Spinal infection

Discuss the pathogenesis and bacteriological features of spinal infections:

In the past pyogenic spinal infections were classified as discitis, vertebral osteomyelitis and epidural abscess. In adults these three forms occur in combination in most cases. Pyogenic spinal infections are more common in immunocompromised (IVDU, diabetics, patients on steroids, organ transplant patients, alcoholics, malnourished, patients on chemotherapy etc…

- The infection can reach the spine through the following routes:

1. Arterial embolisation from distant source (lung, heart, GU tract, skin etc…). Embolic occlusion of the metaphysical artery (end artery) results in necrosis of the vertebral end plate and the disc causing discitis and osteomyelitis of the adjacent vertebra. Retrograde thrombosis of basovertebral veins results in spread of the infection into the epidural space and causes epidural abscess -. In children the metaphyseal artery is not an end artery and its occlusion does not cause infarction of end plate and so infection can be localized to the disc space (discitis).
2. Transvenous route from GI and GU tracts through **Batson's venous plexus**.
3. Direct inoculation of bacteria at the time of epidural injections, LP, discography, surgery and trauma

- **Microbiology**: the most common cause is staph aureus and other gram positive cocci (staph. Epidermides, streptococcus Melleri, pneumoniae, viridans) gram positive rods (dephtheroids and proprniobacterium acnes). In IVDU- staph and pseudomonas. Gram negative bacteria are less common cause.

Discuss the clinical and radiological features of discitis:

- Discitis in children is almost always **primary** and is due to **haematogenous spread** of infection which lodges in the vascular disc or the metaphyseal artery which is not an end artery in children and has anastomosis with periosteal arteries. Occlusion of this artery will not lead to ischemic infarction and osteomyelitis as in adults, but leads to discitis. **The yield of disc aspiration in children is less than in adults**. It is controversial whether some cases of discitis are due to **trauma or viral infection** and do not require Abs. The most common organisms are gram positive cocci (staph and strept.). Patients present with back pain, fever. CRP and ESR are elevated. Blood cultures are positive in 30%. MRI is diagnostic (Hyperintense signal on T2 and enhancement with contrast).CT scan is useful in assessing the bone which is usually spared in paediatric discitis. If no organisms are isolated it may be reasonable to treat children with immobilization and close observation. If infection is suspected or proved children should be given Abs for 6 weeks + bed rest and close clinical and radiological follow up.
- Discitis in adults is:

1. Most commonly secondary to surgery or less commonly discography (staph aureus or epidermidis). Patients present a few weeks after surgery with back pain and low grade temperature (after a period of improvement). CRP and ESR are elevated. Blood cultures can be positive in 30%.MRI is diagnostic and can exclude epidural collection. CT scan will show bone involvement. Treatment with immobilization and 6 weeks of antibiotics. Prognosis is excellent.
2. Primary: due to haematogenous or venous spread of infection. Usually in immunocompromised. Microbiology, diagnosis and treatment are similar to epidural abscess. Usually is apart of pyogenic spinal infection (discitis, osteomyelitis and epidural abscess).

Discuss the clinical and radiological features of epidural abscess:

- **Clinical presentations**: high index of suspicion is required. Patients present with low back pain increased at night associated with local tenderness and later fever, night sweats. If untreated **5-50%** develop neurological deficit (secondary **to mechanical compression of the cord by pus, kyphotic deformity or due to cord ischemia)**.
- **Diagnosis:**
    1. FBC, ESR, CRP, blood cultures (30-60% positive)
    2. MRI with gadolinium-enhancing epidural collection
    1. CT and plain films : good in showing bone involvement
    2. Bone scan(technetium-detects increased blood flow to infected area sensitive but not specific, Gallium- binds to iron binding proteins more specific to PSI and WBC scan (WBC tagged with radionuclide) is more specific for infection
    3. CT guided aspiration of infected disc space : positive in 50%
    4. Diagnosis of associated conditions (TOE, ENT, dental, MSU etc…

Discuss the management principles for epidural abscess and discitis:

- Management of epidural abscess

1. **Surgical draining of the epidural pus through anterior or posterior approach+ Abs** for at least 6 weeks. The presence of neurological deficit is an absolute indication for drainage. Other indications include radiological evidence of compression and liquid pus on MRI scan, failure of medical treatment (bone sequestrum) and to identify the causing organism if less invasive tests are negative. Patients should be followed closely clinically and radiologically. Delayed surgery may be indicated for instability.
2. Medical treatment: Abs + close clinical and radiological follow up for small epidural abscess without clinical or radiological evidence of cord compression particularly if the enhancement is diffuse and no evidence of liquid pus
3. Bed rest
4. Regular clinical and radiological follow up. Weekly CRP, ESR.
5. Diagnosis of associated conditions (TOE, ENT, dental, MSU etc…

- Management of discitis : as above

- **Prognosis**: the prognosis depends on the presence or absence of neurological deficit, age of the patient and the presence or absence of sepsis. Patients who

present with incomplete deficit less than 72 hours duration and younger than 75 years of age have better outcome in one large series. Complete deficit, sepsis and failure to improve after drainage may indicate poor prognosis

Discuss the factors contributing to postoperative spinal infection:

The average rate of infection following spinal procedures is 2%, the risk of infection following instrumentation ranges between 2-85%. Factors contributing to postoperative infection include:

I**. Patient factors**: prior surgery, prior radiation, preexisting neoplasm, chronic steroid therapy, malnutrition, DM, RA, chemotherapy, concurrent infection)

II. **Technical factors**: the duration of the procedure, force of soft tissue retraction, CSF leak, implantation of instrumentation. The risk of infection is higher after posterior approaches in comparison with anterior approaches (muscular mechanical and ischemic injury, wound seroma).

The use of prophylactic antibiotics and placing gentamycin impregnated collagen sponge in the disc space were found to decrease the risk of postoperative infection in some studies.

Discuss the management options for infected postoperative stabilization procedures:

The use of instrumentation is associated with increased risk of infection (2-8.5%). Infections with spinal instrumentation are more common with posterior and posterolateral approaches for the reasons mentioned above. Infections after instrumentation can be

I. **Early** (2-8 weeks): one should differentiate between superficial and deep infection. Superficial infection can be treated with Abs. Deep infection is manifested by wound erythema, dehiscence and discharge, fever; increased CRP, ESR and WBC count. The most common cause is staphylococcus aureus. This infection requires wound debridement, removal of necrotic tissues with prolonged intravenous and oral Abs. They can be usually managed without removal of the instrumentation. Depending on the amount of necrotic tissues the wound can be closed or left to heal by secondary intention.

II. **Delayed infection** (months after the instrumentation): usually due to indolent organisms such as propionibacterium acnes, S. epidermidis or Corynebacterium). The instrumentation is coated by a vascular glycocalyx (exopolysacharides). If enough time has elapsed and a rigid bony fusion is found at surgery, the infected hardware can be removed, otherwise treatment is as for early infections