THE ROLE OF INTRAOPERATIVE NEUROMONITORING IN SPINAL CORD TUMORS SURGERY

Mohamed Ahmed Ibrahim Eshra, Ahmed Abdelaziz Fayed, Ahmed Sherin Hamdy Ahmed, Omar Mohamed Elsayed Elba

Department of Neurosurgery, Faculty of Medicine, Alexandria University

Introduction

Spinal tumors, either in their primaey or secondary origin, account for 10% of all central nervous system neoplasms. Among them, about 5% are intramedullary spinal cord tumors and 95% are extramedullary spinal cord tumors. The most common presenting symptom in patients with a spinal cord tumor is back pain or neuropathic pain .The diagnosis of spinal cord tumors is made by MRI , without treatment, spinal cord tumors can lead to severe neurologic deterioration with serious motor deficits, including paraplegia or even quadriplegia, the most important part of the treatment is surgical resection. Radical resection has been associated with increased long term survival. However, surgery carries a significant risk of intraoperative damage to functional tissues, which leads to neurologic complications, ranging from 3.7% to 7.5%.Neuromonitoring, also known as intraoperative neuromonitoring (IONM), is a vital tool in the operating room, it allows real time check of the functional integrity of both the spinal cord and the nerve roots and is frequently used to improve the safety of spine surgery by providing real-time assessment of neural structures at risk. The types of IONM modalities being used in spinal cord tumors surgery motor-evoked potentials (MEP), somatosensory evoked potential (SSEP) and electromyography (EMG). and running EMG monitoring. Each critical change in IONM requires a prompt analysis of the most recent surgical and anesthesiologic steps. After a check of vital parameters, with specific regard to blood pressure and body temperature, any changes in anesthesia schedule should be verified. In addition to prevent the neurologic iatrogenic injury, IONM may also affect the oncological prognosis by conditioning the extent of surgical excision (for example, if there is a decrease in neurophysiological responses the neurosurgeon can decide to stop the tumor removal).

Aim of the work

This study aims to figure out the role of using the intraoperative neuromonitoring in spinal cord tumors surgery achieving maximum resection with preservation of patients functional capacity.

Subjects:

A prospective study was conducted on 30 patients with spinal cord tumors who were scheduled for surgery with IONM at the Alexandria Main University Hospital neurosurgery department. Approval of the Medical Ethics Committee of Alexandria Faculty of Medicine was obtained.

Methods

Descriptive prospective study, the sample consisted of consecutive patients with SCT admitted to the Neurosurgery department at Alexandria university hospital from August 2022 to July 2024. A total of 30 patients were surgically treated. 15 were male (50%) and 15 were female (50%). The mean age was 48.77 years. Multimodal IONM consisted of motor evoked potentials (MEP), somatosensory evoked potentials (SEP), electromyography (EMG) and Triggered EMG applied during surgery. The neurological status was assessed using a modified McCormick grading scale pre and postoperatively and MRI done for follow up.

Results

Surgeries were performed for resection of SCT for 30 patients ,15 (50%) were intramedullary and 10 (33.3%) were extramedullary and 5 (16.6%) was extradural. Critical and transient IONM changes occurred in 22 patients (73.3%) , 3 patients (10%) showed irreversible IONM signal drop, T.EMG used in 13 patients (43.3%), in the post operative period 27 patients (90%) have been either preserved their neurological functions or improved, 3 patients (10%) worsened then improvement achieved gradually during the follow up, In the post operative MRI there were 22 cases (73.3%) with gross total resection.

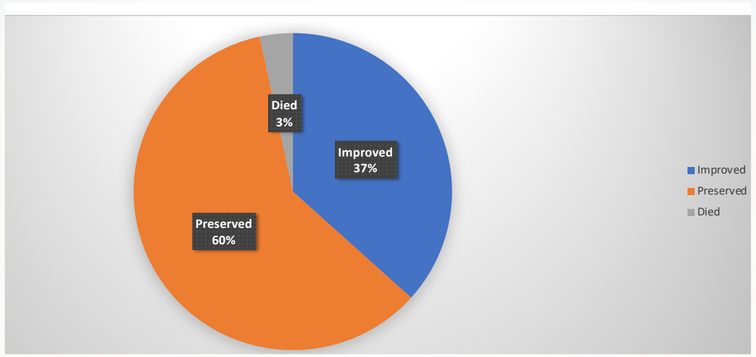

Figure 1: Shows the percentage of the neurological function outcome in the follow up.

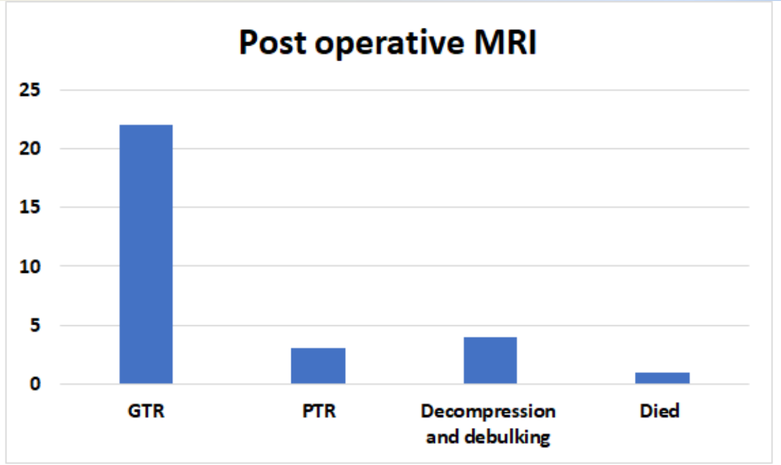

Figure 2: Extent of tumor resection in post operative MRI

Conclusion

IONM helping in maximize the tumor resection with preserving the neurological function by providing real time feedback , although it showed high but not perfect sensitivity and specificity.