



Shifting Paradigms in Peripheral Nerve Surgery: National Trends in Nerve Denervation, Transfer, and Grafting Procedures

Anshumi Desai, MD, Georges Tahhan, MD, Natalia Correa, MD, Angelo Luo, BS, Kayshap Tadisina, MD
University of Miami Miller School of Medicine, Miami, FL



Purpose

To characterize national trends in peripheral nerve surgery from 2011 – 2023, specifically the shift from deinnervation to nerve transfer or grafting, and to evaluate patient demographics and perioperative outcomes, including complications, operative time, length of stay, and readmissions.

Introduction

- Peripheral nerve injuries are underdiagnosed but relatively common, especially after extremity trauma.
- Peripheral nerve surgery (PNS) improves functional, psychological, and social outcomes.
- Neuropathic pain remains a key driver of chronic opioid use, representing a major public health concern.
- Advances include nerve transfers, grafts, TMR, and RPNIs.
- Surgical treatment reduces opioid use and pain severity.
- Trends show a shift toward advanced reconstructive and innovation-driven techniques.

Methods

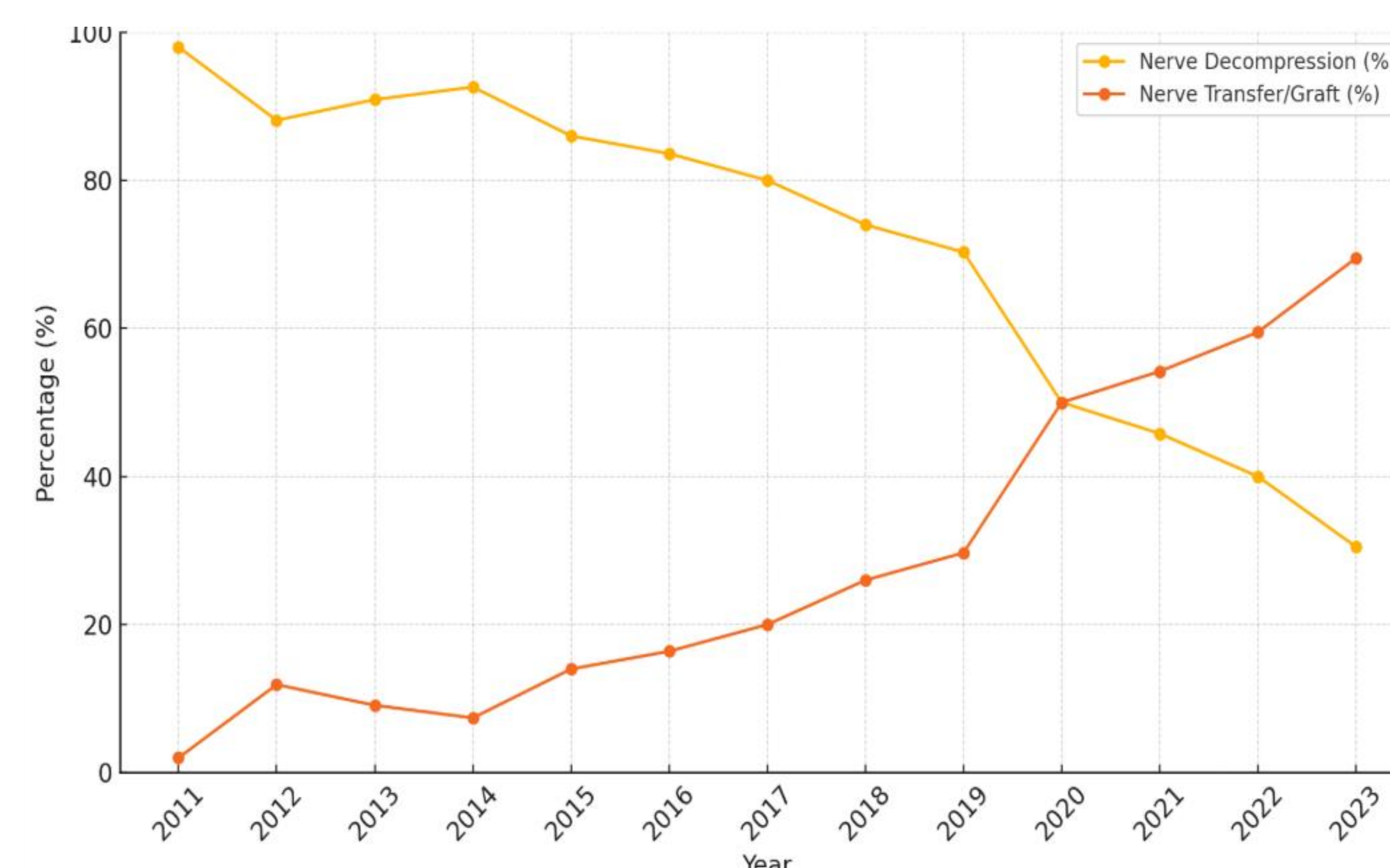
Retrospective cohort study from 2011 – 2023 using the American College of Surgeons National Surgical Quality Improvement Program (NSQIP)

Cases were identified by CPT codes for nerve and nerve transfer/graft.

- Primary outcome: Identifying the trend of these surgeries.
- Secondary outcomes: postoperative complications, operative time, length of hospital stay, readmission rates, return to the operating room and prolonged hospitalization.

Results

1,643 total cases, 1,034 (62.9%) deinnervations, 608 (37.0%) transfers or grafts. Demographic profiles and BMI were stable; functional independence exceeded 95% annually. ASA class trended higher over time. Median length of stay remained 0 days, while operative time increased (88 minutes in 2012 to 165 minutes in 2023). Complications were low for both groups: deinnervation all-cause 2.4%, wound 0.8%; transfer/graft all-cause 5.3%, wound 1.4%. Severe systemic complications were rare (<1.3%). Unplanned readmissions increased over time in both cohorts, and return to OR occurred in 2.1% (deinnervation) versus 3.6% (transfer/graft).



Year	Nerve Deinnervation (%)	Nerve Transfer/Graft n(%)	Total
2011	50 (98.0%)	1 (2.0%)	51
2012	52 (88.1%)	7 (11.9%)	59
2013	50 (90.9%)	5 (9.1%)	55
2014	75 (92.6%)	6 (7.4%)	81
2015	86 (86.0%)	14 (14.0%)	100
2016	92 (83.6%)	18 (16.4%)	110
2017	112 (80.0%)	28 (20.0%)	140
2018	108 (74.0%)	38 (26.0%)	146
2019	102 (70.3%)	43 (29.7%)	145
2020	82 (50.0%)	82 (50.0%)	164
2021	76 (45.8%)	90 (54.2%)	166
2022	80 (40.0%)	119 (59.5%)	200
2023	69 (30.5%)	157 (69.5%)	226
Total	1034 (62.9%)	608 (37.0%)	1643

Conclusion

PNS is shifting toward nerve transfer and grafting over deinnervation, reflecting growing use of more complex reconstructive approaches. Patient demographics and complication rates remain stable, but longer operative times and more unplanned readmissions suggest room to improve technique, patient selection, and perioperative care. Future progress will depend on multidisciplinary, evidence-based care and new technologies to improve outcomes and reduce disparities.

References

- Kamble N, Shukla D, Bhat D. Peripheral Nerve Injuries: Electrophysiology for the Neurosurgeon. *Neurology India*. 2019;67(6):1419. doi:10.4103/0028-3886.273626
- Padovano WM, Dengler J, Patterson MM, et al. Incidence of Nerve Injury After Extremity Trauma in the United States. *Hand (N Y)*. 2022;17(4):615-623. doi:10.1177/1558944720963895
- Randall ZD, Navarro BJ, Brogan DM, Dy CJ. Insights Into the Epidemiology of Peripheral Nerve Injuries in the United States: Systematic Review. *Hand (N Y)*. Published online November 26, 2024:15589447241299050. doi:10.1177/15589447241299050
- Bosch B, Mansell H. Interprofessional collaboration in health care. *Can Pharm J (Ott)*. 2015;148(4):176-179. doi:10.1177/1715163515588106
- Rasulić L, Savić A, Živković B, et al. Outcome after brachial plexus injury surgery and impact on quality of life. *Acta Neurochir*. 2017;159(7):1257-1264. doi:10.1007/s00701-017-3205-1
- Shin AY, Bishop AT, Loosbroch MF, Spinner RJ. A multidisciplinary approach to the management of brachial plexus injuries: experience from the Mayo Clinic over 100 years. *J Hand Surg Eur Vol*. 2022;47(11):1103-1113. doi:10.1177/17531934221110733
- Wade SM, Nesti LJ, Cook GA, et al. Managing Complex Peripheral Nerve Injuries Within the Military Health System: A Multidisciplinary Approach to Treatment, Education, and Research at Walter Reed National Military Medical Center. *Military Medicine*. 2020;185(5-6):e825-e830. doi:10.1093/milmed/usz415
- Poppler LH, Mackinnon SE. The Role of the Peripheral Nerve Surgeon in the Treatment of Pain. *Neurotherapeutics*. 2019;16(1):9-25. doi:10.1007/s13311-018-00695-z
- Grinsell D, Keating CP. Peripheral Nerve Reconstruction after Injury: A Review of Clinical and Experimental Therapies. *BioMed Research International*. 2014;2014:e698256. doi:10.1155/2014/698256
- Budden C, Platt A, Jack A, Moulton R, Olson J, Mehta V. Peripheral nerve surgical competency in plastic surgery and neurosurgery residents. *Clinical Neurology and Neurosurgery*. 2022;216:107217. doi:10.1016/j.clineuro.2022.107217
- Felder JM, Ducic I. Impact of Nerve Surgery on Opioid and Medication Use in Patients with Chronic Nerve Injuries. *Plast Reconstr Surg Glob Open*. 2021;9(9):e3789. doi:10.1097/GOX.0000000000003789