FACULTY OF PAIN MEDICINE of the Royal College of Anaesthetists

THE BRITISH PAIN SOCIETY

British Pain Society/Faculty of Pain Medicine (RCA) Consensus Statement on the use of Corticosteroids for Neuraxial Procedures in the UK.

There has been international debate relating to the use of corticosteroids for neuraxial interventions. This has included the publication of conflicting statements which will add to the challenges faced by the pain physician in supporting their clinical decision making. The British Pain Society and the Faculty of Pain Medicine of the Royal College of Anaesthetists established a working group tasked to create a summary for clinicians to inform decision making in this area.

Summary of evidence considered:

- We recognise that evidence in this field is rapidly progressing.
- There have been a number of reported catastrophic neurological complications with transforaminal injections in the cervical region with particulate steroids.
- According to the current evidence, the likely mechanism of such injury is due to the unintended intravascular injection of the particulate steroid causing direct vascular ischaemia of the spinal cord. Particulate steroid induced aggregation of red blood cells may also be a relevant mechanism.[1,2] In a study using porcine models, all particulate injections into the vertebral artery resulted in catastrophic outcome whereas non-particulate steroid injections resulted in full clinical recovery.[3]
- Whilst the vast majority of the reported injuries have occurred with transforaminal cervical injections, similar events in the lumbar region from both transforaminal and interlaminar routes of injections are also known to have occurred. From 3 reported case studies of spinal cord infarction following interlaminar lumbar epidural steroid injections all had previously undergone laminectomy below the segments of the injection. 50% of reported complications following transforaminal injection had also had lumbar spine surgery (7 out of 14 cases).[4]
- It is accepted that the risk of such catastrophic neurological complication is likely to be much lower in more caudad regions with non-transforaminal routes of injection. It is postulated that the vascular anatomy may be more favourable in those regions which has led to fewer complications being reported.[4]
- There has been one recent case report of non-particulate steroid administered via a transforaminal epidural lumbar route being associated with ischaemic neurological injury. This suggests that other mechanisms may also be at play.[5]
- We recognise that only a proportion of serious complications are reported in the literature.
- We recognise that other types of injury may also lead to neurological complications including direct neurotoxicity of drugs and of vasospasm secondary to needle trauma
- Imaging can reduce but not exclude all inadvertent intravascular injections or complications.[4]
- We recognise there is sufficient evidence to support the continued use of corticosteroids in epidural injections for the acute relief of symptoms, particularly in the presence of acute radicular pain with disc herniation.[6]

- There is only limited evidence that particulate corticosteroid preparations have better efficacy than non-particulate preparations in the short term. There is no long term data to indicate efficacy of any steroid preparation.
- Some preservative formulations used in steroid preparations may be neurotoxic.

Based on current evolving evidence and mindful of the requirement for fully informed consent that is relevant to the patient, the position of the BPS and FPMRCA working group is:

- Particulate steroids must not be used for transforaminal cervical epidural injections on the basis of the risk of rare but catastrophic complications

- Whilst definitive recommendations cannot be given for the choice of soluble or particulate steroid for injections in interlaminar cervical epidurals, clinicians should be aware that serious neurological complication can still occur.

- Whilst definitive recommendations cannot be given for the choice of soluble or particulate steroid for injections in epidurals undertaken in other areas of the spine (thoracic, lumbar and caudal), clinicians should be aware that serious neurological complication can occur with any route of administration particularly if there is a history of previous spinal surgery.

- Steroid preparations for epidural administration may carry a small risk of neurotoxicity with inadvertent intrathecal injection due to the preservative preparation used. The clinician should carefully consider the formulation used.

- The doctor must follow current GMC guidance on consent and record the discussion process. The discussion should ideally occur on an occasion prior to the procedure as well as at the time of the procedure to allow time for reflection.

- The consent process should include discussion and documentation regarding indications, efficacy, safety and alternative treatments

- The use of corticosteroids in epidural injections is an indication that is outside the marketing authorisation (product license). This information should also be incorporated into the consent process and documented in the medical records.

References

1) Laredo J, Laemmel E, Vicaut E. Serious neurological events complicating epidural injections of glucocorticoid suspensions: evidence for a direct effect of some particulate steroids on red blood cells. RMD Open 2016;2:e000320. doi: 10.1136/rmdopen-2016-000320
2) Diehn FE, Murthy NS, Maus TP. Science to Practice: What causes arterial infarction in transforaminal epidural steroid Injections, and which steroid Is safest? Radiology. 2016 Jun;279(3):657-9
3) Okubadejo GO, Talcott MR, Schmidt RE, et al. Perils of intravascular methylprednisolone injection into the vertebral artery. An animal study. J Bone Joint Surg Am. 2008;90:1932–8
4) Dietrich TJ, Sutter R, Froehlich JM, Pfirrmann CW. Particulate versus non-particulate steroids for lumbar transforaminal or interlaminar epidural steroid injections: an update. Skeletal Radiol. 2015 Feb;44(2):149-55
5) Gharibo CG, Fakhry M, Diwan S, Kaye AD. Conus Medullaris Infarction After a Right L4 Transforaminal Epidural Steroid Injection Using Dexamethasone. Pain Physician. 2016 Nov-Dec;19(8): E1211-E1214
6) Low back pain and sciatica in over 16s: assessment and management (2016) NICE guideline NG59

Medical References:

1. Rathmell JP, Benzon HT, Dreyfuss P, Huntoon M, Wallace M, Baker R, Riew KD, Rosenquist RW, Aprill C, Rost NS, Buvanendran A, Kreiner DS, Bogduk N, Fourney DR, Fraifeld E, Horn S, Stone J, Vorenkamp K, Lawler G, Summers J, Kloth D, O'Brien D Jr, Tutton S. Safeguards to Prevent Neurologic Complications after Epidural Steroid Injections: Consensus Opinions from a Multidisciplinary Working Group and National Organizations. Anesthesiology 2015; 122: 974-984.
2. Brouwers PJ, Kottink EJ, Simon MA, Prevo RL. A cervical anterior spinal artery syndrome after diagnostic blockade of the right C6-nerve root. Pain 2001; 91: 397–399.
3. Benzon HT, Chew TL, McCarthy RJ, Benzon HA, Walega DR. Comparison of the particle sizes of different steroids and the effect of dilution: A review of the relative neurotoxicities of the steroids. Anesthesiology 2007; 106: 331–8.
4. Dawley JD, Moeller-Bertram T, Wallace MS, Patel PM. Intra-arterial injection in the rat brain: Evaluation of used for transforaminal epidurals. Spine 2009; 34: 1638–48.
5. Derby R, Lee SH, Date ES, Lee JH, Lee CH. Size and aggregation of corticosteroids used for epidural injections. Pain Medicine 2008; 9: 227–38.
6. El-Yahchouchi C, Geske JR, Carter RE, Diehn FE, Wald JT, Murthy NS, Kaufman TJ, Thielen KR, Morris JM, Amrami KK, Maus TP: The noninferiority of the nonparticulate steroid dexamethasone and triamcinolone in lumbar transforaminal epidural steroid injections. Pain Medicine 2013; 14: 1650–7.
7. Fitzgibbon DR, Posner KL, Domino KB, Caplan RA, Lee LA, Cheney FW; American Society of Anesthesiologists. Chronic pain management: American Society of Anesthesiologists Closed Claims Project. Anesthesiology 2004; 100: 98-105.
8. GMC June 2008 Consent Patients and Doctors making decisions together http://www.gmc-uk.org/static/documents/content/Consent_-_English_1015.pdf
9. Kim D, Brown J. Efficacy and safety of lumbar epidural dexamethasone versus methylprednisolone in the treatment of lumbar radiculopathy: a comparison of soluble versus particulate steroids. Clinical Journal of Pain. 2011; 27: 518-22.
10. Kennedy, D. J., Plastaras, C., Casey, E., Visco, C. J., Rittenberg, J. D., Conrad, B., Sigler, J. and Dreyfuss, P. Comparative effectiveness of lumbar transforaminal epidural steroid injections with particulate versus nonparticulate corticosteroid for lumbar radicular pain due to intervertebral disc herniation: a prospective, randomized, double-blind trial. Pain Medicine 2014:15: 548–555.
11. Lee JH, Lee JK, Seo BR, Moon SJ, Kim JH, Kim SH: Spinal cord injury produced by direct damage during cervical transforaminal epidural injection. Regional Anesthesia & Pain Medicine 2008; 33: 377–9.
12. MacVicar, J., King, W., Landers, M. H. and Bogduk, N. The Effectiveness of Lumbar Transforaminal Injection of Steroids: A comprehensive review with systematic analysis of the published data. Pain Medicine 2013; 14: 14–28.
13. Manchikanti L, Nampiaparampil DE, Manchikanti KN, Falco FJ, Singh V, Benyamin RM, Kaye AD, Sehgal N, Soin A, Simopoulos TT, Bakshi S, Gharibo CG, Gilligan CJ, Hirsch JA. Comparison of the efficacy of saline, local anesthetics, and steroids in epidural and facet joint injections for the management of spinal pain: A systematic review of randomized controlled trials. Surg Neurol Int. 2015; 6 (Suppl 4): S194-235.
14. Okubadejo Go, Talcott MR, Schmidt RE, Sharma A, Patel AA, Mackey RB, Guarino AH, Moran MJ, Riew KD: Perils of intravascular methylprednisolone injection into the vertebral artery. Journal of Bone and Joint Surgery American 2008; 90:1932–8.
15. Park CH, Lee SH, Kim BI. Comparison of the effectiveness of lumbar transforaminal epidural injection with particulate and nonparticulate corticosteroids in lumbar radiating pain. Pain Medicine 2010; 11: 1654–1658.
16. Rathmell JP, Michna E, Fitzgibbon DR, Stephens LS, Posner KL, Domino KB: Injury and liability associated with cervical procedures for chronic pain. Anesthesiology 2011; 114: 918–26

17. Rozin L, Rozin R, Koehler SA, Shakir A, Ladham S, Barmada M, Dominick J, Wecht CH. Death during transforaminal epidural steroid nerve root block (C7) due to perforation of the left vertebral artery. American Journal of Forensic Medicine and Pathology 2003; 2: 351-5.
18. Smith RM, Schaefer MK, Kainer MA, Wise M, Finks J, Duwve J, Fontaine E, Chu A, Carothers B, Reilly A, Fiedler J, Wiese AD, Feaster C, Gibson L, Griese S, Purfield A, Cleveland AA, Benedict K, Harris JR, Brandt ME, Blau D, Jernigan J, Weber JT, Park BJ; Multistate Fungal Infection Outbreak Response Team. Fungal infections associated with contaminated methylprednisolone injections. N Engl J Med. 2013; 369: 1598-609.