

# A Comparison of Functional Outcomes for Triceps Motor Branch Transfer to the Anterior Division Axillary Nerve in Upper Trunk Brachial Plexus Injuries versus Non-brachial Plexus Axillary Nerve Injuries

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**INTRODUCTION:** Leechavengvongs procedure, triceps motor branch transfer to the anterior division of the axillary nerve, was described for patients with a loss of deltoid function secondary to upper trunk (UT) brachial plexus injuries but has evolved to restore deltoid function in peripheral axillary nerve (AX) injuries. We hypothesized that functional outcomes would differ between patients undergoing this procedure in the setting of brachial plexus injury versus non-brachial plexus axillary nerve injury.

**METHODS:** A total of 143 patients undergoing the Leechavengvongs procedure at a single academic institution from 2001 to 2023 were retrospectively reviewed. Patients were included if they had either UT or AX injury and were excluded if follow up was less than two years. Pre- and post-operative outcomes were compared between groups. Continuous variables were analyzed with student t tests; categorical variables were compared with Fisher exact tests. P-values <0.05 were statistically significant.

**RESULTS:**

Thirty cases were classified as an UT injury, and 12 cases were classified as an AX injury. The average age at surgery was 32±17 years, and 37 (88%) patients were male. In UT injuries, 13 (43%) had an isolated UT injury while 17 (57%) had concomitant middle and/or lower trunk injuries. In AX injuries, 8 (67%) had an isolated axillary nerve injury while 4 (33%) had a concomitant peripheral suprascapular nerve injury. Follow-up was similar between groups (34±12 months vs. 21±0.2 months, p=0.2). Pre-operative triceps strength, forward flexion, and abduction were significantly higher in the AX group, while pre-operative deltoid strength was similar (Table 1).

Post-operative deltoid strength was significantly higher in the AX injury group (3.2±1.5 vs. 1.9±1.2, p=0.007), as was a post-operative change in deltoid strength (2.8±1.7 vs. 1.6±1.4, p=0.01). Post-operative forward flexion (136°±57° vs. 79°±54°, p=0.005) and abduction (129°±64° vs. 59°±47°, p=0.004) were significantly better in the PAN group, though post-operative change in flexion and abduction were not different between groups. Post-operative triceps strength was similar between groups as was change in triceps strength. Triceps strength pre-operatively was similar to that post-operatively in both groups as well.

**DISCUSSION AND CONCLUSION:**

Patients with an AX injury had better post-operative deltoid strength, improvement in deltoid strength and shoulder range of motion after Leechavengvongs procedure compared to patients with a UT injury. Triceps strength was unchanged after the procedure in both groups. Our study findings confirm that outcomes of Leechavengvongs procedure are different based on location of the injury, providing insight on prognosis while counseling patients.

**Table 1:** Comparison of pre- and post-operative functional outcomes between UT and AX groups

	Peripheral (N=12)	Upper Trunk (n=30)	P-value
Pre-op deltoid strength	0.3±1.1	0.1±0.6	0.6
Post-op deltoid strength	3.2±1.5	1.9±1.2	0.007*
Change in deltoid grade	2.8±1.7	1.6±1.4	0.01*
Pre-op triceps strength	4.9±0.3	4.4±0.5	0.002*
Post-op triceps strength	4.7±0.5	4.5±0.7	0.3
Change in triceps grade	-0.1±0.6	0.1±0.9	0.2
Pre-op forward flexion	109°±65°	18°±29°	<0.0001*
Post-op forward flexion	136°±57°	79°±54°	0.005*
Change in forward flexion	32°±48°	63°±59°	0.1
Pre-op abduction	94°±71°	12°±29°	<0.0001*
Post-op abduction	129°±64°	59°±47°	0.004*
Change in abduction	34°±56°	48°±57°	0.5
Success rate	10 (83%)	21 (70%)	0.4