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INITIAL ASSESSMENT OF AUTOMATED SSEP FOR DETECTION OF INTRAOPERATIVE POSITIONAL NEUROPRAXIA IN CARDIAC SURGERY

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Abstract:

Introduction: In anesthetised patients positional neuropraxia may be an accompaniment to inadvertent compression or traction of peripheral nerves, of which upper limb and brachial plexus nerves are particularly vulnerable. The incidence of clinically apparent upper limb neuropraxia in cardiac surgery has been estimated at between 0.5% to 37.5%, depending on the type and duration of retractor usage, patient positioning and is variably influenced by patient comorbidities.[1,2] Intraoperatively, peripheral nerve function can be monitored noninvasively using somatosensory evoked potentials (SSEP) however, conventional SSEP monitoring requires presence of a trained SSEP technician, use of needle electrodes and currently bulky SSEP equipment and is thus not practical for routine clinical usage. In this study we report our initial experiences with a non-invasive, miniaturized and automated SSEP device (EPAD, SafeOpSurgical, Hunt Valley, MD)

Methods: Following review board approval and written patient consent, 17 patients undergoing cardiac surgery with median sternotomy and cardiopulmonary bypass were enrolled. Adhesive stimulating electrodes were placed on bilateral wrist in median and ulnar nerve distribution with adhesive receiving electrode placed on posterior neck in C5 position and adhesive ground electrode placed on forehead and variably covered with transparent film dressings. Patient's arms were padded and placed neutral (thumbs vertical) at sides. The SSEP monitor screen alternately displayed a 'good' or 'alert' homunculus of relevant nerve signals, or a time-based display of current SSEP data for each nerve, with alert threshold trigger at > 10% increase from baseline latency or 50% decrease in signal amplitude.

Results: Of 17 patients, 1 died of cardiac failure postoperatively and in a further 3 patients electrode failure resulted in irretrievable data loss. Accordingly electrode adhesive was modified and transparent film dressings applied to all subsequent cases. Of 13 surviving patients with complete SSEP data, intraoperative 'alert' was detected and persisted through end of surgery in 2 patients. No relevant symptoms were reported in 11 patients but of patients with persistent SSEP changes, all complained of numbness and/or tingling in ipsilateral hand on clinical examination. Electromyography studies were performed in these 2 symptomatic patients one of which demonstrated mild left ulnar neuropathy and other showed bilateral ulnar neuropathies worse on symptomatic left side with symptoms suggestive of traction injury to lower brachial plexus.

Conclusion: This pilot study shows efficacy and ease of use of a non-invasive automated SSEP device and consistent with other such studies demonstrates an incidence of intraoperative neuropraxia that is associated with a 15% incidence of persistent clinical symptomatology. A randomized blinded clinical trial is underway to determine whether intraoperative interventions can decrease this morbidity.

References: [1] Anesth Analg 2000;91:1358-69; [2] Interact Cardiovasc Thorac Surg. 2013; 17: 151-7

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Affirmations (Complete):

* The author has read and understands the IARS instructions and Disclosure and Conflict of Interest Policy for Abstract Submission to this program.: Yes