2023 NEHS Annual Meeting Abstract Submission

COMPLETE

NEHS Vice President, Daniel Mastella, M.D., is currently accepting abstract submissions for presentation at our Annual Meeting on December 1, 2023.

This meeting will be held at the Sturbridge Host Hotel in Sturbridge, MA.

Therapists, NPs, and PAs are also encouraged to submit.

THE DEADLINE FOR SUBMISSION IS OCTOBER 15, 2023

RESIDENTS AND FELLOWS ONLY. Please indicate if you want your paper to be considered for the prestigious H.Kirk Watson, M.D. Founder's Award. The abstracts for award consideration will be presented in the morning and the award will be presented in the afternoon.

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*** ABSTRACT TITLE**

Neuroma Morphology: A Macroscopic Classification System

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*** Name of who will present abstract at NEHS meeting on December 1, 2023 Please note that the same person cannot present more than one abstract at the meeting.**

Floris V. Raasveld, MD

*** Please indicate if the presenter is:**

Not currently a resident or fellow

* List full names of abstract authors Please note - one of the lead authors must be present at the meeting to answer questions about the paper.

Floris V. Raasveld, MD*
Daniel T. Weigel, MD, MS
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* presenting author

* ABSTRACT - should include background information and a description of methods, programs, or practices.

Introduction: Neuromas come in different shapes and sizes; yet the correlation between neuroma morphology and symptomatology is unknown. In this study, we aim to investigate macroscopic traits of excised human neuromas and assess the validity of a morphological classification system and its potential clinical implication.

Methods: End-neuroma specimens were collected from prospectively enrolled patients undergoing surgery for symptomatic neuromas. Protocolized images of the specimens were obtained intraoperatively. Pain data (Numeric rating scale, 0-10) was prospectively collected during pre-operative interview, and patient demographic and comorbidity factors were collected from chart review. A morphological classification is proposed, and the inter-rater reliability (IRR) was assessed.

Results: Forty-five terminal neuroma specimens from 27 patients were included in this study. Amputees comprised 93% of the population, of which 3 were upper (11%) and 24 (89%) were lower extremity amputees. The proposed morphological classification, consisting of three groups (bulbous, fusiform, and atypical), demonstrated a strong IRR (Cohen's kappa=0.8) (See Figure 1). No association was found between morphological category and time from injury to neuroma excision (p=0.890). Atypical neuromas were associated with higher pre-operative pain, compared to bulbous (p=0.007) and fusiform (p=0.008) (see Figure 2). Atypical morphology was significantly more prevalent in patients with diabetes (p=0.010) and peripheral vascular disease (PVD) (p=0.018) (See Figure 3), and distal neurite outgrowth was significantly more prevalent in atypical neuromas (See Figure 4).

Conclusion: A validated morphological classification of neuroma is introduced, indicating that atypically shaped neuromas were associated with higher pre-operative pain. Atypical neuromas were more prevalent in patients with diabetes and PVD. This may reflect the potential relationship with the vascular and metabolic microenvironment. These findings may assist surgeons and researchers with better understanding of symptomatic neuroma development and their clinical implications.

Please attach files with diagrams and/or photos to support your abstract (10 MB limit)

neuroma_morphology___abstract_nehs.docx

* Please attach the abstract presenter's CV

Submission: NEHS – presentation
Category: Peripheral nerve
Keywords: Neuroma growth, Pain outcomes, morphology,
Title: Neuroma Morphology: A Macroscopic Classification System

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Words: *283 words*

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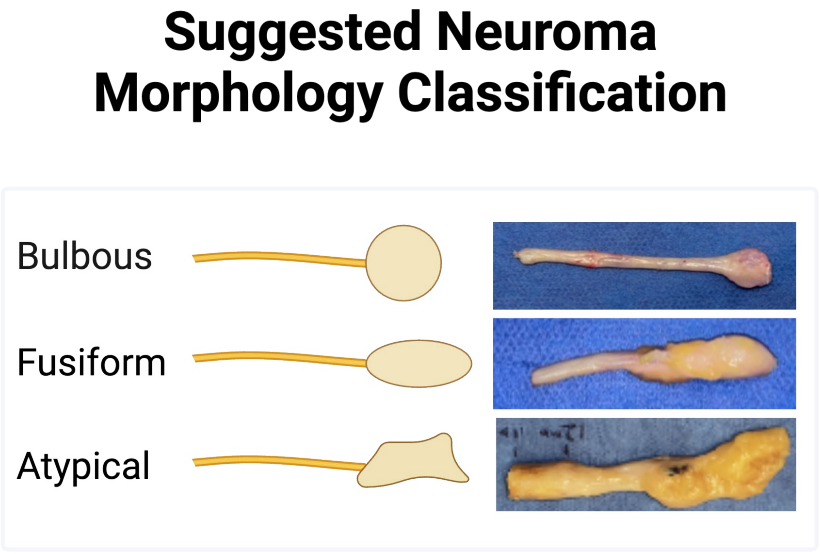

Figure 1 – Suggested neuroma morphology classification.
Schematic example and intraoperatively collected morphological types

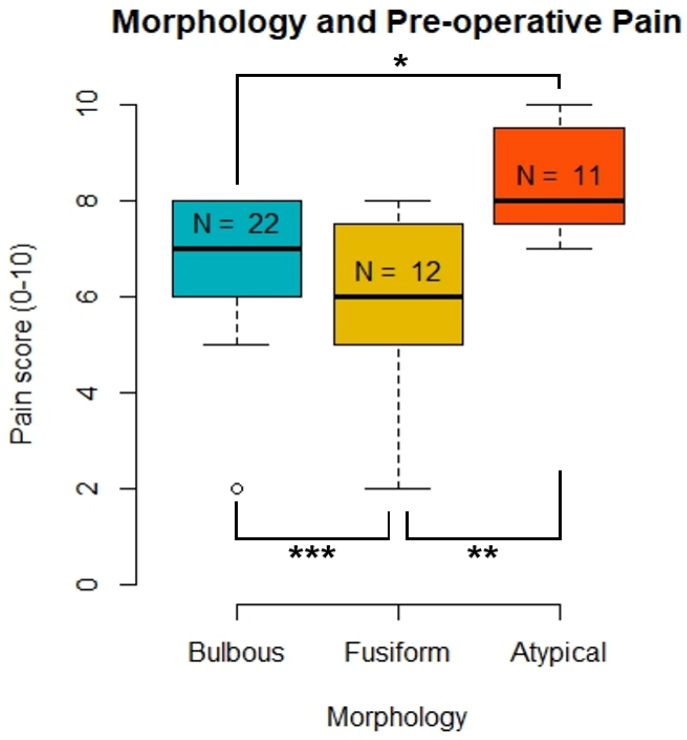

Figure 2 – Morphological type and pre-operative pain
Box plots of the absolute distribution of neuromas per morphological category, in median with IQR.* p=0.007, ** p=0.008, *** p = 0.999

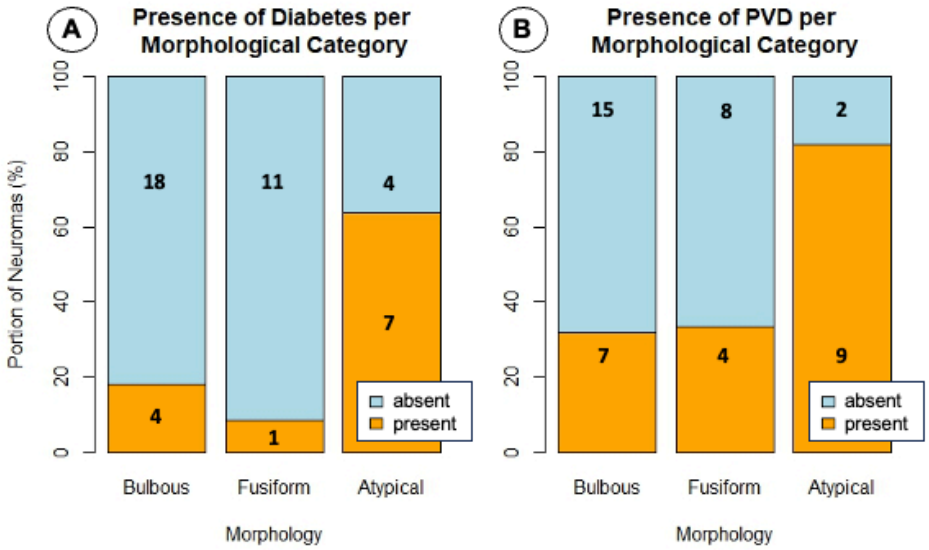

Figure 3 – Presence of Comorbidities per Morphological Classification
A) Proportion of neuromas excised of patients diagnosed with and without diabetes
B) Proportion of neuromas excised of patients diagnosed with and without PVD
The absolute number of neuromas is represented within the bars. Percentage per morphological category is given on the y-axis. Abbreviations: PVD = Peripheral Vascular Disease
IQR.* p=0.007, ** p=0.008, *** p = 0.999

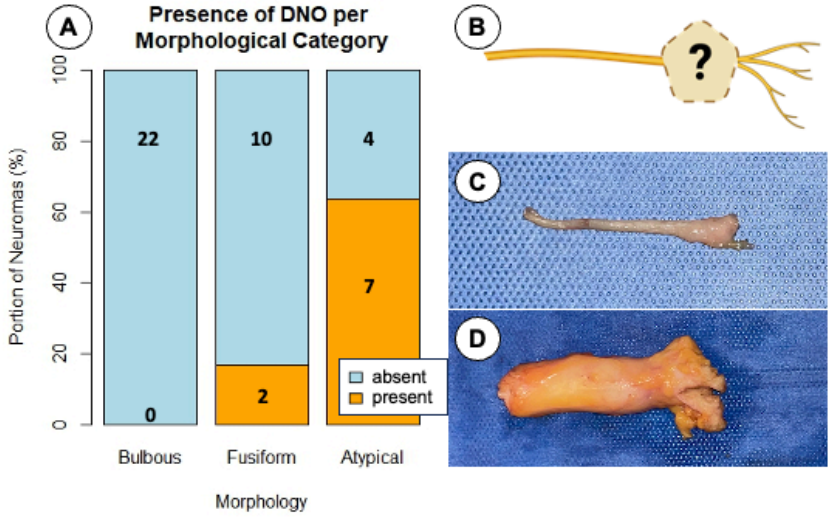

Figure 4 – Atypical neuromas demonstrate significantly more DNO compared to bulbous and fusiform neuromas
A) Bar graph of DNO per morphological category. Absolute number of Neuroma in bars.
B) Schematic unclassified neuroma depicting DNO.
C) Atypical neuroma with DNO of the superficial peroneal nerve in a transtibial amputee.
D) Fusiform neuroma with DNO of the sciatic nerve in a transfemoral amputee
Abbreviations: DNO = Distal Neurite Outgrowth