Parsonage -Turner syndrome
Neuralgic amyotrophy

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No conflicts of interest

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Goal

- Understand Parsonage-Turner syndrome
  - Symptoms
  - Diagnosis
  - Management
  - Outcome
  - Pathophysiology

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Outline

- Definition of syndrome
- Symptoms
- Clinical findings
- ENMG
- Imaging
- Etiology
- Treatment
- Prognosis
- Cases

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THE LANCET ORIGINAL ARTICLES JUNE 26, 1948

NEURALGIC AMYOTROPHY
THE SHOULDER-GIRDLE SYNDROME

M. J. PARSONAGE
M.B. Vict., M.R.C.P.
CHIEF CLINICAL ASSISTANT AND REGISTRAR, DEPARTMENT FOR NERVOUS DISEASES, GUY'S HOSPITAL

J. W. ALDREN TURNER
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NEUROLOGIST, ST. BARTHOLOMEW'S HOSPITAL, LONDON

A SYNDROME comprising pain and flaccid paralysis of the muscles round the shoulder girdle occurred fairly often during the war years 1941–45, though previously it had been rare. We observed 136 cases during neurological work in the Army in the United Kingdom and in India Command.

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- Maurice John Parsonage
  - 1915 - 2009
  - Neurologist
    - Epilepsy, EEG

- John William Aldren Turner
  - 1911-1980
  - Neurologist

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Precipitating causes

Precipitating Cause	*Cases*
Operations	12
Herniotomy	8
Appendicectomy	1
Varicocele	1
Pilonidal cyst	1
Mastoid	1
Trauma	10
Gunshot wound of remote parts	5
Minor local trauma	5
Other conditions	5
Lumbar puncture	1
Air encephalogram	1
Antisyphilitic treatment	2
Severe exposure	1

Precipitating Cause	*Cases*
Infections	71
Malaria	16
Typhus and malaria	5
Typhus	4
Typhoid	1
Dysentery	5
Smallpox	1
Glandular fever	1
Rheumatic fever	1
Chest infections	9
Septic infections	9
Minor fevers	11
Poliomyelitis	2
Diphtheritic polyneuritis	6

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SUMMARY

A syndrome consisting in severe pain across the shoulder and upper arm, followed by atrophic paralysis of muscles round the shoulder girdle, is described.

On clinical grounds it is thought that the pathological process can involve one or more peripheral nerves, two or more spinal roots, or the spinal cord.

The condition appears to be a distinct clinical entity which became increasingly common during the war years.

A similar syndrome may occur some days after the injection of serum, and the two conditions are probably identical, though the ætiology is unknown.

The name "neuralgic amyotrophy" is suggested.

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Lancet 1957:273(6988):209-12

NEURALGIC AMYOTROPHY (PARALYTIC BRACHIAL NEURITIS)
WITH SPECIAL REFERENCE TO PROGNOSIS

J. W. Albeen Turner
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M. J. Parsonage
M.B., B.Sc. Manc., M.R.C.P., D.C.H.
ASSISTANT PHYSICIAN, NEUROLOGICAL DEPARTMENT, GENERAL INFIRMARY AT LEEDS

In 1943 Spillane described localised neuritis of the shoulder girdle, which fairly often afflicted soldiers in the Middle East. The essential clinical picture consisted of pain around the shoulder and upper arm followed within a few hours to several days by atrophic paralysis. The distribution varied from the muscles supplied by a single nerve—e.g., the long thoracic and the circumflex—to more extensive paralysis indicating involvement of several peripheral nerves or nerve-roots. There was no constitutional disturbance at the onset; cutaneous sensory changes, particularly in the distribution of the circumflex nerve, were often present; and the cerebrospinal fluid was normal in the acute stages—all features which distinguished the condition from anterior poliomyelitis.

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Terminology

- **Neuralgic amyotrophy**
  - Most commonly used term today
  - 5% do not have pain
  - Purely sensory nerves may be affected
- Plexus neuritis
  - Traditionally used previously
  - Affects also other structures
- Multifocal multifascicular inflammatory and constrictive brachial neuritis
  - Often very focal, limited to a few fascicles of a nerve
  - Fascicular entrapment (Vastamäki)
- Wartenberg's migrant sensory neuritis
  - Purely sensory neuropathy
- **Parsonage – Turner syndrome**

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Classical PTS - Symptoms

- Acute onset with pain
- 95% onset with severe pain
- Often onset at night
- Initial pain usually a few weeks (1 day - 2 months)
  - 5% 24 hours
  - 10% > 2 months
- Pain is constant, not related to position
- Pain is often not in the same region as the neurological deficit
- Neurologic deficits become evident some time after onset of pain
  - Weakness of muscles innervated by affected nerve
  - Sensory abnormalities

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Atypical PTS

- No pain
  - 5% without pain
- Onset with paresis followed by pain
  - 5 %

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Affected nerves

- Spinal nerves (nerve roots)
- Plexus brachialis
  - Any part may be affected
- Nerves in the arm
  - Anterior interosseus nerve
  - Posterior interosseus nerve
  - Lateral cutaneous of the forearm
  - Radial nerve sensory branch
  - Individual palmar digital nerves
- Individual distal nerve branches
  - Individual muscles
  - Sensory branches

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Affected nerves

- Cervical plexus
  - Phrenic nerve (10%)
- Cranial nerves
  - IX (Glossopharyngeal nerve)
  - X (Vagus nerve or its branches)
  - XI (Accessory nerve)
  - XII (Hypoglossal nerve)
  - VII Facial nerve (Bell's palsy?)
- Individual leg nerves - sometimes, not often
  - Lumbar plexus
  - Proximal leg nerves

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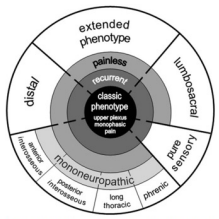
PTS distribution

- Mononeuropathies
- Often multiple mononeuropathies
  - *Lesions appear sequentially at different times*
- Unilateral 75%
- Bilateral 25%
- Dominant > non-dominant arm

18

Van Alfen. Nat Rev Neurol 2011;7:315-322



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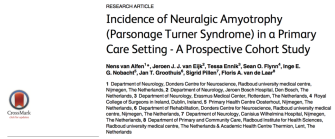
PTS incidence: PLOS ONE 2015; May:1-9



RESEARCH ARTICLE

Incidence of Neuralgic Amyotrophy (Parsonage Turner Syndrome) in a Primary Care Setting - A Prospective Cohort Study

Nens van Alfen*, Jeroen J. J. van Eijk, Tessa Encic, Sean O. Flynn, Inge E. G. Nobomt, Jan T. Groothuis, Sigrid Pillen, Floris A. van de Laar

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Incidence in primary care 1/1000/year

20

PTS age and gender

- Children and adults
  - Range 0 - 90 years
  - Mean age of onset 40 years
- 10% have a family history

21

PTS constitutional risk factors

- Lean > obese
- Male : female = 2:1

Constitutional risk factors for focal neuropathies in patients referred for electromyography

C. Martínez-Aparicio, S. K. Jääskeläinen, L. Puksa, F. Reche-Lorite, P. Torné-Poyatos, J. Paniagua Soto and B. Falck

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European Journal of Neurology 2020, 27: 529–535

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Recurrence

- 20% one recurrence
- 5 % two recurrences
- 4 % three recurrences
- 1 % four or more recurrences

30% will recur!

Van Alfen N, van Engelen BGM. The clinical spectrum of neuralgic amyotrophy in 246 cases. Brain 2006;129:438-450

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Antecedent events to PTS

- Infection
  - 10% have hepatitis E, Coxacie A2, Influenza
  - Covid 19 not more prone than other virus infections
- Surgery
- Childbirth
- Unusual physical activity
- Vaccination
  - Covid 19 vaccines not more prone than other vaccines
- Trauma
- No identified antecedent event 30-40%
- May start within hours of antecedent events
- Onset usually within 2 weeks of predisposing event

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Nerve biopsy findings

- Epineural perivascular mononuclear T-cell infiltration
- Active multifocal axonal degeneration without blood vessel wall inflammation or necrosis
- Perineural thickening
- ?? T-Cell mediated and/or B-Cell mediated(Postinfectious nature)

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Pathophysiology of PTS

- Immune triggers
- Genetic predisposition
  - Hereditary neuralgic amyotrophy (HNA – SEPT9 mutation)
  - Other yet unknown mutations
  - Tendency for recurrent episodes
- Mechanical factors
  - Lesions often around joints
  - Preceding repetitive physical activity, dominant arm > non dominant arm
- *Organ specific immune mediated disorder*

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ULTRASONOGRAPHIC IDENTIFICATION OF NERVE PATHOLOGY IN NEURALGIC AMYOTROPHY: ENLARGEMENT, CONSTRICTION, FASCICULAR ENTWINEMENT, AND TORSION

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Accepted 10 February 2015

ABSTRACT: *Introduction:* The aim of this study was to characterize the ultrasonographic findings on nerves in neuralgic amyotrophy. *Methods*: Fourteen patients with neuralgic amyotrophy were examined using high-resolution ultrasound. *Results*: Four types of abnormalities were found: (1) focal or diffuse nerve/fascicle enlargement (57%); (2) incomplete nerve constriction (36%); (3) complete nerve constriction with torsion (50%; hourglass-like appearance); and (4) fascicular entwinement (28%). Torsions were confirmed intraoperatively and were seen on the radial nerve in 85% of patients. A significant correlation was found between no spontaneous recovery of nerve function and constriction/torsion/fascicular entwinement ($P = 0.007$). *Conclusion*: Ultrasonographic nerve pathology in neuralgic amyotrophy varies in order of severity from nerve enlargement to constriction to nerve torsion, with treatment ranging from conservative to surgical. We postulate that the constriction caused by inflammation is the precursor of torsion and that development of nerve torsion is facilitated by the rotational movements of limbs.

Muscle Nerve **52**: 503–511, 2015

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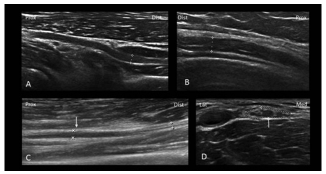
Nerves with edema



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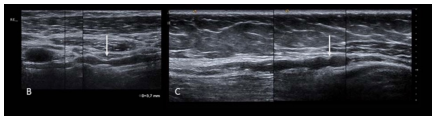
Hour glass constriction



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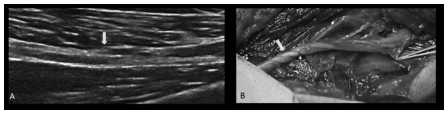
Entwinement/torsion



Ultrasound Intraoperative

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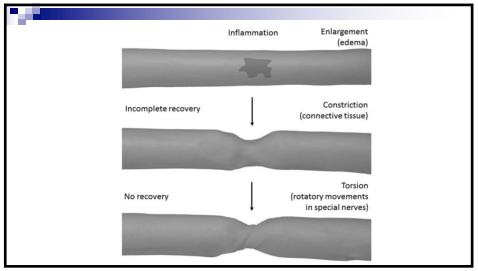

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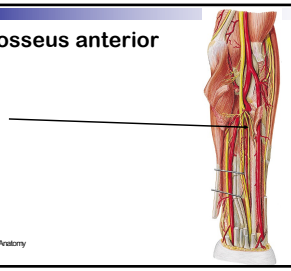
N.interosseus anterior



Sobotta: Atlas of human Anatomy
Urban & Schwarzenberg

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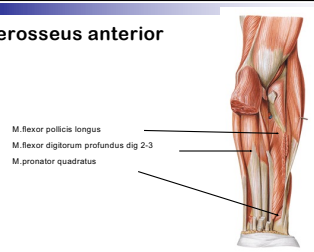
N.interosseus anterior



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N.anterior interosseus

- Severe pain in the forearm
  - 2 days to 2 months
- Distal phalanx of thumb and forefinger flexion weak
- Variable recovery
- Parsonage Turner syndrome (neuralgic amyotrophy)
- Anterior interosseus syndrome not an entrapment

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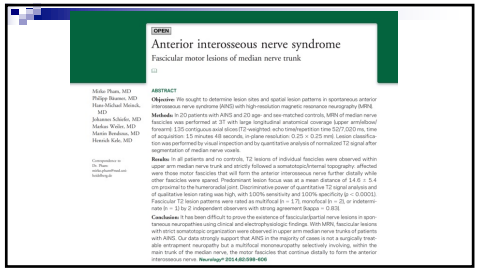
OPEN

Anterior interosseous nerve syndrome

Fascicular motor lesions of median nerve trunk

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Philipp Bäumer, MD
Hans-Michael Mosich, MD
Johannes Schiefer, MD
Markus Weiler, MD
Martin Bendszus, MD
Henrich Kehr, MD

ABSTRACT

Objective: We sought to determine lesion sites and spatial lesion patterns in spontaneous anterior interosseous nerve syndrome (AINS) with high-resolution magnetic resonance neurography (MRN).

Methods: In 20 patients with AINS and 20 age- and sex-matched controls, MRN of median nerve fascicles was performed at 3T with large longitudinal anatomical coverage (upper arm/elbow/forearm). 3.25 contiguous axial slices (T2-weighted: echo time/repetition time 52/7,020 ms, time of acquisition: 1.5 minutes 48 seconds, in-plane resolution: 0.25 × 0.25 mm). Lesion classification was performed by visual inspection and by quantitative analysis of normalized T2 signal after segmentation of median nerve voxels.

Results: In all patients and no controls, T2 lesions of individual fascicles were observed within upper arm median nerve trunk and strictly followed a somatotopic/internal topography: affected were those motor fascicles that will form the anterior interosseous nerve further distally while other fascicles were spared. Predominant lesion focus was at a mean distance of 14.6 ± 5.4 cm proximal to the humeroradial joint. Discriminative power of quantitative T2 signal analysis and of qualitative lesion rating was high, with 1.00% sensitivity and 1.00% specificity ($p < 0.0001$). Fascicular T2 lesion patterns were rated as multifocal (n = 17), monofocal (n = 2), or indeterminate (n = 1) by 2 independent observers with strong agreement (kappa = 0.83).

Conclusions: It has been difficult to prove the existence of fascicular/partial nerve lesions in spontaneous neuropathies using clinical and electrophysiologic findings. With MRN, fascicular lesions with strict somatotopic organization were observed in upper arm median nerve trunks of patients with AINS. Our data strongly support that AINS in the majority of cases is not a surgically treatable entrapment neuropathy but a multifocal mononeuropathy selectively involving, within the main trunk of the median nerve, the motor fascicles that continue distally to form the anterior interosseous nerve. Neurology® 2014;82:598–606

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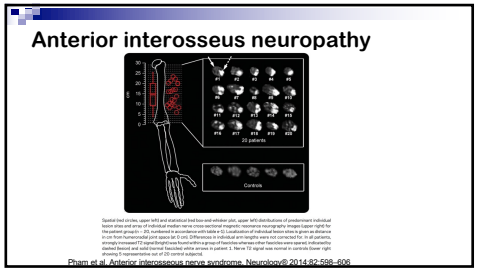
Anterior interosseus neuropathy

Pham et al. Anterior interosseous nerve syndrome. Neurology® 2014;82:598–606

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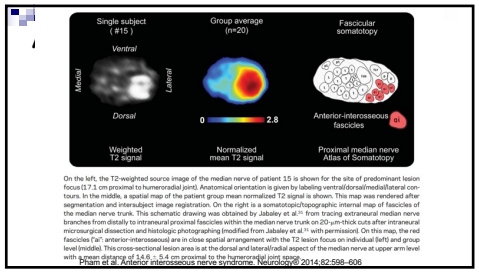
Single subject (#15)

Group average (n=20)

Fascicular somatotopy

Ventral

Medial

Lateral

Dorsal

0

2.8

Anterior-interosseous fascicles

Weighted T2 signal

Normalized mean T2 signal

Proximal median nerve Atlas of Somatotopy

On the left, the T2-weighted source image of the median nerve of patient 15 is shown for the site of predominant lesion focus (17.1 cm proximal to humeroradial joint). Anatomical orientation is given by labeling ventral/dorsal/medial/lateral contours. In the middle, a spatial map of the patient group mean normalized T2 signal is shown. This map was rendered after segmentation and intersubject image registration. On the right is a somatotopic/topographic internal map of fascicles of the median nerve trunk. This schematic drawing was obtained by Jabaley et al.[7] from tracing extraneural median nerve branches from distally to intraneural proximal fascicles within the median nerve trunk on 20-μm-thick cuts after intraneural microsurgical dissection and histologic photographing (modified from Jabaley et al.[7] with permission). On this map, the red fascicles ("ai": anterior-interosseous) are in close spatial arrangement with the T2 lesion focus on individual (left) and group level (middle). This cross-sectional lesion area is at the dorsal and lateral/radial aspect of the median nerve at upper arm level with a mean distance of 14.6 ± 5.4 cm proximal to the humeroradial joint space.

Pham et al. Anterior interosseous nerve syndrome. Neurology® 2014;82:598–606

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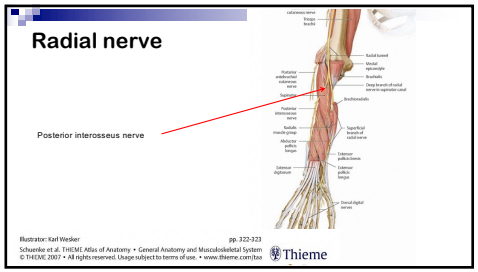
Radial nerve

Posterior interosseus nerve

Illustrator: Karl Wesker

pp. 322-323

Schuenke et al. THIEME Atlas of Anatomy • General Anatomy and Musculoskeletal System

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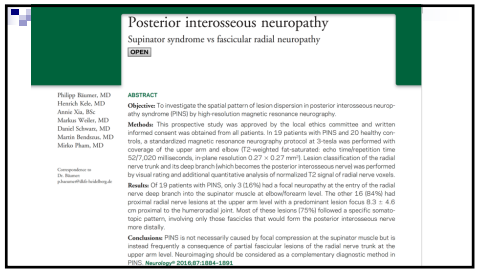
Posterior interosseous neuropathy

Supinator syndrome vs fascicular radial neuropathy

OPEN

Philipp Bäumer, MD
Henrich Kehr, MD
Annie Xia, BSc
Markus Weiler, MD
Daniel Schwarz, MD
Martin Bendszus, MD
Mirko Pham, MD

ABSTRACT

Objective: To investigate the spatial pattern of lesion dispersion in posterior interosseous neuropathy syndrome (PINS) by high-resolution magnetic resonance neurography.

Methods: This prospective study was approved by the local ethics committee and written informed consent was obtained from all patients. In 19 patients with PINS and 20 healthy controls, a standardized magnetic resonance neurography protocol at 3-tesla was performed with coverage of the upper arm and elbow (T2-weighted fat-saturated: echo time/repetition time 52/7,020 milliseconds, in-plane resolution 0.27 × 0.27 mm²). Lesion classification of the radial nerve trunk and its deep branch (which becomes the posterior interosseous nerve) was performed by visual rating and additional quantitative analysis of normalized T2 signal of radial nerve voxels.

Results: Of 19 patients with PINS, only 3 (16%) had a focal neuropathy at the entry of the radial nerve deep branch into the supinator muscle at elbow/forearm level. The other 16 (84%) had proximal radial nerve lesions at the upper arm level with a predominant lesion focus 8.3 ± 4.6 cm proximal to the humeroradial joint. Most of these lesions (75%) followed a specific somatotopic pattern, involving only those fascicles that would form the posterior interosseous nerve more distally.

Conclusions: PINS is not necessarily caused by focal compression at the supinator muscle but is instead frequently a consequence of partial fascicular lesions of the radial nerve trunk at the upper arm level. Neuroimaging should be considered as a complementary diagnostic method in PINS. Neurology® 2016;87:1884–1891

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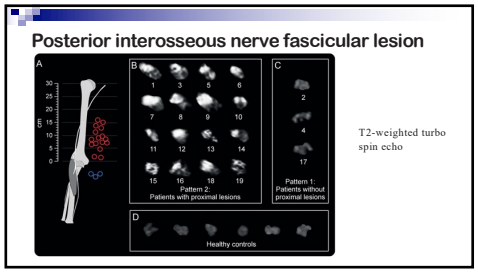
Posterior interosseous nerve fascicular lesion

A

B

C

D

Pattern 2: Patients with proximal lesions

Pattern 1: Patients without proximal lesions

Healthy controls

T2-weighted turbo spin echo

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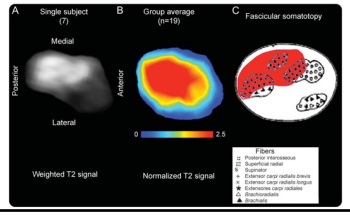
Somatotopic findings



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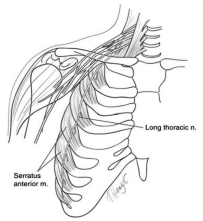
N.thoracicus longus

- Winging of the scapula
- Difficulty of abduction of the arm above the shoulder
- Slow recovery
  - axonal reinnervation starts at 6-8 months after onset
  - recovery completed at two years after onset

45

N.thoracicus longus



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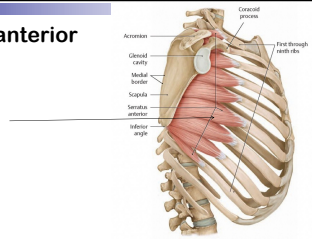
M.serratus anterior



Innervation: N.thoracicus longus
Myotomes: C5-7

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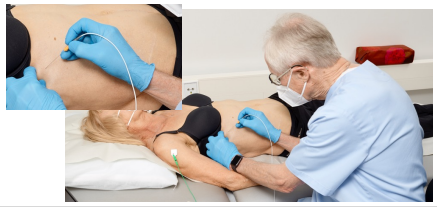
M.serratus anterior



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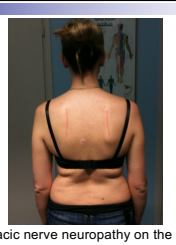
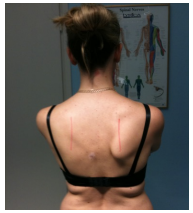


Long thoracic nerve neuropathy on the right side
9/2009, onset after childbirth 7/2009

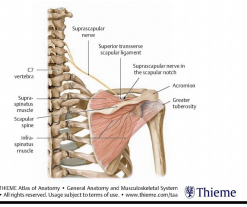
50



Long thoracic nerve neuropathy on the right side
9/2009, onset after childbirth 7/2009

51

Suprascapular nerve



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N.suprascapularis

- Shoulder pain
- Weak upper arm outward rotation
- Weak shoulder abduction
- Atrophy of m.infraspinatus and m.supraspinatus

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Suprascapular neuropathy

- 4 % of patients with shoulder pain
- Trauma
- Parsonage-Turner syndrome

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Hereditary neuralgic amyotrophy
HNA

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Hereditary neuralgic amyotrophy (HNA)

- Genetically heterogeneous
- One form linked to chromosome 17q24
  - Gene codes septin 9 (SEPT9)
  - Septins are implicated in the formation of the cytosceleton, cell division and tumorgenesis
  - Missense mutations
  - Intragenic duplications
- Autosomal dominant inheritance
- Variable penetrance
- Onset often in early childhood

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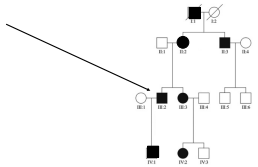
Pedigree of own HNA family



57

HNA - Clinical features

- Onset usually in second to third decades
- Sometimes in the first decade
- Painful episodes of local nerve lesions
- Pain lasting a few days to a few weeks
- Often satisfactory recovery
- Repeated or severe attacks leave residual symptoms
- Penetrance high - 80%

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EMG findings in HNA

- In unaffected parts normal EMG and neurography
- Abnormalities only in affected nerves
- Different from HNPP (hereditary liability to pressure palsies)

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Diagnosis

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Diagnosis

- Clinical picture
- Symptoms
- Laboratory tests
- Imaging
- ENMG

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Laboratory tests

- SR, CRP normal
- Autoimmune antibodies normal
- Spinal fluid
  - Sometimes elevated proteins or lymphocyte counts
- If risk factors present
  - Borrelia
  - HIV

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EMG

- Optimal timing 3 weeks following onset
  - Denervation in muscles is seen > 2-3 weeks from onset
- Many clinical neurophysiologists do US

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Imaging

- MRI of the plexus
  - Abnormalities often seen after 2-4 weeks
  - T2-weighted Dixon fat suppression/inversion recovery sequences, multiple planes
  - Intravenous gadolinium contrast at the discretion of the radiologist.
- Ultrasound
  - 6-18 MHz linear transducer
  - Very good in experienced hands
- Imaging not only the affected nerve, but also the parent nerve
- Choice of imaging method depends on availability/experience
- MRI better in deeply located nerves

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Muscle & Nerve. 2022;66:709–714

CLINICAL RESEARCH ARTICLE

MUSCLE&NERVE WILEY

Imaging of neuralgic amyotrophy in the acute phase

Paolo Ripellino MD, MSc[1] | Zsuzsanna Arányi MD, PhD[2] | Nens van Alfen MD, PhD[3] | Elisa Ventura MD[4] | Anne-Kathrin Peyer MD, PhD[5] | Alessandro Cianfoni MD, PhD[6,A] | Claudio Gobbi MD[1] | Emily Pedrick BA[7] | Darryl Brett Sneag MD[7]

- US/MRI showed oedema or hourglass constriction (HGC) in 90% within one month
- Earliest change with US in 12 hours with MRI 8 days
- HGC 4 patients in 1 week, 8 in 2 weeks, 5 within 3 weeks, 12 within 4 weeks

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Muscle Nerve 56: 1054–1062, 2017

ULTRASONOGRAPHY IN NEURALGIC AMYOTROPHY: SENSITIVITY, SPECTRUM OF FINDINGS, AND CLINICAL CORRELATIONS

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Accepted 23 May 2017

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US findings

Table 1. Summary of affected nerves with respective ultrasonographic findings

Affected nerves	Number (total)	Ultrasonographic findings			
		None	Swelling without constriction	Incomplete constriction	Complete constriction
AIN	16 (7[*])	2	10	3	1
Radial nerve / PIN	12 (1[†])	1	2	3	6 (2[‡])
Long thoracic nerve	12	7	5	—	—
Suprascapular nerve	8	2	2	4	—
Accessory nerve	6	1	5	—	—
Axillary nerve	5	3	1	—	1
Musculocutaneous nerve	3	—	1	1	1 (1[†])
Median nerve	2	—	2	—	—
Superficial radial nerve	2	—	1	—	1
LABCN	1	—	—	1 (1[†])	—
Thoracodorsal nerve	1	1	—	—	—
Dorsal scapular nerve	1	1	—	—	—
Upper trunk	1	—	1	—	—
Total	70 (100%)	18 (26%)	30 (43%)	12 (1[†]) (17%)	10 (4[‡]) (14%)

AIN, anterior interosseous nerve; PIN, posterior interosseous nerve; LABCN, lateral antebrachial cutaneous nerve.

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Outcome with conservative therapy

- Nens Van Alfen
  - 10% full recovery
  - 60% will have some pain
  - 50% fatigue
  - 25% unable to work
- Cruz-Martinez A et al J Peripheral Nervous System 2002:7:198-204
  - Good outcome in the 22 out of 40 patients that were followed for 2 years
  - In 41 of 43 affected nerves good outcome

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Treatment

- Analgesia
  - NSAID, opioids if necessary
- Immunomodulation
  - No controlled studies
  - Should be started acutely at the onset! Within 30 days from onset
    - Prednisone, desending dosage, dosage! 100 mg – 80 mg – 60 mg mg – 40 mg – 20 mg
    - IVIg?
  - Shorter and better recovery times suggested in some uncontrolled studies
- Surgery
  - In severe cases with complete axonal involvement and torsion
  - Future studies will soon show exact criteria

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J Neurol Neurosurg Psychiatry 2009;80:1120–1124

Evaluation of prednisolone treatment in the acute phase of neuralgic amyotrophy: an observational study

J J J van Eijk,[1] N van Alfen,[1,2] M Berrevoets,[1] G J van der Wilt,[3] S Pillen,[2] B G M van Engelen[1]

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J Neurol Neurosurg Psychiatry 2009;80:1120–1124

- Observational study
- 50 patients treated, 203 historical controls
- Within 1 month from onset
- Prednisolone for 2 weeks
  - 60 mg/day for one week, next week tapering 10 mg per day

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Table 2 Outcomes for the study (prednisolone) group (SG) and the historical controls (HC)

	Study group	Historical controls	
Median time (days) until initial pain relief (mean)	12.5 (17.1)	20.5 (37.2)	Not significant, p = 0.13
Recovery of strength within 1 month	9/50 (18.0%)	11/174 (6.3%)	p = 0.011
Full functional recovery within the first year	6/50 (12.0%)	2/189 (1.0%)	p<0.001
Good (but not full) self-reported recovery within			
6 months	16/50 (32%)	3/103 (2.9%)	p<0.001
12 months	22/50 (44.0%)	11/103 (10.7%)	p<0.001

- Shorter duration of pain
- Functional recovery of weakness earlier
- Better final outcome

72

Gstoettner C, et al. J Neurol Neurosurg Psychiatry 2020;91:879-

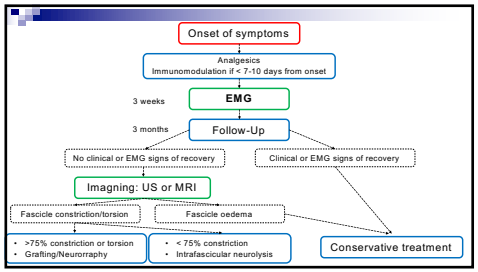
Neurosurgery

REVIEW

Neuralgic amyotrophy: a paradigm shift in diagnosis and treatment

Clemens Gstoettner ,[1] Johannes A Mayer,[1,2] Stephanie Rassam,[1,3] Laura A Hruby,[1,4] Stefan Salminger,[1,5] Agnes Sturma,[1,6] Martin Aman,[1,7] Leila Harhaus,[7] Hannes Platzgummer,[8] Oskar C Aszmann[1,5]

73



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J Hand Surg Am 2021:46:43-53

EDITOR'S CHOICE

Outcomes of Microneurolysis of Hourglass Constrictions in Chronic Neuralgic Amyotrophy

Karthik R. Krishnan, MS,*† Darryl B. Sneag, MD,*††
Joseph H. Feinberg, MD,* Ogonna K. Nwawka, MD,*††
Steve K. Lee, MD,*† Zsuzsanna Arányi, MD, PhD,§ Scott W. Wolfe, MD*‡

81

J Hand Surg Am 2021:46:43-53

- 24 patients with PTS with hour-glass constriction
- 11 treated with microsurgical epineurolysis or perineurolysis
  - 9 patients significant recovery
  - Time from onset to surgery 6-18 months
- 13 treated non-surgically
  - 3 patients significant recovery

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J Hand Surg Am 2021:46:43-53

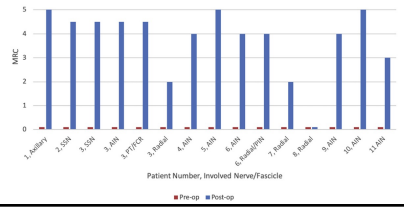
TABLE 3. Changes in Electrodiagnostic Outcomes

Outcome	Classification Category	Before Surgery	After Surgery
Motor unit recruitment	None	30	6
	Low discrete	2	4
	High discrete	0	5
	Decreased	0	14
	Full	0	3
Motor unit configuration	None	30	6
	Nascents	2	17
	Increased polyphasics	0	0
	Di-/triphasics	0	9

Preoperative and postoperative counts of the number of muscles demonstrating each pattern of motor unit recruitment or configuration across all operative patients.

83

Operated patients – outcome



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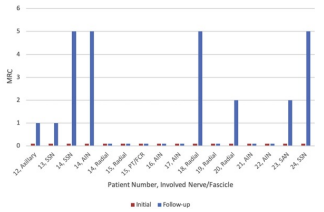
Conservatively treated patients -outcome



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Summary

- PTS is a common focal peripheral neuropathy
- Immune mediated focal neuropathy
- Most common neurological disorder causing shoulder pain
- Onset acute with severe pain
- May affect any peripheral nerve
  - Most often single nerves emerging from plexus brachialis
  - Rarely affects leg nerves
- 60-70% preceded by infection, trauma, surgery, etc
- Diagnosed with EMG, US/MRI
- Treatment in mild or moderate cases conservatively, in severe cases surgically

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Patient

87

Referral from orthopedic surgeon

- 52 old male general practitioner
- Acute onset of severe pain in the left thigh three weeks ago
- MRI shows no lumbar disc herniation
- Neuropathy?

88

History

- 52-year-old male general practitioner
- Hypertension, Candesartan 16 mg
- BMI 21 kg/m^2
- Four weeks prior to EMG slipped on a snowy morning
  - Shoulder luxation on the right side, reposition without difficulties
- Two days later severe pain (NRS 8-9/10) in the left thigh
  - Severe pain for two weeks
- Allodynia in the anterolateral part of the left thigh
- No back pain
- Lumbar MRI on week following onset – no lumbar disc herniation

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Clinical findings

- Normal muscle strength in the left leg
- Tendon reflexes symmetrical
- Allodynia in the anterolateral part of the left thigh

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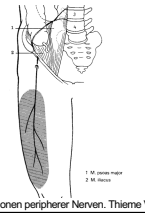
N.cutaneus femoris lateralis

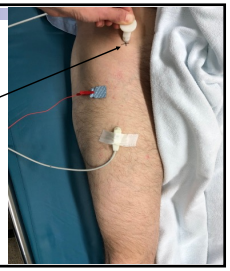


Mumenthaler M, Schliack H. Läsionen peripherer Nerven. Thieme Verlag 1982

91

Neurography

Spina ilica anterior superior



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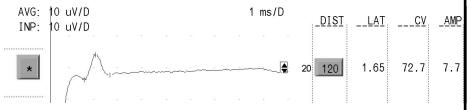
Cutaneus femoris lateralis dx



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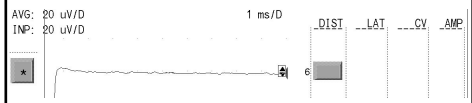
Cutaneus femoris lateralis sin



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EMG – normal findings

- m.vastus lateralis
- m.liopsoas
- m.adductor magnus
- m.tensor fascia latae
- m.biceps femoris
- m.gastrocnemius
- m.extensor hallucis longus:

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Neurography

- N.cutaneus femoris lateralis
  - Normal on right side
  - No response on the left side
- Left n.suralis sensory neurography normal
- Left n.peroneus profundus motor neurography normal finding

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Conclusion

- N.cutaneus femoris lateralis neuropathy on the left side
- Etiology?
  - Acute onset and severe pain not compatible with "meralgia paresthetica"
  - Normal BMI not compatible with "meralgia paresthetica"
- Most likely cause is Parsonage-Turner syndrome
  - Triggered by the shoulder luxation

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Outcome one year later

- Pain subsided completely in 6 weeks
- Slight dysesthesia and hypoesthesia over anterolateral part of the left thigh

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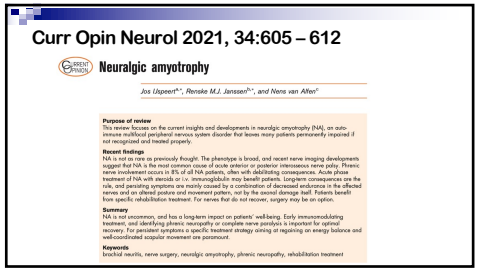

Curr Opin Neurol 2021, 34:605 – 612

Neuralgic amyotrophy

Jos Ulspeert[a,*], Renske M.J. Janssen[b,*], and Nens van Alfen[c]

Purpose of review
This review focuses on the current insights and developments in neuralgic amyotrophy (NA), an autoimmune multifocal peripheral nervous system disorder that leaves many patients permanently impaired if not recognized and treated properly.

Recent findings
NA is not as rare as previously thought. The phenotype is broad, and recent nerve imaging developments suggest that NA is the most common cause of acute anterior or posterior interosseous nerve palsy. Phrenic nerve involvement occurs in 8% of all NA patients, often with debilitating consequences. Acute phase treatment of NA with steroids or i.v. immunoglobulin may benefit patients. Long-term consequences are the rule, and persisting symptoms are mainly caused by a combination of decreased endurance in the affected nerves and an altered posture and movement pattern, not by the axonal damage itself. Patients benefit from specific rehabilitation treatment. For nerves that do not recover, surgery may be an option.

Summary
NA is not uncommon, and has a long-term impact on patients' well-being. Early immunomodulating treatment, and identifying phrenic neuropathy or complete nerve paralysis is important for optimal recovery. For persistent symptoms a specific treatment strategy aiming at regaining an energy balance and well-coordinated scapular movement are paramount.

Keywords
brachial neuritis, nerve surgery, neuralgic amyotrophy, phrenic neuropathy, rehabilitation treatment

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