



Safety & Efficacy of Thoracic Pedicle Impedance Testing in Surgery of the Growing Spine

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Background

Spinal deformity surgery has a risk of spinal cord injury of 0.1 – 3%. Intra-operative triggered electromyography (t-EMG) utilises impedance testing of thoracic pedicle screws post insertion to detect medial wall perforation. T-EMG has been shown to have high sensitivity in detecting screw malposition. We hypothesised that testing the pedicle tract utilising a similar methodology prior to screw insertion would improve the safety profile of pedicle screw insertion.

Methods

Adolescent scoliosis patients were enrolled in a prospective longitudinal study. All selected pedicles were examined manually, using t-EMG post pedicle tapping & post screw insertion, as well as radiologically. Radiological examination of screw trajectory comprised biplanar rotational image acquisition with 3D reconstruction. T-EMG threshold was set at 15mA as per manufacturers guidelines.

Results

40 patients, comprising 685 thoracic pedicle screws, were included with a mean age of 14 (range 10-16 years). There were 132 positive alerts of which 31 had a confirmed medial wall breach clinically or radiologically (PPV 0.23). Of the 543 alert negative pedicle screws, none had radiological evidence of medial wall

breach (NPV 0.83). Of the alert positive screws 55 screws were omitted. 77 had corrective action instigated with either downsizing of screws (n=45) or a change in screw trajectory (n=32). No patients in this cohort had post operative neurological deterioration as per day 1 post operative ASIA examination.

Conclusions

T-EMG utilising this technique shows excellent sensitivity in detecting medial wall breaches prior to screw insertion. Further study is ongoing to ascertain the safe threshold for t-EMG testing of the thoracic pedicle.