The epidural abscess:Diagnosis and treatment

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Incidence

Most epidural abscesses do occur spontaneously, in normally healthy persons and in all kinds of patients. It can be seen even without any form of anaesthesia. All doctors can be confronted with the development of an epidural abscess, which if not noticed, can lead to desastrous consequences. Epidural abscesses can develop in patients who undergo an operation under general anaesthesia, spinal, epidural or combined spinal-epidural anesthesia.

Epidural anaesthesia is a worldwide used valuable technique, which is very safe with few neurologic complications. Temporary (transient neurologic symptoms) or permanent sensory and motor dysfunction (sfincter incontinency, paresis and paraplegia) are known to occur. Only in exceptional cases we see permanent devastating neurologic damage.

All levels can be affected with an epidural infection, and its location can be in the anterior, posterior or lateral epidural space. Sometimes extensive abscesses can be found which extent from the cervical till the lumbar epidural space. All ages can be affected, including the very young and the aged patients. Epidural abscesses can be found after operative interventions, in the postoperative period, in obstetrics and in pain clinics, where sometimes the pain due to the development of the epidural abscess is blurred by the original pain problem.

Epidural abscesses may even develop days to weeks after removal of the epidural catheter. The long delay between the epidural catheter removal and the development of epidural absceses may cause a delay in the diagnosis. The relationship with epidural anesthesia has frequently been unnoticed if this delay is too long (sometimes several months). Sometimes the diagnosis is difficult or delayed when antibiotics are used as prophylacticum during operations or in the postoperative period. Signs and symptoms of infections are delayed or not noticed at all.

Infection

The infection rate of the epidural space is less than 0.01%. Infection can be related to the introduction of a Tuohy needle or an epidural catheter, especially when the insertion is difficult. Patients who are restless or in pain or who recently had a trauma, resulting in a traumatic puncture causing hematomatas, are prone to develop an epidural infection.

The skin infection rate around the insertion point of the epidural catheter is between 4.3-12%. Any epidural catheter acts as a foreign body. Darchy et al. studied the infection rate on intensive care patients. The infection rate of epidural catheters was 1.2 per 100 days epidural anaesthesia, while it was 0.5 per 100 days when a CVP line was in situ. Strong et al. found an epidural catheter related infection rate of 1/1702 days of epidural use in cancer patients who received long-term epidural catheters. They concluded that the onset of an epidural infection is not related to the duration of the epidural catheter in situ.

The etiology of an epidural abscess can vary. Flora from patient, doctors or nurses may be the cause. Direct bacterial spread from the spinal canal, invasion of skin bacteria through

the channel produced by the Tuohy needle or the epidural catheter. The use of contaminated syringes or local anesthetics and epidural hematomata may also be the cause.

Risk factors contributing to the development of epidural abscesses are diabetes mellitus, renal insufficiency, morbid obesity, herspes zoster infection, reflex sympathetic dystrophia, rheumatoid arthritis, the use of IV drugs and alcohol abuse, immuno-compromized patients (AIDS), vascular catheters and frequent manipulations of epidural catheters (bolus injections). However, most epidural abscesses do occur spontaneously and are related to infections as e.g. osteomyelitis of the spinal canal.

Diagnosis

Diagnostic features vary widely. Backache, local tenderness, meningismus, fever, chills, headache, changes in reflexes, sensory and motor function, paresthesiae, heaviness in legs, radicular signs, signs and symptoms of spinal cord compression, including loss of sfincter control, paresis and paraplegia, may all occur, but are not essential. Scant purulent discharge can sometimes be the only indication of an epidural abscess.

Laboratory examination can result in leucocytosis, bacteremia and positive blood and/or CSF cultures. Danner studied 166 epidural abscesses and found positive results in 97/107 (bacteriology), 15/88 (CSF) and 36/60 (blood culture) of the cases studied. However all tests can also be normal!

Radiological examination is not always consistent, with false positive and negative results. Myelography can demonstrate an obstruction of the CSF flow, is non-specific and can even spread further the epidural abscess. The non-invasive MRI test is indicated whenever an epidural abscess is suspected. At that moment maximal priority should be given to obtain an MRI, which gives you a correct diagnosis in 80-90%. The use of gadolinium contrast (Gd-DPTA) is actually the best diagnostic tool.

Clinical phases of an epidural infection leading to the development of an epidural abscess are: I: bachache and local tenderness; II (2-3 days later): radicular pain, fever and neck rigidity; III (3-4 days later): changes in reflexes, sensory and motor dysfunction; IV: fast progression to paralysis. However, not every epidural abscess follows these phases and sudden paralysis without any prodromes are also possible.

Microbiology: Staphylocci species (S. aureus in 2/3 of the cases), gram- and anaerobic bacteriae, mycobacteriae and fungi may all cause the development of an epidural abscess.

Misdiagnosis can be due to the presence of a trauma, pain, or a dominant underlying disease or illness.Doctors also can be misled by diagnoses as traumatic cervicodorsal cord, subarachnoid bleeding, effect of local anesthetic, and a variety of other diseases as e.g.: discitis, meningitis, lung emboli, pneumothorax, pancreatitis,...In conclusion, clinical signs and symptoms, laboratory and radiological examinations are not always conclusive.

Review articles on the incidence of epidural abscesses reveal that the initial diagnosis was wrong in 50-60% of the cases.

Neurologic evolution

The neurologic deterioration can develop very fast, from hours to several weeks. Also the

first appearance of an epidural abscess can vary and the diagnosis is often difficult.

Treatment

There is no uniform treatment of an epidural abscess. In suspected cases, remove the epidural catheter and ask to perform microbiology tests on it. Small isolated abscesses may be treated with IV antibiotics. Neurologic deficits warrants an emergency MRI, followed by urgent surgical decompression performing a laminectomy, combined with IV antibiotics for 2-6 weeks.

Outcome

Outcome depends on the time of diagnosis and the extent of damage at the time of decompresion. Paralysis existing for over 36 hours results in a poor result, whereas paralysis lasting less than 36 hours may give full recovery. However, an early laminectomy does not guarantee for full recovery and existing neurologic sequelae may still persist. Mortality was very high in the past and is still decreasing due to better treatment. Most often those patients were paralyzed before the surgical decompression.

Epidural catheters have many indications and few contra-indications. Patients who cannot be evaluated for sensory and motor blockade (coma or heavily sedated patients) should not receive an epidural catheter.

Prevention and monitoring

Aseptic precautions should be taken. The operator should minimally wear mask and sterile gloves. Desinfection with chlorhexidine is better than with iodine. The use of a continuous technique, combined with a bacterial filter is more advantageous than a technique using frequent intermittent bolus injections. The epidural catheter at the back of the patient should be as such that frequent evaluation of the insertion site is possible.

Monitoring of sensory and motor blockade should be performed, also on the ward, every 6-8 hrs, also after removal of the epidural catheter. One should look for infection parameters and be alert for any block that intensifies without changing the local anesthetic rate. The anesthesiologist should immediately be informed about any abnormal findings. An hospital protocol for the prevention of epidural abscesses should be available in all departments dealing with patients with epidural catheters.

Use a local anesthetic solution whereby the dose has a minimal impact on motor function. Ideally, pain relief should be obtained without any motor blockade.

Conclusion

An epidural abscess is a very rare complication with a potential devastating outcome. Recovery depends on the following actions: the use of an aseptic technique, regular check-up of sensory and motor function, quick diagnosis and prompt therapy of any developing abscess; and if necessary, consultation of a neurologist.

Any anesthesiologist involving with epidural catheters should maintain a high index of suspicion.

Most epidural abscesses are NOT seen by anesthesiologists but by other doctors. They too have to be alert.
Most epidural abscesses develop in the absence of any form of anaesthesia.
Epidural anaesthesia is still a superior pain relief method.
Continuous vigilance by all doctors and nurses involved in the care of patients prevents severe epidural related complications.

Chronic Refractory Angina

Nursing Guidance for High Thoracic Epidural Infusion

These Guidance recommendations have been produced in accordance with the NHS Executive publication "Clinical Guidelines" (May 1996) and incorporate those standards produce by the King's Fund for evidence based clinical practice.

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Introduction (see clinical section)

High thoracic epidural analgesia has been reported as being effective in the relief of refractory angina. Blomberg (1,2) demonstrated that this technique was useful in both short and long-term treatment of patients with unstable angina by giving a bolus injection and then infusion. Toft and Jorgenson (3) used continuos thoracic epidural bupivacaine to relieve the pain of myocardial infarction. Gramling and Babb and co-workers 4 published data on ten patients who all had improvement in their symptoms. There was one non-epidural related death and no patients had either myocardial infarction or significant arrhythmia.

Definition
The administration of local anaesthetic into the epidural space to block the thoracic sympathetic ganglion. It is considered if stellate ganglion and Paravertebral block fails to adequately ameliorate symptoms

Treatment contract
It is essential that at all stages of treatment a clear treatment contract is developed with attainable goals set by the patient and careers. *Thoracic Epidural cannot cure the problem*. The actual aim of the treatment, being to ameliorate the effect of angina so that the patient and their family can enjoy a better quality of life. The treatment program and expectations of the patient and their carers are dealt with at all stages of the treatment by the angina management team. This helps to ensure that the patient and carers expectations on pain relief are not unrealistic and thereby unachievable.

Patients on Anticoagulant Therapy
There are different indications for anticoagulation in cardiac patients, which can be stratified into low-risk e.g. atrial fibrillation with no previous embolic history; and high-risk groups e.g. metal valve replacement, when considering the temporary interruption of their warfarin.
In the low risk group, anticoagulants can be stopped when the INR is <1.4. This usually takes three days. In the high-risk group the "therapeutic window" must be tightly controlled to minimise the embolic risks to the patient without exposing them to the risk of haematoma. The medical team looking after the patient must closely monitor the control of the anticoagulant.

Pre-procedure
The patients skin should be clean before any skin preparation is applied. The patient should shower/bathe within a skin disinfectant on the morning of the procedure. Shaving is not recommended, if hair removal is necessary clippers should be used.

Equipment
1. Venflon for venous access.
2. Chlorhexidine or equivalent skin cleansing agent.

3. Local anaesthetic Lignocaine 2%.
4. Normal Saline 20mls.
5. Anaesthetic 6mls of 0.5% plain Bupivacaine.
6. Selection of needles, Blue 24g and green 21g.
7. 10ml and 20ml syringe
8. Sterile dressing pack.
9. 18G Tuohy needle.
10. Epidural catheter pack with filter. , which includes - 18g Tuohy needle, obturator, low friction syringe, filter, and extension lead.
11. Occlusive dressing.
12. Infusion pump
13. Sterile gowns.
14. Gloves.
15. Towels.

Phenylephrine or Methoxamine should be available for emergencies

Anaesthesia Bupivacaine (usually) for infusion rate to be decided by the doctor.

Analgesia Fentanyl 250mg over 24hours via infusion pump.

Preparation

Epidural catheterization should be carried out in a theatre or a clinical room that has been documented as complying with HTM2025 guidelines.

An aseptic technique must be adhered to and sterile gloves; surgical mask and gown should be worn.

The skin should be visibly clean before any skin preparation. An antiseptic skin preparation of either alcoholic chlorhexidine or alcoholic povidone Ò iodine solution should be applied to the insertion site and surrounding area vigorously, using gauze swabs rather than cotton wool. The skin must be allowed to dry before proceeding in order to ensure decontamination of the skin is effective. The skin disinfection should be repeated.

Observation of the patient pre procedure.

Base line observation of the blood pressure, pulse, temperature and respiratory rate will be taken.

Procedure Rational

1. The procedure will be explained to the patient. To ensure that the patient understands the procedure and gives written consent.
2. An electrocardiograph is performed pre and Initially as routine base line and then post if problems develop post procedure To observe for any ECG changes (e.g. ischaemia, infarction).
3. The patientÌs back is prepared with cleaning solution. To reduce risk of infection.
4. Patient to sit on a hard surface with arms resting on a table or pillow. To allow identification of the spinous process and prevent sudden movement.
5. Give the patient support and encouragement. Reassurance is very important.

Doctor/Nurse action

1. The skin and subcutaneous spaces are infiltrated with local anaesthetic. To reduce discomfort felt by the patient on insertion of Tuohy needle.
2. The Tuohy is introduced between 5cmlateral to the midline at the level of T3-T4. The needle is advanced until the costotransverse ligament is felt and the needle 'gives' as it enters the epidural space. A negative aspiration must be obtained before injection of 15mls 0.5%.Bupivacaine. Constantly reassure and explain procedure.
3. Following insertion the catheter is connected to the extension line, filter and infusion pump.The rate of infusion to be decided by medical team.

Complications

It is estimated that minor complications occur in less than 5% of cases(5) and tend to occur during injection or shortly afterwards. In a large series of patients having mainly perioperative blocks, the main complications were hypotension in 4.6%, vascular puncture in 3.8%, pleural puncture in 1.1% and pneumothorax in 0.5% (6).

Accidental extradural or intrathecal injection is rare and due to taking too medial an approach.

Total spinal anaesthesia has been reported, with no long-term sequelae (7)

Assist the doctor as required during the insertion and removal of epidural catheter.

Observe effectiveness of pain relief following the procedure.

Wound Management post procedure

The epidural site must be covered with a sterile dressing e.g. Tegarderm or IV3000 for their increased moisture vapour transmission capability. A secondary dressing may be required to anchor the line and minimise the risk of catheter movement. The epidural dressing should be observed regularly to ensure it remains intact and secure. If there is slight leakage of blood/serious fluid it may be aspirated using a syringe and blunt needle. The puncture site should be resealed with a smaller occlusive dressing. If the dressing is no longer intact or is no longer adhering to the skin it should be changed. The skin should be observed for trauma and allergic reaction to the dressing.

Before all dressing changes or handling of the line hands should be decontaminated in accordance with hospital policy.

Wound Site inspection must be carried out on a daily basis for signs and symptoms of infection. The obvious signs and symptoms include:

Erythema, tenderness, swelling or purulent discharge and its appearance documented

A spreading erythema accompanied by tenderness or swelling.

Back pain, neurological deficits (paralysis, weakness) or meningitis may indicate the presence of a spinal abscess.

If a problem is suspected then the managing clinical team must be informed immediately.

Post-operative wound dressing must be performed using an aseptic technique. During dressing replacement, great care must be taken not to dislodge the epidural catheter. The replacement of the epidural administration line, filter and syringe must also take place under strict aseptic technique.

Line and filter contamination.

If the line or filter are suspected of being contaminated the incident must be documented, the team managing care informed and the epidural removed, a swab will be taken for culture and sensitivity (C+S) from the wound site and the catheter tip taken for also for C+S.(8)

Catheter removal

The removal must be under taken under strict aseptic technique, the site must continue to be inspected daily for signs and symptoms of infection. The catheter tip must be sent for virology analysis.

Observation for potential side effects post procedure.

Refractory angina patients will be on drug therapies that may cause hypotension and bradycardia in their mode of action. It is therefore important to record the patients blood pressure pulse and respiratory rate prior to the procedure to evaluate base line observations.

Hypotension - check blood pressure every 15 minutes for the first hour and then 1/2 hourly for the next two hours post procedure.

Bradycardia- check pulse every 15 minutes for the first hour and then 1/2 hourly for the next two hours post procedure

Respiratory depression - record respiratory rate, depth and pattern of breathing every 15 minutes for the first hour and then 1/2 hourly for the next two hours post procedure

Inadvertent Epidural anaesthesia - loss of power to the lower torso. Place patient into supine position and call for medical assistance.
Total spinal anaesthesia - rapid loss of consciousness with cardiovascular collapse and apnoea medical emergency - call crash team, institute Cardiopulmonary Resuscitation.
Local anaesthetic toxicity - caused by systemic adsorption of local anaesthetic resulting in high blood levels occurring 20-30 minutes after the block. It is characterised by tingling of the lips and tongue, confusion, light headedness, unconsciousness, convulsions and coma. Lie the patient flat and get medical assistance urgently.
Observe infiltration site for haematoma - recent anticoagulant therapy can predispose to haemorrhage into the epidural space.
Nausea or vomiting - side effect of local anaesthetic and hypotension.
Headache - may be caused by accidental puncture of the dura.
Urinary retention - due to parasympathetic block of the sacral level of the spinal cord.
If any of the above problems occur inform the medical team immediately.

Discharge from hospital

Inform district nurses prior to discharge and instruct on aim of treatment and care of the epidural catheter.

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