Assessment of sural nerve-originated neuropathic pain after ankle surgery

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Introduction

Neurological complications following ankle surgery may be the cause of chronic pain and disability. The sural nerve (SuN) is in particular susceptible to trauma because of its suprafascial course.

Purpose of study

The aim of this study was to examine the prevalence of neuropathic pain in Open Reduction and Internal Fixation (ORIF) treated patients by using validated questionnaires and to determine the diagnostic utility of high-resolution sonography to detect pathological changes of the SuN.

Methods

Observational retrospective survey

- 530 patients, operated in the period from January 2007 to 2014, were invited to an online questionnaire.
- Pain symptoms were assessed using the MCGill Pain Questionnaire, the DN4 and the CISS.
- Risk factor analysis was performed through a logistic regression model.

Blinded case-control study

- From all survey participants 14 symptomatic patients, 14 asymptomatic patients and 14 healthy volunteers were selected.
- The SuN was identified using 18 MHz high-frequency ultrasound imaging and routine physical examination.
- Cross-sectional area (CSA), echogenicity and vascularization were measured.

Results

- A total of 271 patients completed the questionnaire.
- Mean follow-up period was 4.5 years (± 1.9) and the prevalence of neuropathic pain symptoms was 78 (28.8%).
- The following parameters were associated with neuropathic pain: hypertension (p = 0.055), diabetes (p = 0.075), a thyroid disorder (p = 0.056), lower back pain (p = 0.056) and the use of pain medication (p = 0.023).
- In multivariate analysis, no significant predictors were identified.
- The SuN was clearly identified in all 43 participants.
- CSA and vascularization were increased in symptomatic patients.
- No significant differences were found in nerve echogenicity.

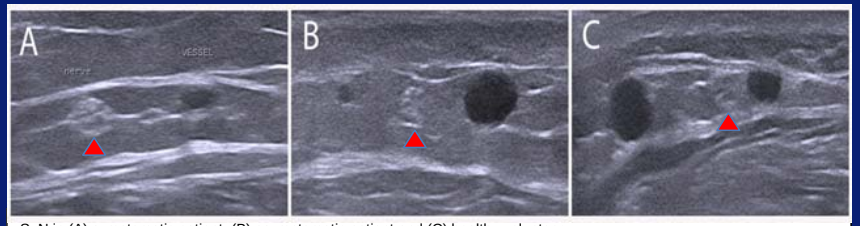
Figure 1

Ultrasound set-up

Table 1: Sonographic findings

Characteristics	Symptomatic patients	95% CI	Asymptomatic patients	95% CI	Healthy controls	95% CI	p-value
CSA in mm²	9.1 ± 2.6	5.7-14.4	5.8 ± 1.5	2.9-8.7	6.1 ± 1.8	2.9-8.7	0.000
Echogenicity	112 ± 13	92-133	111 ± 11	94-128	100 ± 12	100-136	0.983
Vascularization	9 (64)		1 (7)		2 (14)		0.002

Figure 2



SuN in (A) symptomatic patient, (B) asymptomatic patient and (C) healthy volunteer.

Discussion

- The main limitation of the survey is its retrospective design; a potential of recall bias exists.
- This study shows no significant differences between the symptomatic and asymptomatic groups in terms of echogenicity. Ankle surgery might have altered the echogenicity of the nerve or the computerized echogenicity measurement technique might have inadequate applicability in the evaluation of peripheral nerves.
- Future research should focus on a quantitative method to score echogenicity.

Conclusions

- This study shows that 29% of the patients with moderate to severe pain also suffer from neuropathic pain symptoms, which causes increased interference with daily activities and health related quality of life.
- Five associations with neuropathic pain were identified.
- Our results suggest that ultrasound may be a valuable tool for evaluating clinical suspected SuN damage after ankle surgery.

References

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