Evaluation of the Effects of Intraoperative Soft Tissue Tension and Extremity Elongation on Brachial Plexus Nerves with Neuromonitorization in Patients Undergoing Reverse Total Shoulder Arthroplasty

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INTRODUCTION:

The most common treatment method for rotator cuff tear arthropathy is total reverse shoulder arthroplasty (RTSA). One of the significant complications during this surgery is nerve injury. This study aims to investigate, with the help of intraoperative neuromonitoring, which brachial plexus nerves are at risk and at which stage of the surgery these nerves are most likely to be affected. Additionally, the effects of extremity lengthening and acromiohumeral distance (AHD) changes due to reverse shoulder arthroplasty on nerves were examined.

METHODS:

Twenty patients diagnosed with ≥ Hamada stage 3 rotator cuff tear arthropathy who underwent total reverse shoulder arthroplasty between January and November 2024 in a single tertiary center were included in the study. Demographic data, preoperative shoulder range of motion (ROM), and functional scores were recorded. Radiological measurements of extremity lengths and AHD were done. Intraoperative neuromonitorization was used to assess motor-evoked potentials (MEP) and somatosensory-evoked potentials (SEP) of brachial plexus nerves. Amplitude decreases > 30% in MEP values were accepted as significant. The relationship between these values and intraoperative MEP amplitude drops was analyzed. The affected nerves and the surgical stages at which MEP drops occurred were recorded.

RESULTS:

Among the 20 patients evaluated, 14 were female. Mean age was 68.5 ± 6.3. None of the patients experienced significant SSEP decrease, while 8 patients (40%) had significant MEP decrease. Smoking history (p=0.019) and increased preoperative internal rotation (p=0.05) significantly increased the risk of nerve involvement. Differences between preoperative bilateral extremity lengths and acromiohumeral distances were found to be significantly lower for the operated side (p<0.05). The mean difference between preoperative and postoperative extremity length is 2.6±2.8 cm. A difference of less than 3.7mm in preoperative AHD between the operated and contralateral sides reduced the risk of nerve involvement by 4.2 times. When all MEP changes were included, the musculocutaneous (n=15) and radial nerves (n=15) were most frequently affected, particularly during the glenoid preparation stage (n=17).

DISCUSSION AND CONCLUSION:

In conclusion, the musculocutaneous and radial nerves have the highest risk potential for injury during RTSA. Nerve events are more commonly seen during the glenoid preparation phase. The main reason for this is the excessive traction and inappropriate retractor positioning. The difference of preoperative acromiohumeral distances lower than 3.7mm is linked to a 4.2-fold decrease in nerve events. Smoking history and preoperative increased internal rotation degrees are correlated with higher intraoperative nerve event risk.