Correct level in Spinal Surgery

The Victorian Surgical Consultative Council

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The VSCC previously reviewed a number of cases where the operation occurred at the incorrect level, mainly at the lumbar spine level but also in the cervical spine.

Neurosurgical cases continue to top the list of surgical malpractice suits in the USA, in particular spinal surgery. In a recent study by Mody et. al. a survey was sent to all members of the American Academy of Neurological Surgeons. Of the respondents, 50% reported one or more wrong level surgeries during their career. 15% had prepared the incorrect site at the beginning of the operation but rectified the problem prior to making the incision.

A prospective study (Ammerman et. al.) examined a single surgeon’s technique with 100 consecutive patients. The expected spinal level for surgery was prepared and draped. Intra-operative imaging was then utilised to correlate the spinal level. The wrong level was prepared 15% of the time.

Factors predictive for incorrect site of surgery include increasing patient age, and pathology above the L5/S1 level. Other factors identified in the literature include the surgeon’s experience, fatigue, unusual anatomy (e.g. lumbarised sacrum) and emergency operations.

Guidelines for ensuring correct site surgery have been in place for many years. The recommendations from Mody et. al. are:-

- direct pre-operative communication between the surgeon and the patient
- marking of the intended site
- use of an image intensifier

Multiple studies have identified intra-operative x-ray as the gold standard for preventing wrong level surgery. However, intra-operative x-ray has its limits:-

- congenital malformations e.g. lumbarised sacrum
- incorrect counting of relevant vertebral levels
- inadequate radiological visualisation (especially in large patients)
- failure to recognise the absence of the expected lesion at operative level

Mohanial et. al. audited the use of pre-operative localisation of spinal level in lumbar microdiscectomy. Placement of a pre-operative marker and the use of intra-operative lateral fluoroscopy to identify this marker is gold standard for lumbar microdiscectomy.

The following recommendations are made:-

1. **Plain x-rays of the spine should be displayed in the theatre.** Discussion of the need for plain xrays in addition to imaging such as an MRI affords an additional safeguard against the possibility of wrong level surgery. MRI alone is not sufficient to clarify congenital abnormalities, and CT scans can be confusing in this regard.

2. **The spine should be marked before surgery commences,** preferably with the patient positioned and the area prepared and draped but before the incision is made.

3. **A needle is placed into the most likely spinous process (in the lumbar spine) and a lateral image intensifier used to confirm the level.**

4. **In the cervical spine with an anterior approach it is recommended that a needle be placed in the disc at the presumed correct level and an image intensifier used to check it is the correct level.**

VSCC Guidelines / Practice Statements are intended to provide some broad statements of principle to facilitate the improvement and safety of surgical practice. They are not legally binding, nor do they provide a comprehensive analysis of every situation.
5. **Preoperatively as part of informed consent**, the surgeon should discuss with the patient and document the possibility of a mistaken level of operation, especially in the thoraco-upper-lumbar spine. Reports are now rare, but the risk endures.

6. **Postoperatively check** that there has been an appropriate relief of symptoms. If in doubt, arrange x-ray before discharge.

References: