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Decompressive Surgery in Diabetes

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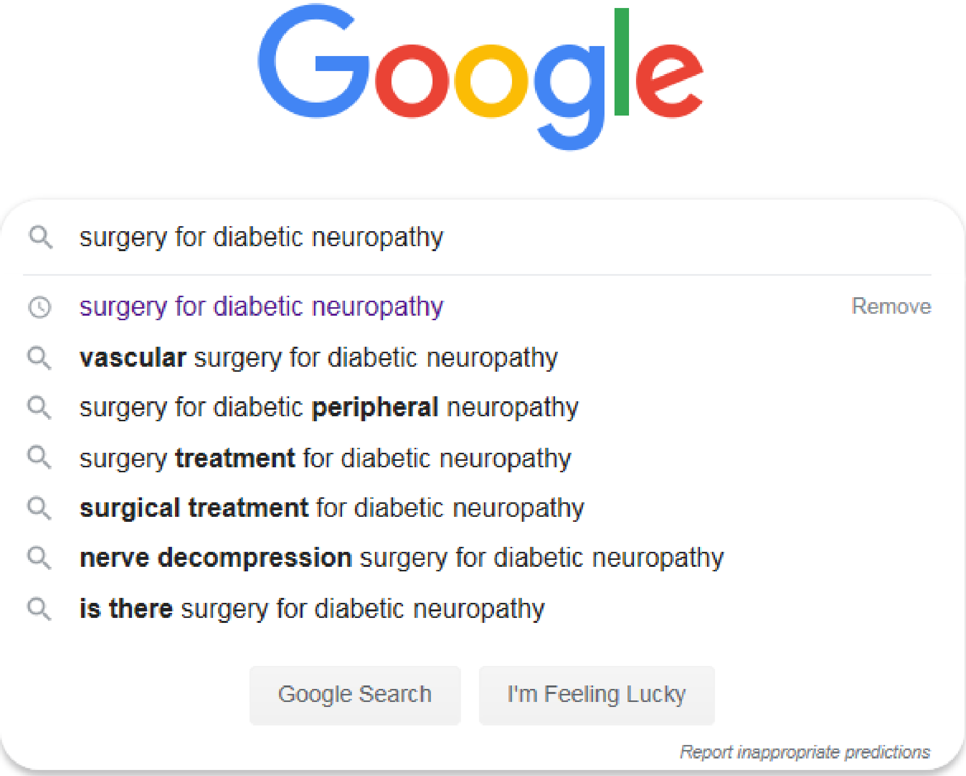
Google
surgery for diabetic neuropathy
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vascular surgery for diabetic neuropathy
surgery for diabetic peripheral neuropathy
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PPM
PRACTICAL PAIN MANAGEMENT

Nerve Decompression Surgery Can Reverse Neuropathy of the Foot

Similar to carpal tunnel syndrome surgery, nerve decompression surgery helps improve symptoms of diabetic peripheral neuropathy of the foot and prevents amputation.

By Stephen L. Barrett, DPM, FACFAS and D. Scott Nickerson, MD, FAAOS

Like water flowing through a dam, nerve decompression surgery can reverse the symptoms of numbness and tingling (nerve compression and entrapment) associated with diabetic neuropathy.

Decompressive Nerve Surgery: What is it?

- Meant to address patients with symptoms of distal symmetric polyneuropathy, with presumed component of compressive nerve injury
- Most often, surgical compression of
  - peroneal nerve at the fibular head
  - Deep peroneal nerve in the foot
  - and tibial nerve branches at the ankle/tarsal tunnel

Why think about this?

- Diabetic neuropathy is extremely common and expensive
- Diabetics are known to be more susceptible to compressive nerve injuries
- limited treatments exist for this common, costly problem

AAN Summary of Evidence-based Guideline for CLINICIANS

UTILITY OF SURGICAL DECOMPRESSION FOR TREATMENT OF DIABETIC NEUROPATHY

- Noted that there was not enough distinction between patients with DSP vs. entrapment neuropathies
- Existing studies did not clearly define periopheral neuropathy or use validated or standardized outcome measures
- Recommended more monitoring of glycemic control, complications in future studies

Cochrane Library

[Intervention Review]

Decompressive surgery of lower limbs for symmetrical diabetic peripheral neuropathy

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- No randomized, controlled trials were available for inclusion

Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy
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REVIEW

Decompression nerve surgery for diabetic neuropathy: a structured review of published clinical trials

Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy 2018:11 493–514

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REVIEW

Decompression nerve surgery for diabetic neuropathy: a structured review of published clinical trials

- Key endpoints:
  - Pain relief
  - Sensory testing
  - Nerve conduction velocities

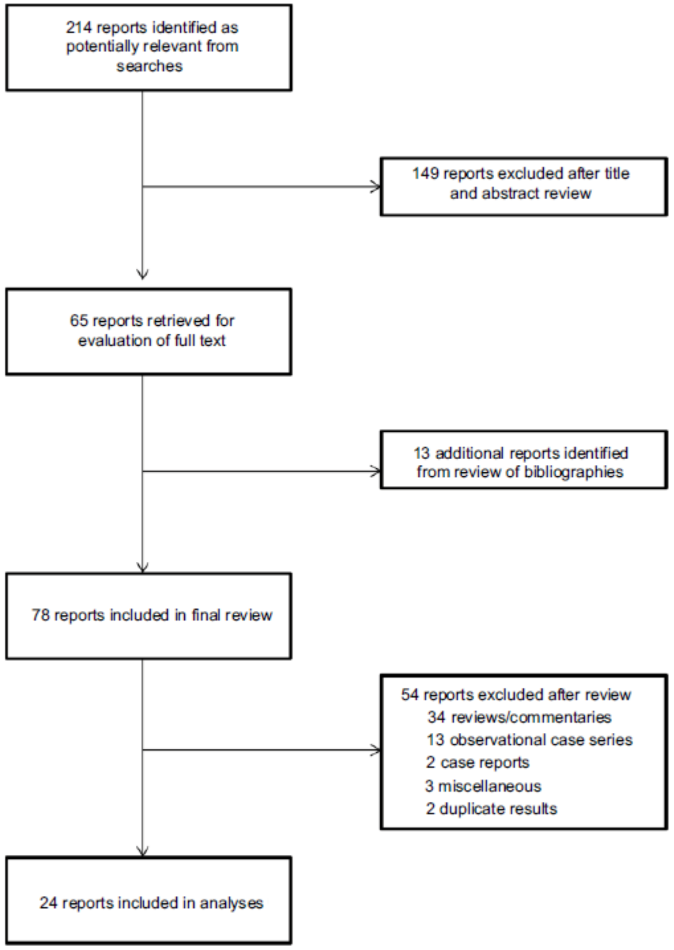

Figure 1 Flow diagram of literature search results.

Secondary Outcomes

Sensation

- 9 studies assessed 2-point discrimination
- 6 papers addressed touch-pressure sensation
- 1 paper addressed quantitative sensory testing

- All sensory measurements tended to improve with surgery
- Pooled data from 5 studies assessing 2PD at great toe: mean improvement in 5.8 mm

Nerve Conduction Studies

- 3 studies included NCS data
- Only 1 study included information about amplitude and distal latency of lower extremity nerves
- 2 other studies only included data regarding conduction velocity

- No improvement in amplitude or latency of peroneal or tibial nerves pre- vs. post-surgery, or vs. control leg
- Some improvement in CV – combined effect size of 1.4

Table 3 Global subjective pain scores pre- and post-DNS; mean ± SD and estimated effect size (median value and range), where a positive effect size value indicates improvement

Authors	Study type	Pain scale	Limb/group	n	Pre-DNS score	Post-DNS pain score at nearest month (effect size)					
						0.5	3	6	12	24	48
DNS groups											
Karazog et al (2008)[26]	Observational	VAS[a]	DNS	24	6.9±2.1	1.4±1.8 2.7 (2.4–3.6)		1.2±1.6 2.9 (2.6–4.0)			
Knobloch et al[27]	Observational	VAS	DNS	12	7.1±1.2				3.3±2.4 2.0 (1.7–3.2)		
Liao et al[28] (diffuse pain)	Observational	VAS	DNS	161	8.3±1.8[b]			3.5±2.7[b] 2.1 (1.8–2.8)	3.0±2.8[b] 2.2 (1.9–3.0)	2.5±2.8[b] 2.5 (2.1–3.3)	
Liao et al[28] (focal pain)	Observational	VAS	DNS	145	8.2±1.3[b]			2.3±1.7[b] 3.9 (3.1–4.7)	2.1±1.9[b] 3.7 (3.2–4.9)	1.0±1.6[b] 4.9 (4.2–6.4)	
Macaré van Maurik et al[33]	Randomized limb	VAS	DNS limb	38	6.1±1.9		2.8±1.3[h] 2.0 (1.7–2.7)	3.1±1.2 1.9 (1.6–2.5)	3.5±3.0 1.0 (0.9–1.4)		
Rader[29]	Observational	VAS	DNS	38[d]	8.7±1.6	0.6±0.4 6.8 (5.1–10.5)			0.3±0.3 7.3 (5.3–11.4)		
Rozen et al[32]	Double-blind, RCT	Likert[c]	DNS limb	40	−8.0[e]				[−5.7±2.1][f] 2.7 (2.3–3.5)		[−7.5±2.5][f] 3.0 (2.5–3.9)
Wood and Wood[39]	Observational	VAS	DNS	30	8.8±1.9		3.1±2.3 2.7 (2.3–3.5)				
Yang et al[30]	Observational	VAS[g]	DNS	11	7.1±1.3	4.5±1.7 1.7 (1.5–2.2)	3.2±1.5 2.8 (24–3.6)	2.1±1.7 3.3 (2.8–4.3)	2.0±2.0 3.0 (2.6–4.0)	1.9±2.1 3.0 (2.6–4.0)	
Average pain score (average effect size)				459	8.0±1.8	1.5±1.8 4.7	3.0±1.8 2.4	2.7±2.3 2.9	2.5±2.5 3.0	1.8±2.4 3.6	[−7.5±2.5][f] 3.0
Control groups/limbs											
Liao et al[28]	Observational	VAS	Control group	92	8.0±1.2[b]			7.6±1.4[b] 0.3 (0.3–0.4)	8.0±1.1[b] 0.0 (0.0–0.0)	7.8±1.3[b] 0.2 (0.1–0.2)	
Macaré van Maurik et al[33]	Randomized limb	VAS	Control limb	38	6.1±1.9		4.4±0.7[h] 1.2 (0.9–1.7)	4.6±0.6[h] 1.1 (0.8–1.5)	5.3±2.8 0.3 (0.3–0.4)		
Rozen et al[32]	Double-blind, RCT	Likert	Sham limb	~20	~8.0[e]				[−5.3±2.8][f] 1.9 (1.6–2.4)		[−6.0±2.4][f] 2.5 (2.1–3.2)
Rozen et al[32]	Control group		Control group	~20					NS		NS
Average pain score (average effect size)				170	7.7±1.7		4.4±0.7 1.2	4.6±0.6 1.1	5.3±2.8 0.3	7.8±1.3 0.2	

Notes: [a]VAS pain scores based on eleven-interval analog scale (0–10); [b]Liao et al mean ± SD measured from Figure 1 of their paper; [c]Likert pain scores based on eleven items (0–10), with distances between each item being equal; [d]results confounded by 10 of 38 participants having bilateral DNS; [e]estimated using mean difference from baseline at 12 months (DNS leg, −5.72±2.71; sham leg, −5.3±2.9) and at 54 months (actual value not reported and unavailable on request); [f](mean difference ± SD) from pre-DNS minus post-DNS; [g]combined daytime, nighttime, and peak pain scores, expressed on eleven-interval analog scale (0–10); [h]estimated SD from 12-month data.

Abbreviations: DNS, decompression nerve surgery; RCT, randomized controlled trial; VAS, visual analog scale.

RECONSTRUCTIVE

Value of Surgical Decompression of Compressed Nerves in the Lower Extremity in Patients with Painful Diabetic Neuropathy: A Randomized Controlled Trial

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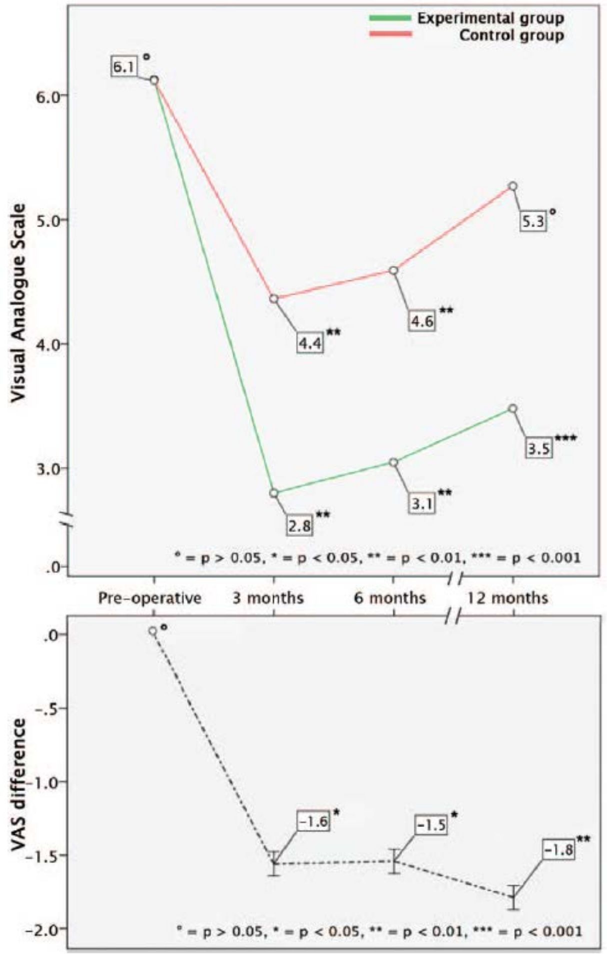
Ruben P. A. van Eijk, B.Sc.
Moshe Kon, M.D., Ph.D.
Edgar J. G. Peters, M.D., Ph.D.

Plastic and Reconstructive Surgery • August 2014



Rozen et al, “DNND study:
a controlled, randomized, double-blinded prospective study on the roleof surgical decompression oflowe extremity nerves for the treatments of patients with symptomatic diabetic neuropathy with chronic nerve compression”

- Patients randomized to surgical or non-surgical group in 2:1 ratio
- Surgical group underwent DNS on one side, and sham surgery on the contralateral side. Patients and examiners blinded to which side received true nerve decompression
- 92 patients randomized to surgery, 48 to the control group
- 40 patients also re-evaluated at 1 year, 36 at 4 years
- Pain measured on Likert scale

Rozen et al, DNND study, continued

- At 1 year, mean pain reduction:
  - **5.7** (+/-2.1) in the **surgical leg**
  - **5.3** (+/-2.8) in the **sham leg**
  - **Not statistically changed in the control group**

Pain scores were significantly reduced from baseline and from the control group, but not in the surgical compared to sham legs.

Effect size in sham surgery leg: 1.9

Effect size in surgical leg: 3.0

Effect size in control leg in previous study 0.3

Decompressive Surgery: Take Home Points

- Diabetic neuropathy is a painful, expensive, disabling condition and patients are looking for more answers

- Recommending decompressive nerve surgery is problematic for a number of reasons

Decompressive Surgery: Take Home Points and Concerns

- The existing literature does not clearly differentiate patients with distal symmetric polyneuropathy from those with true compressive injury. (Overreliance on Tinel sign?) Who is the target population?
- Sensation is often measured in unclear ways, or with methods inconsistent with what is often employed in clinic.
- Complications and complication rates of these surgeries are not very well-described
- No quality, randomized, controlled trials exist.
- In existing trials, marked improvement in the sham leg is difficult to explain. Suggests a strong surgical placebo component.

- The evidence currently does not support recommending decompressive nerve surgeries, though some surgical candidates are likely to exist.