

NOTE: CONTRAINDICATIONS: anticoagulation or clotting disorder; infection of skin over injection site or spinal canal (discitis); inadequate epidural space in the cervical or thoracic spine or cauda equina syndrome in the lumbar area.

In patients with active or prior Peptic Ulcer Disease it is recommended that they be prophylactically treated with H2-receptor antagonists.

Aspirin should be discontinued at least 3-5 days and NSAIDs should be discontinued 1-3 days prior to ESI. Diabetics should be warned of raised blood sugar (hyperglycaemia). (source xxv)

Since the withdrawal of oil-based myelography, Depo-Medrol (Depo-Medrone) is one of the principal causes of adhesive arachnoiditis in the Western world....(note that water based myelographic dyes such as metrizamide are also causative agents).....ANY steroid preparations containing preservatives can cause toxic damage.

Adhesive arachnoiditis is an incurable neurological condition that causes severe intractable back and limb pain as well as a wide range of other debilitating symptoms.

Dr. Burton of the Institute of Low Back and Neck Care in Minnesota, maintains that almost all cases of clinically significant adhesive arachnoiditis are caused by Depo-Medrol:

"NOTE: Over the past decade, following the cessation of use of oil-based myelographic agents in the 1980s, the most common cause of incapacitating, clinically significant, adhesive arachnoiditis in the world population has now become the subarachnoid deposition of substances containing polyethylene glycol."([11](#))

He also now recognises that other steroid preparations such as Aristocort (Kenacort) or indeed any preparation which contains neurotoxic preservatives may also be causative factors.

Furthermore, if there are multiple injections given, the risks are higher: Burton comments,

"If inflammatory changes are produced in the epidural space by re-injection of materials this "space" can become obliterated.

Once the epidural space has been obliterated and further spinal injections at the site will then be directly into the subarachnoid space." ([\[ii\]](#))

The NHMRC report (vii) from 1994 shows that the risk of dural puncture is, on average, "at least 5%".

The authors also warn, "particular care must be taken if attempting an epidural injection in patients previously treated by spinal surgery.

Complete obliteration of the epidural space occurs following decompressive laminectomy and in such cases an attempted epidural injection carries a very high risk of dural tap." Indeed, the report suggests that previous spinal surgery is a relative contraindication for ESIs.

For patients who already have arachnoiditis, O'Connor et al ([\[iii\]](#)) sum up the situation by stating that the "abnormalities of the epidural and subarachnoid spaces in such patients"(i.e. with chronic spinal arachnoiditis)... gives rise to "unpredictable and potentially dangerous results" following drug injection into these spaces.

On the matter of the neurotoxic preservatives, Dr. Michael Whitworth has written privately to me (xii) and said:

"While there are different preparations of depomedrol available (some with benzyl alcohol) I am concerned about the rare potential intrathecal injection.

Therefore, I use Celestone soluspan, which has a better safety profile and contains no propylene glycol."..... "the subarachnoid space is not forgiving at all and drugs such as benzyl alcohol, propylene glycol can cause permanent damage intrathecally administered."

Indeed, the 1998 Bush and Tanner (of the British Institute of Musculoskeletal Medicine) report ([\[iv\]](#)) on the Safety and Efficacy of ESIs mentioned the evidence of damage due to intrathecal injections of the preservatives cited by Dr. Whitworth.

The authors of the report also mentioned the Mackinnon studies ([\[v\]](#)) which showed direct neurotoxic effect with intraneural injections and they admitted that lumbar ESIs "stray from true on occasion."

Wood ([\[vi\]](#)) studied the effects of injections of methylprednisolone acetate into rat sciatic nerves. Nerves treated with either the steroid or its vehicle showed damage, including collagen (scar) formation and demyelination.

The debate on the neurotoxicity of ESIs has centred on the notion that the epidural space is a great deal more forgiving than the subarachnoid (intrathecal) space and that intrathecal damage seen in animal studies is irrelevant as epidural injections do not reach the subarachnoid space.

However, this completely fails to take into account the use of epidural anaesthetics, which are by design given precisely because they get through to the subarachnoid space and exert their intended effect on the spinal cord.

Indeed, it is widely accepted as part of clinical practice that epidural doses need to be about 10 times higher than intrathecal doses as only 10% of the dose will reach the subarachnoid space.

In other words, this admits that therefore contrary to popular medical opinion, 10% of epidural steroids can reach the subarachnoid space.

This is explained by Crowhurst (in the context of epidural anaesthesia):

“A drug placed in the epidural space will be re-distributed into various other compartments...fat, connective tissues, blood, epineurium sheaths, nerve roots and the spinal CSF.

Only a fraction of the drug reaches the thecal nerve roots, its intended target.

.....Unfortunately, the remainder of the dose is not without its unwanted effects...” ([vii](#))

Whilst he is approaching the subject of how much drug gets through to the subarachnoid space from the other direction (in other words, more transfer is better for the purposes of anaesthesia as opposed to viewing the amount as potentially neurotoxic).

In the ISIS (International Spinal Injection Society) newsletter of July 1998 Richard Derby MP wrote ([viii](#)):

"There are several preparations commonly used during epidural injection procedures that are potentially neurotoxic in nature and are a likely contributing factor to observe chronic arachnoiditis when inadvertently injected into the subarachnoid space.

On the other, Celestone Soluspan has been shown in animals to be "relatively innocuous" when the clinical equivalent human dose of 12mg is injected within the subarachnoid space."

The only steroid preparation in the UK that does not contain preservatives is Decadron manufactured by Faulding.

Dr. Michael Whitworth wrote (in private discussion xii),

"The list of potential side effects (of interlaminar injections) is protracted. These include numerous papers describing retinal detachment, blindness, arachnoiditis from inadvertent subdural injections, permanent neurologic impairment, epidural haematomas and abscesses etc. etc."

One of the reasons for this is that there needs to be a relatively large volume of injectate, partly due to absorption by the epidural fat. This concurs with Crowhurst's statement.

Other adverse effects are clearly outlined by Kaplan and Derby ([ix](#)):

"Risks associated with needle placement or with the injection of diagnostic/therapeutic substances, including the local anesthetic and steroid suspension, include, infection, bleeding, nerve injury, transient numbness or weakness, paralysis, contrast reaction (allergy), adrenal suppression, and fluid retention with systemic manifestations which may include peripheral

swelling.

Pneumothorax may occur if undergoing a thoracic procedure. Total spinal blockade is possible with cervical procedures.

There is also a potential for minor subcutaneous infection, vasovagal episode, as well as failure to obtain a definitive diagnosis or positive therapeutic injection with persistence of chronic pain."

The State of Colorado Invasive Treatment Procedures 1998 (xxx) states that "permanent paresis (weakness), anaphylaxis (acute allergic reaction of a life-threatening degree) and arachnoiditis have rarely been reported with the use of epidural steroids."

(however, it must be noted that there is substantial under-reporting of iatrogenic conditions such as arachnoiditis due to lack of medical recognition of the condition; reports of long-term adverse effects fail to be seen in most of the medical literature because the studies tend to be short-term and thus longer-term events will not be included).

In conclusion: epidural steroid injections carry a risk of serious, irreversible adverse effects.

[i] Internet resource: Dr. C Burton Institute for Low Back and Neck Care, Minnesota. 1999 <http://ilbnc.com>

[ii] Internet resource: The Burton Report, <http://www.burtonreport.com/InfSpine/MinInvasProcEpiSter.htm>

[iii] O'Connor M, Brighthouse D, Glynn CJ Clin J Pain 1990 Sep; 6(3): 240-2 Unusual complications of the treatment of chronic spinal arachnoiditis.

[iv] Report on Efficacy and Safety of Epidural Steroid Injections for a Type 2 variation on Kenalog and Adcortyl data sheets. Dr. K. Bush and Dr. J. Tanner British Institute of Musculoskeletal Medicine. (1998)

[v] Mackinnon SE, Hudson AR Plast. Reconstr. Surg. 1982; 69: 482-489 Peripheral nerve injection injury with steroid agents.

[vi] Wood KM Arguelles J Norenberg MD Reg Anaesth 1980 5:13-15 Degenerative lesions in rat sciatic nerves after local injections of methylprednisolone in aqueous solution.

[vii] John Crowhurst, Reader in Obstetric Anaesthesia, Imperial College School of Medicine, London: on the subject of "walking labour analgesia." (ESRA Europe 1999)

[viii] Derby R ISIS Scientific Newsletter 1998 Vol 3(1) p17 Procedural safety Training Guidelines for the performance of interlaminar cervical epidural steroid injection

[ix] Internet resource: **When, How, and Why To Use Epidural Corticosteroid Injections:An Overview** Michael Kaplan MD & Richard Derby, Jr. MD <http://www.spinaIdiagnostics.com/Articles/kapepi/KapEpi.htm>