The Risk of Developing Phantom Limb Syndrome with Pain in Patients with Complex Regional Pain Syndrome and Its Association with Amputation Type and Level

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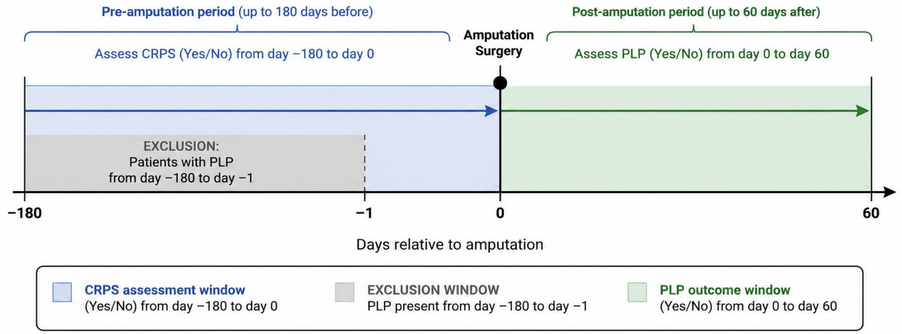
INTRODUCTION

- Phantom limb syndrome with pain (PLP) is a common and often debilitating complication following limb amputation, yet the factors underlying its development remain incompletely understood. [1]
- Complex regional pain syndrome (CRPS) is a chronic neuropathic pain disorder characterized by aberrant pain processing and sensory dysfunction and may represent a risk factor for developing PLP. [2]
- This study examines the relationship between pre-existing CRPS, amputation level, and the subsequent development of phantom limb syndrome with pain.

METHODS

- We conducted a retrospective descriptive study using Merative Marketscan (2018-2022) under IRB protocol #2017-0169.
- The study was approved by the Institutional Review Board, and informed consent was waived due to the retrospective nature of the study and use of de-identified data.
- Amputations were identified using CPT and ICD procedure codes, and PLP and CRPS were identified by using ICD diagnosis codes (G54.6x; G90.5x, G56.4x, G57.7x, respectively).
- A positive diagnosis was defined as occurring within 60 days of amputation (Figure 1). Patients with pre-existing phantom limb syndrome with pain diagnoses were excluded.

Study Timeline Relative to Amputation



Summary: Exclude patients with PLP from day −180 to −1. Determine CRPS (Yes/No) from day −180 to 0. Determine PLP (Yes/No) from day 0 to 60.

	CRPS within 180 days before amputation			
	No		Yes	
	N	Percent	N	Percent
Age Group				
<45	2786	22.4	23	31.5
45-64	9681	77.7	50	68.5
Sex				
1	9208	73.9	35	48.0
2	3259	26.1	38	52.1
Amputation category				
Lower extremity	9342	74.9	63	86.3
Upper extremity	3125	25.1	10	13.7
Amputation proximality				
Distal/Very Distal	10460	83.9	32	43.8
Mid-level	1496	12.0	31	42.5
Proximal/Very Proximal	511	4.1	10	13.7
PLP within 60 days after amputation	427	3.4	11	15.1

RESULTS

- We identified 12540 unique patients who received amputation surgeries, with a total of 438 (3.49%) developing post-operative PLP (Table 1).
- In this cohort, 73 (0.058%) patients had pre-operative CRPS, 11 (15.07%) of which were newly diagnosed with post-operative PLP, a much higher rate of prevalence compared to 3.43% (n=427 of 12467) of patients without pre-operative CRPS developing post-operative PLP.
- Thus, the risk of PLP was higher among patients with pre-existing CRPS diagnosis (RR= 4.9 (2.6-9.2)).
- Our data suggests that female patients were more likely to have pre-operative CRPS. Patients who received lower extremity amputations, compared to upper extremity amputations, and more proximal amputations were more likely to have pre-operative CRPS.

DISCUSSION

- The frequency of PLP occurrence may be strongly associated with pre-operative CRPS in patients with amputations. Further research is needed to clarify the relationship between CRPS and PLP and to determine whether CRPS contributes to the development of PLP.

[1] Culp CJ, Abdi S. Current Understanding of Phantom Pain and its Treatment. Pain Physician. 2022;25(7):E941-E957.
[2] Taylor SS, Noor N, Urits I, et al. Complex Regional Pain Syndrome: A Comprehensive Review. Pain Ther. 2021;10(2):875-892.