Welcome and General Session: Best of Awards

Wednesday, February 26

7:30 AM - 9:00 AM

Protecting the Femoral Nerve During Lumbar Lateral Interbody Fusion

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ABSTRACT

Background: The transpsoas lateral lumbar interbody fusion (LLIF) technique is an effective alternative to traditional anterior and posterior approaches to the lumbar spine. The advantages of the far lateral lumbar approach are well documented, however iatrogenic injuries to the lumbar plexus are the most commonly reported post-operative complications. The most feared of these complications is a high-grade femoral nerve injury which can be debilitating. Suspected mechanisms of femoral nerve injury include, compression, stretch, and disrupted vascular perfusion, all of which are suspected to be related to excessive or prolonged surgical retraction. New methods of monitoring femoral nerve function have been evolving and gaining greater acceptance as multiple independent groups have reported similar promising findings. We present our results from a multi-center study conducted over the course of 3 years using a multimodality femoral nerve monitoring protocol that includes saphenous nerve somatosensory evoked potentials (SnSSEP), motor evoked potentials with quadriceps muscles recordings (MEPq) and free- running EMG (EMG) to assess femoral nerve function during surgical retraction.

Material & Methods: Intraoperative monitoring data was acquired from 172 cases consisting of 278 surgical levels. Alerts were made when there was a significant amplitude degradation limited to the surgical side femoral nerve evoked potentials (SnSSEPs and/or MEPq). The acquired neuromonitoring data was reviewed and correlated to post-operative clinical findings.

Data Analysis: Descriptive statistics was used to identify mean, median, mode, standard deviation and frequency of the variables. Retraction time was analyzed using an independent samples t test (alpha = .05, two tailed).

Results: In 153 of the surgeries (248 surgical levels), there were no alerts in the acquired femoral nerve evoked potential data (Negative group). In 19/153 (11%) (19 surgical levels), alerts were prompted following a significant degradation of the amplitudes of the SnSSEP and/or MEPq responses limited to the surgical side (Positive group). In 17/19 of these alerts, prompt surgical countermeasures were employed (i.e. reducing or removing surgical retraction and/or increasing blood pressure). Following prompt surgical countermeasures, in all 17 cases the degraded evoked potential responses recovered, and no new post- operative femoral nerve deficits were observed. In 2/19 cases with alerts, no surgical countermeasures were employed, and no improvements were observed in the degraded surgical side femoral nerve evoked potentials by the time of surgical closure. Both of these patients exhibited postoperative findings suggesting sensorimotor femoral nerve injury as predicted by the degraded femoral nerve monitoring data. The mean retraction time of the negative group was 29 minutes, whereas the positive group had a significantly shorter duration averaging only 20 minutes (P=.001).

Conclusion: A multimodality approach to femoral nerve monitoring including SnSSEPs and MEPq recordings is proving to be specific and sensitive in predicting post-operative outcomes. Our results suggest that the common method of limiting retraction duration is not effective in reducing the likelihood of femoral nerve injury; however, multimodal femoral nerve monitoring can provide surgeons with a timely alert to failing femoral nerve function, so that prompt surgical countermeasures can be employed.