



## 2025 NEW YORK REGIONAL SOCIETY OF PLASTIC SURGEONS ANNUAL RESIDENTS' NIGHT RESEARCH COMPETITION

MONDAY, MARCH 10, 2025  
NEW YORK ACADEMY OF MEDICINE

**ABSTRACT SUBMISSION TITLE:** *C2 - Navigating Pain: A Cross-Sectional Analysis of Pain Interference and Outcomes in Amputees with Osseointegrated Implants*

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**Abstract Text:**

**PURPOSE:**

Osseointegrated (OI) prostheses are a novel solution for patients with poorly tolerated socket-based prostheses by inserting a direct implant into the bone to which the prosthesis is attached. Plastic surgeons are becoming increasingly responsible for soft tissue reconstruction around OI prostheses. Furthermore, nerve reconstruction is often done concurrently with OI prostheses to alleviate pain and prevent painful neuroma formation. This study aims to analyze pain outcomes in this unique patient population.

**METHODS:**

A series of cross-sectional surveys was conducted to evaluate pain outcomes in patients with single-stage lower-limb osseointegrated implants at our institution from 2019-2024. Patients who were eligible for nerve reconstruction were referred on a case-by-case basis. Nerve reconstruction procedures included targeted muscle reinnervation(TMR), regenerative peripheral nerve interface(RPNI), or a combined TMR-

RPNI approach, with the combined approach being introduced into clinical practice in 2022. Surveys were collected at four distinct time points: preoperatively, 6 months, 1 year, and 2 or more (2+) years postoperatively. Data collected included phantom limb pain (PLP) intensity, residual limb pain (RLP) intensity and the Pain Interference Short Form 8a (PROMIS PI-SF 8a). PLP and RLP were collected on a scale on 0 to 10. A 4–5-point change in T-scores using the PROMIS PI-SF 8a is considered clinically significant improvement or worsening in pain interference.

#### RESULTS:

Our study included a total of 21 patients, comprised of 11 above-the-knee amputees and 10 below-the-knee amputees. The survey participation was as follows: 5 participants preoperatively, 5 participants 6-months postoperatively, 6 participants 1-year postoperatively, and 5 participants 2+years postoperatively. In the 6-month group, 4 out of 5 participants received nerve reconstruction, all with the combined TMR-RPNI approach. In the 1-year group, 5 out of 6 participants received nerve reconstruction: 4 with the combined TMR-RPNI approach and 1 with RPNI only. In the 2+year group, nerve reconstruction was completed with TMR only in 4 out of 5 participants. The average PLP score was 2.8 in the preoperative group, 2.2 in the 6-month group, and 1.2 in the 1-year group, while the 2+year cohort reported an average PLP intensity of 4. The average RLP was 4 in the preoperative group, 1.2 in the 6-month group, 2.5 in the 1-year group, and 3.2 at 2+year group. Lastly, the pain interference T-score was 62 in the preoperative group, 43.4 in the 6-month group, 48.2 in the 1-year group, and 53.7 in 2+years group.

#### CONCLUSIONS:

Our study suggests that osseointegration with and without concurrent nerve reconstruction may reduce pain interference and improve patient outcomes. Notably, the pain interference scores were lower in all three postoperative timepoints by over 5 points compared to the preoperative timepoint. While PLP and RLP were lower in the first year postoperatively, there was an increase in pain levels observed in the 2+ year cohort. These results may suggest that TMR alone is not as powerful at controlling pain compared to combined TMR-RPNI. Future studies with longitudinal follow-up surveys will allow for a more comprehensive evaluation of long-term pain management following osseointegration.