



Anaesthesia and epidural abscess

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Clinical case



- 76 yrs., arthritis, diabetes, HF
- 2005.07.04 – CSE (aseptic in OR) for hip arthroplasty
- 07.04-07.09– PCA in regular ward (continuous inf., bacterial filter) (5 days – old practice)
- 07.11 – rehab. clinic
- 07.14 – spine pain, fever (38°C)
- 07.15 – leg numbness, back in hospital 11 a.m.
- 07.15 1 p.m. – consultation of anaesthesiologist (on duty, not orthopaedic – *Saturday ☹*) – request for neurosurgeon
- 07.15 1-6 p.m. – backache increases, paraplegia (neurosurgeon is busy in OR)
- 8 p.m. – consultation of neurosurgeon, emergency CT – epidural abccess
- 10 p.m. – laminectomy
- Paraplegia not resolved – case in court

Rare complication?

	Population		
	Mixed	Obstetric	Surgical
Aromaa and colleagues ⁴	2/170 000		
Auroy and colleagues ⁷	0/30 000		
Dahlgren and Tornebrandt ²⁵	0/9200		
Kane ⁵³	0/50 000		
Kindler and colleagues ⁶¹	2/13 000	1/2000	Nil (<1/9000)
Phillips and colleagues ⁹⁵	1/2500	Nil (<1/5000)	1/800
Rygnestad and colleagues ¹¹³			2/2000
Scott and Hibberd ¹²⁰		1/505 000	
Wang and colleagues ¹³⁶	1/1930	Nil	

*<1 in 10 000
epidurals?*

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Aromaa U, Lahdensuu M, Cozantitis DA. Severe complications associated with epidural and spinal anaesthetics in Finland 1987–1993. A study based on patient insurance claims. *Acta Anaesthesiol Scand* 1997; 41: 445–52

Auroy Y, Narchi P, Messiah A, Litt L, Rouvier B, Samii K. Serious complications related to regional anesthesia: results of a prospective survey in France. *Anesthesiology* 1997; 87: 479–86

Dahlgren N, Tornebrandt K. Neurological complications after anaesthesia. A follow-up of 18 000 spinal and epidural anaesthetics performed over three years. *Acta Anaesthesiol Scand* 1995; 39: 872–80


Kindler U, Stedjeberg L. Complications of epidural or spinal anesthesia. *Anesth Analg* 1981; 60: 150–61

Phillips UM, Steadford LG, Hartsilver F, Roberts C. Epidural abscess complicating epidural anesthesia and analgesia. *Anesthesiology* 1998; 42: 614–20

Rygnestad T, Borchgrevink PC, Eide E. Postoperative epidural infusion of morphine and bupivacaine is safe on surgical wards. Organisation of the treatment, effects and side-effects in 2000 consecutive patients. *Acta Anaesthesiol Scand* 1997; 41: 868–76


Scott DB, Hibbard BM. Serious non-fatal complications associated with extradural block in obstetric practice. *Br J Anaesth* 1990; 64: 537–41

Wang LP, Hauerberg J, Schmidt JF. Incidence of spinal epidural abscess after epidural analgesia: a national 1-year survey. *Anesthesiology* 1999; 91: 1928–36



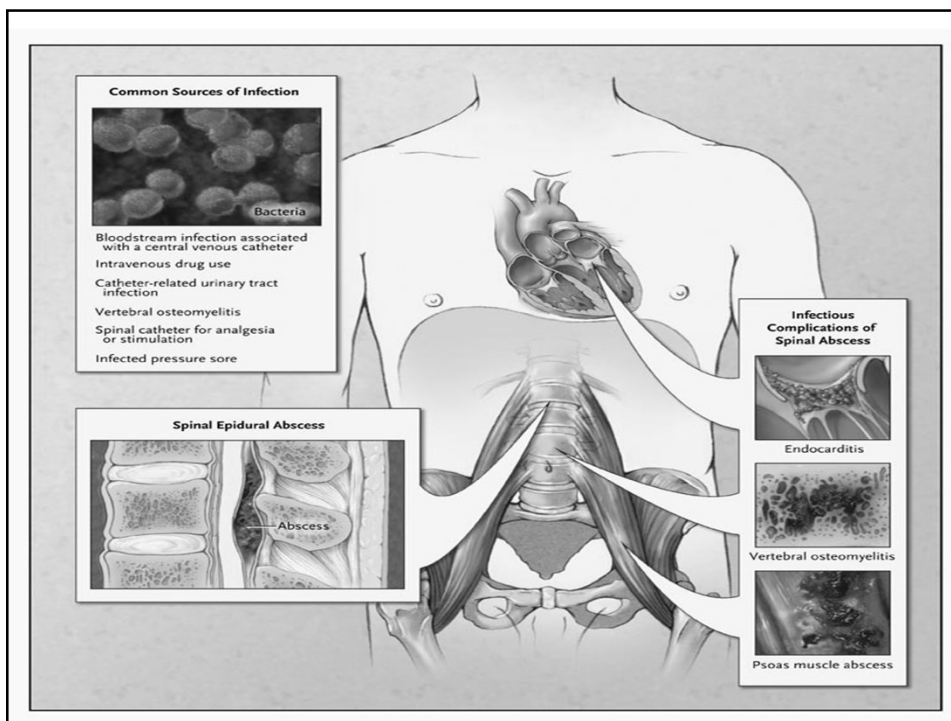
Two types of patient:

- young, fit, parturient
- elderly, multiple co-morbidities, requiring major surgery and, thus, with **significant risk factors:**



- Immunodeficiency: diabetes mellitus, steroid or other immunosuppressive therapy, malignancy, HIV infection, alcoholism, cirrhosis.
- Disruption of the spinal column: degenerative disease and disruption by trauma, surgery or instrumentation, including central neuraxial block (difficulty in insertion? Hematoma?)
- Duration of catheterization: > 2days - incidence of infection 4.3% (intravascular devices)
- Source of infection: respiratory, urinary and minor soft tissue infections - sources of hematogenous spread

(abscess following a block does not mean that the organism was introduced by the anaesthetist, but the need for an aseptic technique would seem self-evident)



Clinical view (> 4 days after instrumentation).

- Backache with spinal tenderness (72%),
- Neurological symptoms (pain with irradiation (47%), leg vague(35%), loss of sensations (23%), bladder or intestinal dysfunction (30%), paraplegia (21%))
- Superficial infection at the needle/catheter insertion site (not always)
- Signs of general inflammation
 - Fever (not always)
 - Leukocytosis, elevated erythrocyte sedimentation rate
- CSF changes (not always)

S. Grewal, G. Hocking and J. A. W. Wildsmith. Epidural abscesses. Review article. British Journal of Anaesthesia 2006 96(3):292-302;

Gram-positive cocci— <i>Staphylococcus aureus/epidermidis/mitis</i> /sp.,	621
coagulase-negative staphylococci	
Other Gram-positive bacteria— <i>Streptococcus pneumoniae/viridans/</i>	58
<i>pyogenes/milleri</i> /sp., <i>Enterococcus</i> sp.	
Facultatively anaerobic, Gram-negative rods— <i>Escherichia coli</i> ,	38
<i>Proteus mirabilis</i> /sp., <i>Enterobacter</i> sp., <i>Salmonella</i> sp.,	
<i>Klebsiella</i> sp., <i>Citrobacter</i> , <i>Serratia</i> , <i>Haemophilus</i>	
Anaerobic gram-negative rods— <i>Bacteroides</i> sp.	5
Aerobic gram-negative rods— <i>Pseudomonas aeruginosa</i> +sp.	15
Mycobacteria	9
Mixed bacterial	27
Fungi— <i>Aspergillus fumigatus</i> +sp., <i>Sporotrichium schenkii</i> ,	13
<i>Torulopsis glabrata</i>	
Parasites— <i>Dracunculus</i> , <i>Echinococcus</i>	3
Assorted other— <i>Neisseria</i> , <i>Acinetobacter</i> , <i>Brucella</i> sp.,	12
<i>Clostridium</i> , <i>Actinomyces</i> , <i>Propionibacterium</i> , <i>Nocardia</i>	

Reihsaus E, Waldbaur H, Seeling W. Spinal epidural abscess: a meta-analysis of 915 patients. *Neurosurg Rev* 2000; **23**: 175–204

Outcome



Worse after epidural abscess associated with anaesthesia:

- complete recovery only in 38%, compared with 43% in spontaneous cases,
- severe neurological deficit in 27%, compared with 15%.

Frequency of back pain and fever in postoperative and obstetric patients leads to dismissal of early features as inconsequential. Symptoms may also begin only after discharge from hospital, or a superficial infection may be treated with antibiotics so allowing progression of the underlying abscess.

Phillips JM, Stedeford JC, Hartsilver E, Roberts C. Epidural abscess complicating insertion of epidural catheters. Br J Anaesth 2002; 89: 778–82
Rathmell JP, Garahan MB, Alsofrom GF. Epidural abscess following epidural analgesia. Reg Anesth Pain Med 2000; 25: 79–82

Investigations

- **Blood tests** : helpful, but not diagnostic (leukocytosis 68% , erythrocyte sedimentation rate)
- **Lumbar puncture**: but spread of infection to the subarachnoid space?
- **Imaging**

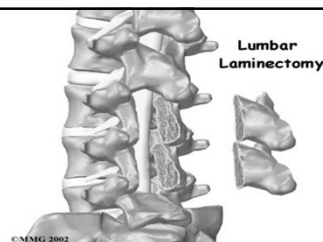
Plain radiographs useful no more than 20% of cases.
Myelography is an invasive procedure with potentially serious complications.

CT can detect both encroachment of the spinal canal and air in epidural pus, but it is insufficiently sensitive to different soft tissue densities.

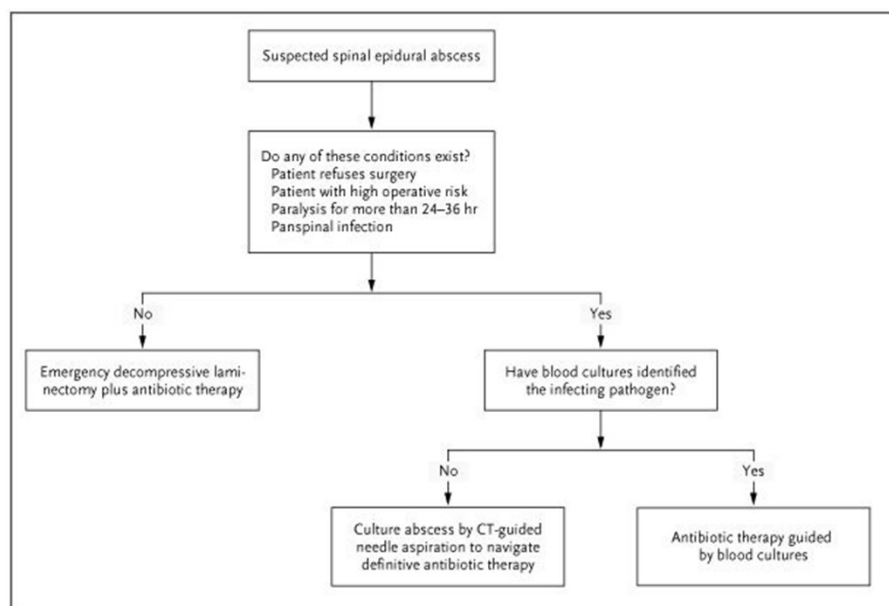
MRI is as effective as myelography in diagnosing epidural abscess (91% vs 92%), although it is superior in the emergency situation because the spinal cord can be examined in all planes without moving a patient with neurological injury.



Management



- Early surgical decompression (posterior laminectomy in 6 hrs after diagnosis) and prolonged (6–12 weeks) antibiotic (i.v., followed by oral) are the mainstays of treatment
- For dorsal abscesses well delineated by imaging, percutaneous drainage is possible, and may be the treatment of choice for multi-compartmental abscesses
- High dose, semi-synthetic penicillin, substituting a first-generation cephalosporin if possible in patients allergic to penicillin. Second generation cephalosporins also have reasonable anti-staphylococcal activity



Reducing the risk and basic precautions



Standard Precautions

Rules of Engagement in the War Against Germs

Asepsis and bacteriological risk



Both equipment and solutions can become contaminated: after a single insertion using an aseptic technique of operating room clothing, hat, skin preparation with 10% povidone iodine, sterile gloves and a drape, around 18% of spinal and epidural needles collected immediately were contaminated with skin commensal organisms, as were 5% of syringes of epidural infusate. There were no cultures grown from the corresponding catheter tips, and contamination does not equate with infection, but such studies indicate that an avenue for infection is present.



Raedler C, Lass-Flörl C, Pühringer F, Kolbitsch C, Lingnau W, Benzer A. Bacterial contamination of needles used for spinal and epidural anaesthesia. Br J Anaesth 1999; 83: 657–8

Basic precautions



There is good evidence that the risk of central venous catheter infection is reduced by the use of maximal sterile precautions, that is mask, cap, sterile gloves, gown and large drape, compared with only sterile gloves and a small drape

Can 'not wearing a mask' be justified knowing that identical organisms have been grown from an epidural abscess and a nasal swab from an anaesthetist who did not wear a mask?

Basic precautions as described above are not new, and are in accordance with the AAGBI Guidelines for Infection Control in Anaesthesia

Safdar N, Kluger DM, Maki DG. A review of risk factors for catheter-related bloodstream infection caused by percutaneously inserted, noncuffed central venous catheters: implications for preventive strategies. Medicine (Baltimore) 2002; 81: 466–79
Catchpole CR, Symonds JM, O'Dell C. Epidural catheter insertion and operating theatre standards. J Hosp Infect 1996; 32: 79–81
Association of Anaesthetists of Great Britain and Ireland. Infection Control in Anaesthesia, 2002

Skin disinfection



- Chlorhexidine is superior over other common agents in a range of clinical settings, including epidural block.
- The preparation is important: alcohol solutions are more effective than aqueous ones, chlorhexidine (0.5%) in ethanol (80%) being fully bactericidal in 15 s.
- Skin biopsies taken 10 min after skin preparation for laminectomy suggest alcohol solutions are more effective at penetrating lipid barriers in hair follicles and the stratum corneum.
- Other agents require longer to reduce bacterial counts
- Single-use containers should be used.

Chaiyakunapruk N, Veenstra DL, Lipsky BA, Saint S. Chlorhexidine compared with povidone-iodine solution for vascular catheter-site care: a meta-analysis. Ann Intern Med 2002; 136: 792–801

Infusion systems

- Epidural infusate is thought to be the least important - antibacterial activity.
- Use large volume reservoirs of epidural infusate prepared by the pharmacy or a reputable supplier instead of repeatedly changing syringes, which may be sub-optimally prepared on the ward
- What to do if the epidural infusion system becomes disconnected?

Laboratory study using deliberately contaminated catheters suggested that reconnection is safe within 8 h provided that the fluid inside the catheter is static (or the meniscus has moved <12.5 cm) and does not move when lifted above the level of the patient. The outside must be disinfected, for 3 min and allowed to dry thoroughly before up to 20 cm is cut from the end with a sterile instrument. If these conditions are not met, the catheter must be removed

Langevin PB, Gravenstein N, Langevin SO, Gulig PA. Epidural catheter reconnection. Safe and unsafe practice. Anesthesiology 1996; 85: 883-8



Antibiotic prophylaxis



It is inappropriate to use prophylactic antibiotics purely for epidural insertion, a conclusion supported also by guidelines on their use for central venous lines

Ward V, Wilson J, Taylor L, Cookson B, Glynn A (eds). Preventing Hospital-Acquired Infection: Clinical Guidelines. Public Health Laboratory Service, 1997

Minimizing the risk and recommendations

- Patient assessment for risk factors for epidural abscess (not contra-indication, but greater level of awareness)
- Maximal sterile precautions (clean area with long sleeved sterile surgical gown, large drapes, sterile gloves, theatre cap, a facemask, and assistants who are trained to support this technique).
- Anaesthetists should wash and disinfect their hands according to local guidelines, prepare the patient's back with 0.5% chlorhexidine in at least 70% alcohol, and give the solution sufficient time to dry completely. All the above recommendations are in line with the AAGBI Guidelines for Infection Control in Anaesthesia, which are likely to be quoted in the event of an adverse outcome.
- The needle (and catheter if used) should be inserted as atraumatically as possible to minimize the risk of haematoma formation.
- Acute pain team should review the patient daily and ensure compliance with local guidelines on catheter inspection/dressing and other aspects of management.

Association of Anaesthetists of Great Britain and Ireland. Infection Control in Anaesthesia, 2002
S. Grewal, G. Hocking and J. A. W. Wildsmith. Epidural abscesses. Review article. British Journal of Anaesthesia 2006 96(3):292-302;

Early diagnosis

- Deteriorating spinal cord function: extensive numbness, loss of control of bladder or bowel, and lower limb paralysis. Effects of the block?, even when they redevelop hours or days after they have regressed, but the least malign implication is that the block is excessive, which itself can cause morbidity.
- All staff must recognize that lower limb paralysis is, at best, unwanted and mandates immediate re-referral.
- Regular assessment of lower limb motor power in every patient receiving continuous epidural block. Epidural catheter placement at the lumbar level only if clinically necessary. This is so in labour and for lower limb surgery, but abdominal epidural should be placed close to the central dermatome to optimize analgesia and minimize lower limb weakness.
- A solution unlikely to produce paralysis has to be used. Analgesia with minimal lower limb weakness is obtained in labour and the same should be possible after surgery. Ropivacaine produces less motor block than bupivacaine, opioids allow reductions in local anaesthetic concentration, particularly with patient controlled epidural analgesia, and other additives.
- Epidural abscess can present after discharge from hospital, - an information sheet noting the possible symptoms and signs of epidural abscess, and with advice to seek medical help if they persist or progress.

S. Grewal, G. Hocking and J. A. W. Wildsmith. Epidural abscesses. Review article. British Journal of Anaesthesia 2006 96(3):292-302;