

## **Utility of intraoperative motor-evoked potential during L4-5 direct transpsoas lateral interbody fusion to detect and avoid nerve injury: preliminary results of a prospective study of consecutive patients**

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**Introduction:** Nerve root injury has been reported as high as 23% in direct transpsoas lateral interbody fusion (LLIF), particularly at L4-5. We aimed to evaluate the utility of transcranial motor evoked potential (MEP) to detect and avoid nerve root injury during LLIF at L4-5 level.

**Methods:** This is a prospective, observational, cohort study of patients undergoing L4-5 LLIF conducted by two spine surgeons at an academic hospital. The study period began in January 2018 and data collection is ongoing. Spontaneous and triggered EMG, somatosensory evoked potentials (SSEP) were routinely recorded. In addition MEPs from quadriceps and anterior tibialis muscle groups were also recorded bilaterally. Transcranial MEP were recorded every 5 minutes from the time of incision. A decrease in amplitude of 50% or more from baseline was considered a positive result, and the surgeon was alerted accordingly. Patient's neurological exam and health related quality of life measures were collected preoperatively, immediately postoperatively, and at the time of follow up at 6 weeks, 3 months, 6 months and 1 year.

**Results:** Thirty-two patients were considered, two patients were excluded due to history of seizure and technical difficulties of obtaining reliable signals. Of the 30 patients included, 15 underwent lateral interbody fusion only, of whom in 11 patients, L4-5 level was the only treated level. **REWORD: AWKWARD.** Outcome data demonstrated gradual improvement of all measured HRQOL measures at one year including ODI (40 to 34), back pain (7.6 to 4.0) and leg pain (4.5 to 2.0) visual analogue score. Transient quadriceps weakness occurred in 73% of patients but resolved by 6 weeks. Fifteen patients (50%) had a significant decrease in MEP amplitude without changes in spontaneous or triggered EMG and SSEO. Six patients had sustained decrease at the time of closure and two patients had persistent weakness in dorsiflexion at time of last follow up at 6 weeks (3/5 strength) and 1 year (1/5 strength). In one patient the surgery was aborted at the time of introduction of retractor due to 69% reduction in MEP and inability to mitigate the changes. None of the patients with a negative MEP developed persistent weakness postoperatively resulting in sensitivity of 100%.

**Conclusion:** MEP monitoring has additional value to sEMG and tEMG during LLIF procedure at L4-5 by providing the surgeon of impending injury that would otherwise go unnoticed. The value of MEP recording is clearly during the phase of the procedure where the retractor is placed and opened, not during traversing the psoas muscle where EMG is most valuable. Continued prospective data collection is necessary to ascertain the sensitivity and specificity of this neuromonitoring modality.