

## Abstract

**Purpose:** The purpose of this study is to analyze the results of brachial plexus reconstructive surgery. The work focused on the analysis of the brachial plexus repair at Masaryk Hospital in Ústí nad Labem between 2012 and 2023. The aim of the study was to focus on a set of patients operated using the technique of nerve transfers. In addition to the clinical results, the presence of neuroplasticity was investigated by monitoring postoperative synkinesis and evaluating factors on which the presence of neuroplasticity depends.

**Methods:** A total of 34 proximal nerve transfers were performed in 21 patients for restoration of shoulder abduction, external rotation and elbow flexion. The evaluation of the results was carried out at least 3 years after surgery. The resulting muscle strength, range of motion, Mallet scale, pain quantification, electrophysiological testing and the presence or absence of synkinesis between donor and recipient were assessed. An evaluation of subjective assessment of the effect of decreased function on normal activities of daily living including work capacity (DASH) was recorded. The results were statistically processed.

**Results:** Of the 34 neurotransfers, 20 achieved M3 or greater strength (58.8 %), and 5 transfers achieved M4 or greater strength. The disappearance of synkinesis and demonstrable independent voluntary activation of the recipient was noted in 10 neurotransfers (29.4 %). Using correlation analysis, a direct relationship between early (within 6 months after surgery) reinnervation and resulting muscle strength ( $R_s = 0.528$ ) and an inverse relationship between muscle strength and DASH score ( $R_s = - 0.510$ ) were found. We did not demonstrate a dependence of the presence of neuroplasticity on age, number of transfers performed, or time or laterality, the only dependency factor found in our cohort was the interval between injury and time of surgery ( $R_s = - 0,500$ ).

**Conclusion:** The outcome of brachial plexus surgery does not simply include the evaluation of the resulting muscle strength, but it is also necessary to consider other factors, including range of motion, pain, subjective assessment of limb function and neural plasticity. The latter is a prerequisite for regaining independent free control of the limb after nerve transfer.