PEDICLE SCREW INSERTION IN CRITICALLY ILL PATIENTS UNDERGOING SPINAL SURGERIES: FREEHAND VERSUS COMPUTER-ASSISTED NAVIGATION.

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Introduction: Recent statistics indicate that pedicle screw misplacement can be as high as 30% in patients undergoing spinal surgery. Indeed, this could potentially have negative implications (e.g. permanent numbness/paralysis of limbs) on patients. It has been previously shown that repositioning of a concurrent pedicle screw perforation may not necessarily resolve the underlying neurological risks, and it would be better to avoid the perforation in the first place. Computer-assisted navigation enables surgeons to visualise the spinal anatomy in a multi-dimensional fashion, which assists in tracing surgical instruments in relation to spinal anatomy.

Objectives: To evaluate which technique—computer-navigated or non-navigated—is more accurate when inserting pedicle screws in critically ill patients.

Methods: Electronic databases (MEDLINE and EMBASE) were systematically searched between January 2003-March 2013 for comparative studies on the accuracy of pedicle insertion. Cohort and randomised control trails were included in this meta-analysis. Upon identifying the studies involved, we preformed a hand search of the cross-references in those trials. The main outcomes searched for was whether or not there were any pedicle perforations. The secondary outcomes were operative time and complications.

Results: Fourteen studies were used in this analysis: 12 cohort studies and 2 randomised trials. The most common indications for those who underwent the surgery were trauma, degenerative disease (e.g. rheumatoid arthritis) and tumour. The overall number of pedicle screws used was 5977; of those, 3347 were navigated. It was found that the relative risk of pedicle perforation was 0.33 (p<0.001), favouring the computer-navigated technique. No neurological complications were identified using the navigated pedicle screw insertion (3347 screws), whereas, two neurological complications were reported with the non-navigated method (2630 screws). Moreover, there was no significant difference between the surgical techniques in terms of operative time.