patient comorbidities and health has been optimized and consultation with an infectious disease specialist.

Summary of recommendations
Pre-operative measures
Optimize glucose control
Discontinue tobacco use
If hair is present, use electric clippers immediately before surgery
Use prophylactic antibiotic therapy
Vancomycin should not be used routinely
Intraoperative measures
Use appropriate preparation technique and agent selection for skin antisepsis
Maintain positive pressure ventilation in the operating room (OR)
Keep the OR doors closed during procedure
Limit OR traffic
Handle tissue gently and limit dead space
Postoperative measures
Use occlusive sterile dressing for 4-48 hours post-operatively
If dressing change is required use precautions:
Hand washing
Sterile technique

Take home points:

- Careful patient selection and optimization of comorbidities prior to implantation is crucial as prevention is the best treatment strategy.
- Vigilance and early recognition with appropriate treatment is critical to the management of surgical site infections.
- Laboratory markers of infection and imaging aid in determining extent of infection, begin broad spectrum antibiotics till cultures return with sensitivity.

- Consult Infectious Disease for their recommendations.
- Do not hesitate to surgically debride the wound and explant the device when the clinical picture is suspicious for a deeper infection, neuraxial infection is plausible or the patient is clinically deteriorating.
- Prior to considering re-implantation, identify and mitigate patient risk factors that contributed to the infection. Ensure the infection has resolved. Consult with an Infectious disease specialist prior to considering re-implantation for recommendations.

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