Evidence Table

Clinical Area **Spinal; cord stimulation for critical leg ischemia**

References: **Ubbink D T, Vermeulen H. Spinal cord stimulation for critical leg ischemia: A review of effectiveness and optimal patient selection. *J Pain Symptom Manage.* 2006;31:S30-S35.**

Ubbink DT, Vermeulen H. Spinal cord stimulation for non-reconstructable chronic critical leg ischemia. *The Cochrane Database of systematic reviews* 2005 Issue 3. Art No.:CD00401 DOI:10.1002/14651858.CD004001. pub2.

Ubbink D T, Vermeulen H, Spincemaille GH, et al. Systematic review and meta-analysis of controlled trials assessing spinal cord stimulation for inoperable critical leg ischemia. *Br J Surg.*2004;91:948-955.

Study Type: Meta-analysis.

Study Aim: To identify and summarize the evidence for the effectiveness of spinal cord stimulation (SCS) in the treatment of patients with chronic critical leg ischemia as compared to conservative treatment.

Outcomes:

Primary: Effect on limb salvage.

Secondary: Pain relief, wound healing, complications of SCS, and QoL.

Design

- *Focused on a discrete clinical question:* Yes.
- *Explicit description of literature search:* Yes.
- *State inclusion and exclusion criteria for studies*: Inclusion: Randomized or controlled trials on patients suffering from inoperable critical leg ischemia (CLI) due to atherosclerosis, and who were usually at a relatively advanced age. Exclusion: The presence of merely intermittent claudication, Raynaud's or Buerger's disease.
- *Description of study populations:* Yes.
- *State criteria used to evaluate quality of studies*: Yes.
- *Method used to synthesize data (fixed-effects model, random-effects model, both):* Both the fixed and random effects models were used.

Validity:

- *Is the study type appropriate for the question(s) being asked?* Yes.
- *Did two or more independent reviewers select studies and extract data?* Yes.
- *Data tested for homogeneity?* Yes.
- *If data were heterogeneous, was the analysis method appropriate? (e.g. stratified analysis or random effects model)?* Yes.
- *Did the authors do sensitivity analysis to examine robustness of findings (e.g. by quality of studies)?* Yes.
- *Did the authors address possible publication bias?* Not discussed.

Conclusions regarding validity of methods:

The meta-analysis had generally valid methodology.

Results:

- The meta-analysis included 5 RCTs and one nonrandomized controlled trial. All were conducted in European countries.
- Sample sizes varied from 37 to 120 with a total of 444 participants in all the trials.
- All participants suffered from inoperable CLI with ischemic rest pain or ulcers <3cm in diameter.
- In all studies patients received standard control treatment with or without SCS.
- The primary outcome in all trials was limb salvage (no amputation of foot or higher within 12 months).

Outcomes of SCS

	No of trials	*SCS n/N*	*Control N/N*	*Risk difference (95% CI)*	*NNT** (95% CI)*
12 months amputation rates	6*	75/238	88/195	-0.11 (-0.20 to -0.021)	9 (5-50)
Clinical improvement ***	2**	27/65	5/59	0.33 (0.19 to 0.47)	3 (2-5)

*P for heterogeneity =0.70
**P for heterogeneity =0.54
*** From critical leg ischemia to claudications

- Data on pain relief could not be pooled.
- No difference in mortality was observed.
- The general quality of life remained unchanged.

Complications of SCS

- Pooled risk of implantation problems of SCS device was 8.2 % (95% CI –6 to 22%) with a NNH** of 12
- Pooled complication* risk 0.18 (95% CI 0.03 to 0.32) with a NNH of 6 (95% CI=3 to 33)

*Infection, depletion of battery, and dislocation or breakage of the lead
**NNT (number needed to treat), and NNH (number needed to harm) were calculated by the authors

Authors' Conclusions:

The authors concluded that the addition of SCS to conservative therapy for patients with inoperable critical leg ischemia (and particularly those with a foot $TcpO_2$ between 10 and 30mmHg) improves limb salvage, ischemic pain and the general clinical situation. They noted however that these benefits should be weighed against the cost and the minor complications associated with the technique.

Reviewer's Conclusions:

The meta-analysis had valid methodology. The trials include were small, but were judged by the authors to have good quality. All were conducted in Europe, and the principal investigator was sponsored by a research center that belongs to Medtronic the manufacturer of the SCS device.

The results of the analysis indicate that the highly selected patients with inoperable critical limb ischemia had better outcomes with the SCS therapy compared to those who were treated conservatively. They experienced significantly less amputation rates in 12 months (NNT to salvage a limb was 9), and showed significant clinical improvement (NNT to improve the condition from critical leg ischemia to claudications =3). The procedure was not associated with a difference in mortality or QoL vs. conservative treatment, but was associated with some adverse events.