Prophylactic Posterior Targeted Muscle Reinnervation (TMR) Approach in Below Knee (BKA) Amputation Settings

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Background/Objective: Targeted muscle reinnervation (TMR) is a nerve reconstruction technique focused on improving phantom limb pain (PLP), residual limb pain (RLP), prosthesis function, and limiting neuroma formation. In below-knee-amputations (BKA), TMR performed "through-the-wound" is heavily documented. Alternatively, the "posterior approach" was developed to help increase visibility of peripheral nerves from the posterior fossa. This study focuses on the surgical efficiency and patient outcomes of the posterior approach compared to the through-the-wound approach. We hypothesize the posterior approach will be comparable to or improve time-to-prosthesis fitting, OR time, and pain scores.

Methods: 157 patients underwent TMR at two hospitals in Indianapolis, IN, and were identified using CPT 64890. 39 patients underwent posterior approach TMR post-BKA. Data on demographics, follow-up/rehabilitation visits, post-operative complications, prosthesis fitting, and total OR time were collected. Additionally, 32 patients received TMR "through-the-wound", and total OR time, post-operative complications, and time-to-prosthesis fitting were tracked. Patient-reported outcome (PRO) surveys are being sent to patients pending IRB approval.

Results: Of the 39 who received the posterior approach between 1/10/2020 and 4/6/2023, 25 received TMR in the right leg and 14 in the left. Following BKA, average time to TMR was 144 days. However, 18 patients received TMR directly after undergoing BKA (46.2%). Average OR time for acute and delayed posterior TMR patients was 208.06 minutes and 199.47 minutes, respectively. 10 patients reported post-operative complications (25.6%): dehiscence (12.8%) or infection (7.7%). 23 patients received prosthesis fitting on average 3 months post-op. Average OR time and time-to-prosthesis fitting for "through-the-wound" TMR surgeries were 192.84 minutes and 5.81 months, respectively.

Potential Impact: Posterior approach TMR had no significant impact on OR time, but time-to-prosthesis fitting significantly decreased. Once PRO surveys return, average long-term PLP and RLP can be determined. Preliminarily, posterior approach TMR improves aspects of patient outcomes while not compromising surgical efficiency.