Diseases of peripheral nervous system

Professor Leila Rinatovna Akhmadeeva

http://ufaneuro.org

Nov. 1, 2022

Заболевания периферической нервной системы и вертеброгенные неврологические синдромы

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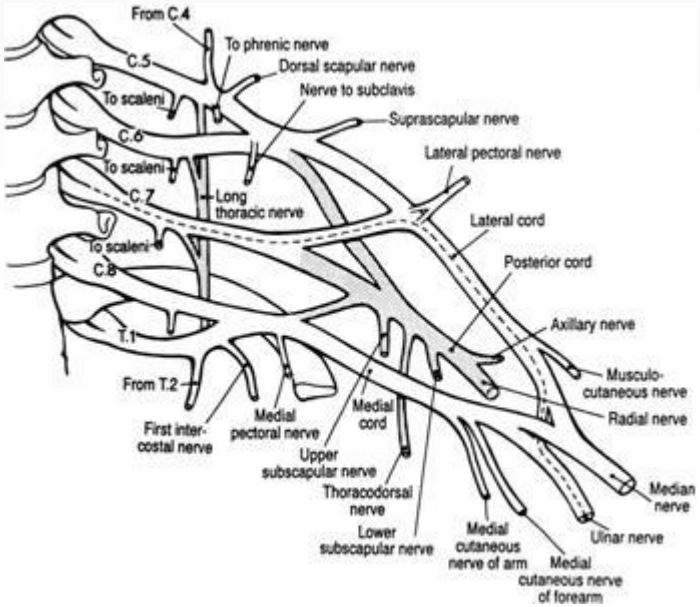
Nov. 1, 2022



- Peripheral nerves
- Ganglia
- Plexus
- Nerve roots

CLASSIFICATION

- **LOCATION: NEUROPATHY, RADICULOPATHY,…**

- **ETIOLOGY: INFECTION, TRAUMA, NEOPLASM, ISCHEMIA, AUTOIMMUNE, …**

HOW OFTEN?

Polyneuropathy - 2.4% (more in the elderly)
Carpal tunnel syndrome - 5% in women, 0.5% in men

Neurology in practice
Peripheral nerve diseases
Richard Hughes
http://dx.doi.org/10.1136/jnnp.2008.162412

How to recognize?

Overview of Peripheral Nervous System Disorders

Автор: Michael Rubin, MDCM, Professor of Clinical Neurology, Weill Cornell Medical College; Attending Neurologist and Director, Neuromuscular Service and EMG Laboratory, New York Presbyterian Hospital-Cornell Medical Center

www.msdmanuals.com/ru

Aim today

Several examples

Polyneuropathies

Guillain-Barré syndrome

ICD 10 - G61.0

Guillain-Barré syndrome

- 1859 Landry (10 patients)

- 1916 –
- George Guillian,
- Jean Alexandre Barré
- Albert Strohl

Guillain-Barré syndrome

- Any age
- 1-3 per 100 000 / year

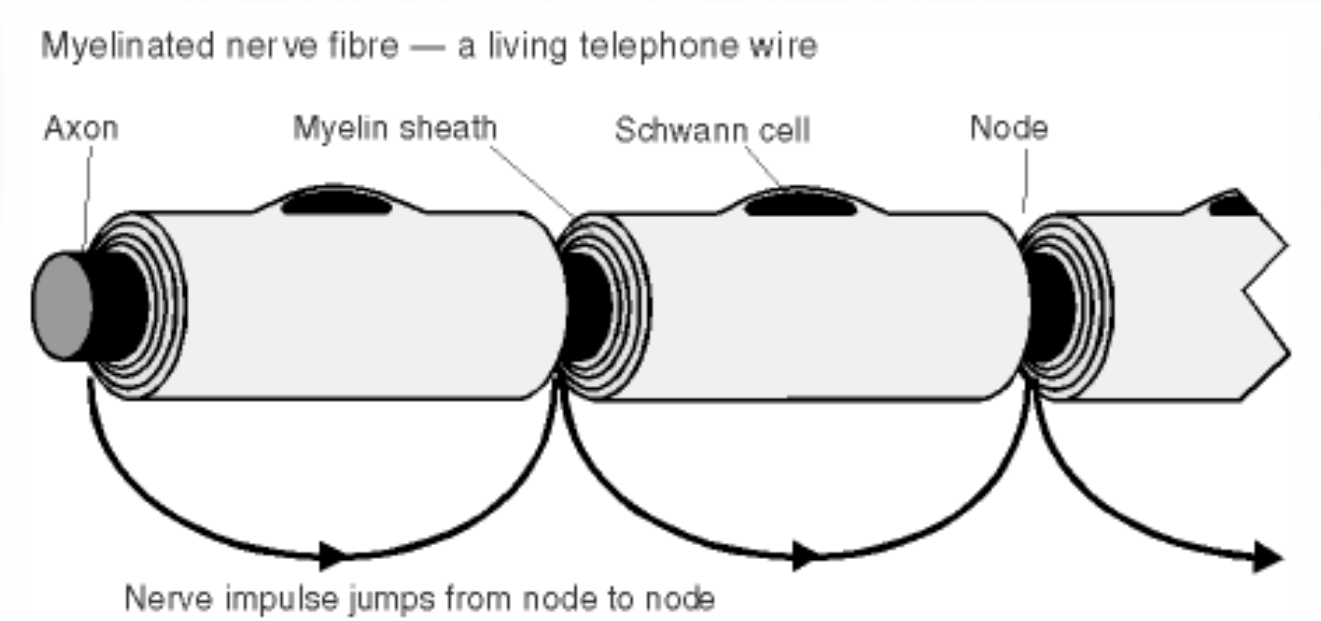
Guillain-Barré syndrome

- **Etiology - unknown**
- Autoimmune disease

Guillain-Barré syndrome

- 1-3 weeks
- Distal muscle weakness
- – Artificial ventilation needed in 25-30% of cases
- Sensory loss / pain
- Autonomic dysfunctions

Guillain-Barré syndrome



Guillain-Barré syndrome

- EMG
- CSF:
  - 100-400 ml/dl - proteins
  - < 50 cells

Guillain-Barré syndrome

- Plasma Exchange
- IVIg
- No steroids!

Guillain-Barré syndrome

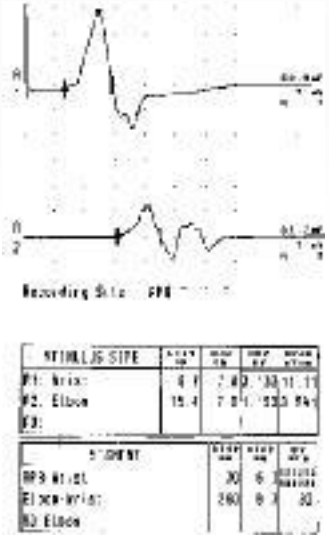
- Recovery- 85% during 6-12 mo
- Die– 3-8%

CIDP

A patient of L. Akhmadeeva

A patient of L. Akhmadeeva

EMG



Biopsy

- n.suralis

CIDP management

- **Immunosupressants**

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upper extremity peripheral nerve

Contents | Calculators | Drug Interactions | UpToDate Pathways

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Overview of upper extremity peripheral nerve syndromes

Topic | Graphics

Author: Seward B Rutkove, MD
Section Editor: Jeremy M Shefner, MD, PhD
Deputy Editor: Richard P Goddeau, Jr, DO, FAHA

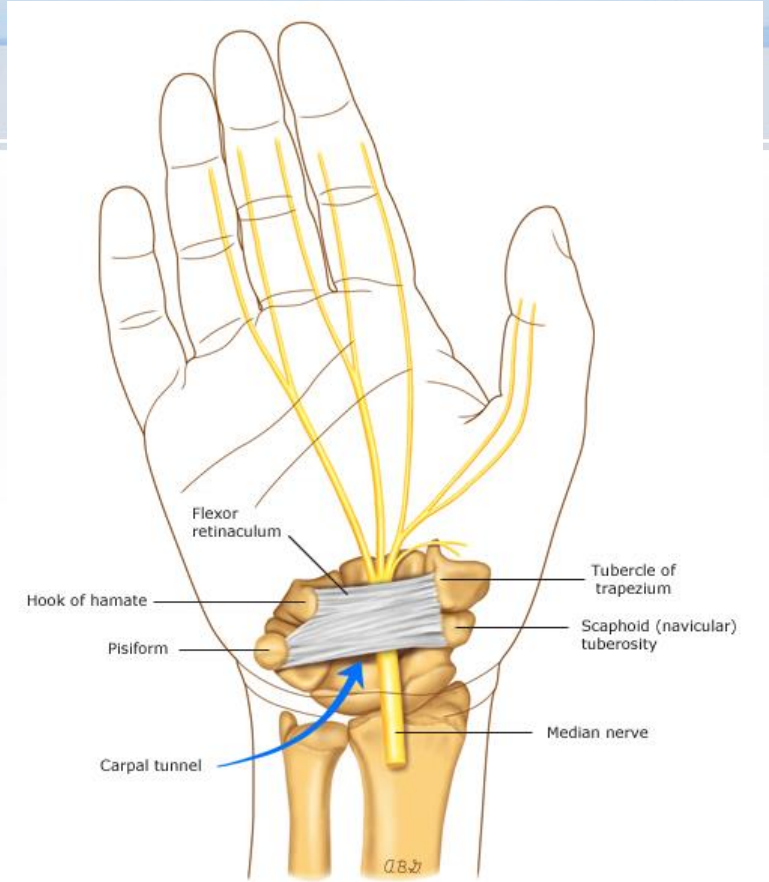
Contributor Disclosures

All topics are updated as new evidence becomes available and our peer review process is complete.

Literature review current through: **Sep 2022.** This topic last updated: **Nov 09, 2021.**

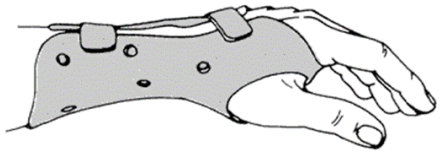
- The major mechanisms of upper extremity peripheral nerve injury are compression, transection, ischemia, inflammation, neuronal degeneration, and radiation exposure.

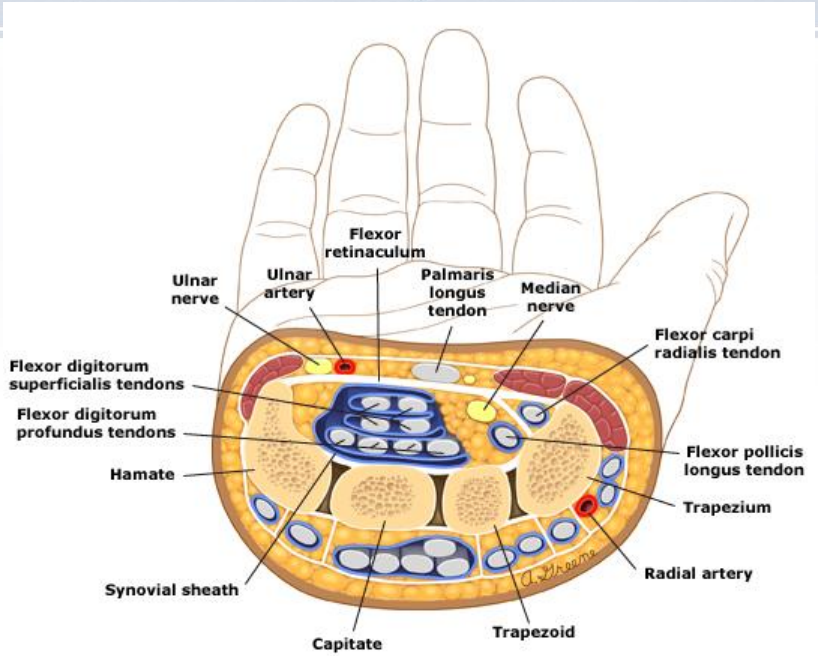
- Carpal tunnel syndrome is the most frequent mononeuropathy affecting the upper extremities, while ulnar neuropathy at the elbow is the second most frequent. Cervical radiculopathy is also common.

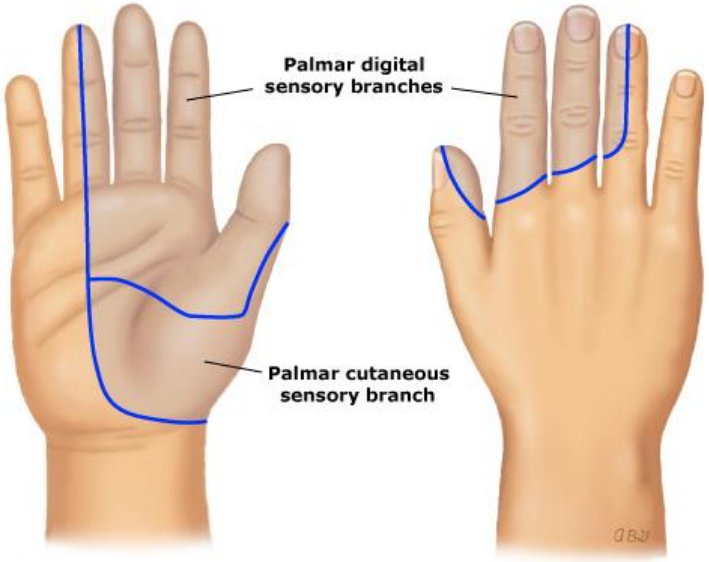

Flexor retinaculum
Hook of hamate
Pisiform
Carpal tunnel
Tubercle of trapezium
Scaphoid (navicular) tuberosity
Median nerve

- Electromyography (EMG) and nerve conduction studies (NCS) are useful for identifying and classifying peripheral nerve disorders affecting the upper extremity.

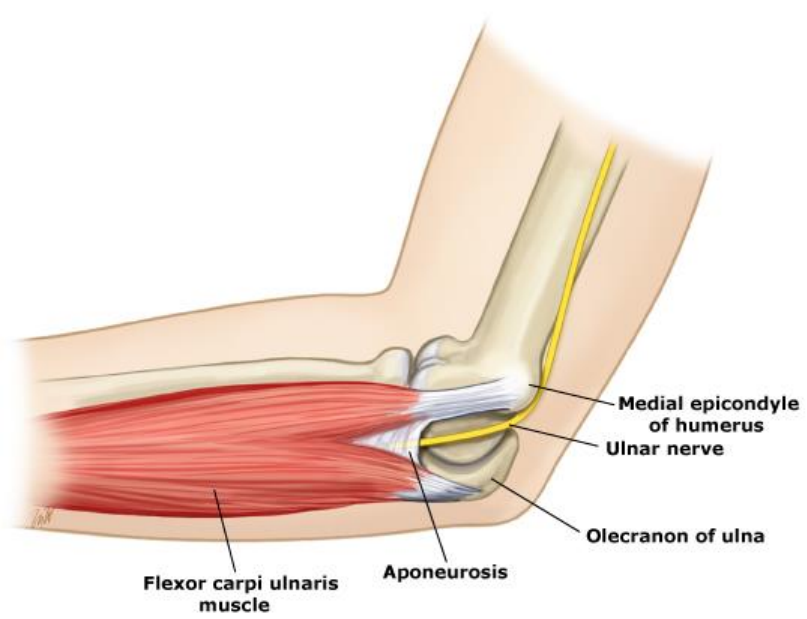
- The hallmark of classic carpal tunnel syndrome is pain or paresthesia in a distribution that includes the median nerve territory, with involvement of the lateral portion of the hand The symptoms are typically worse at night and characteristically awaken affected individuals from sleep. Conservative therapy involves wrist splinting, while glucocorticoid injection and surgical release are options for moderate to severe carpal tunnel syndrome that is refractory to more conservative measures.

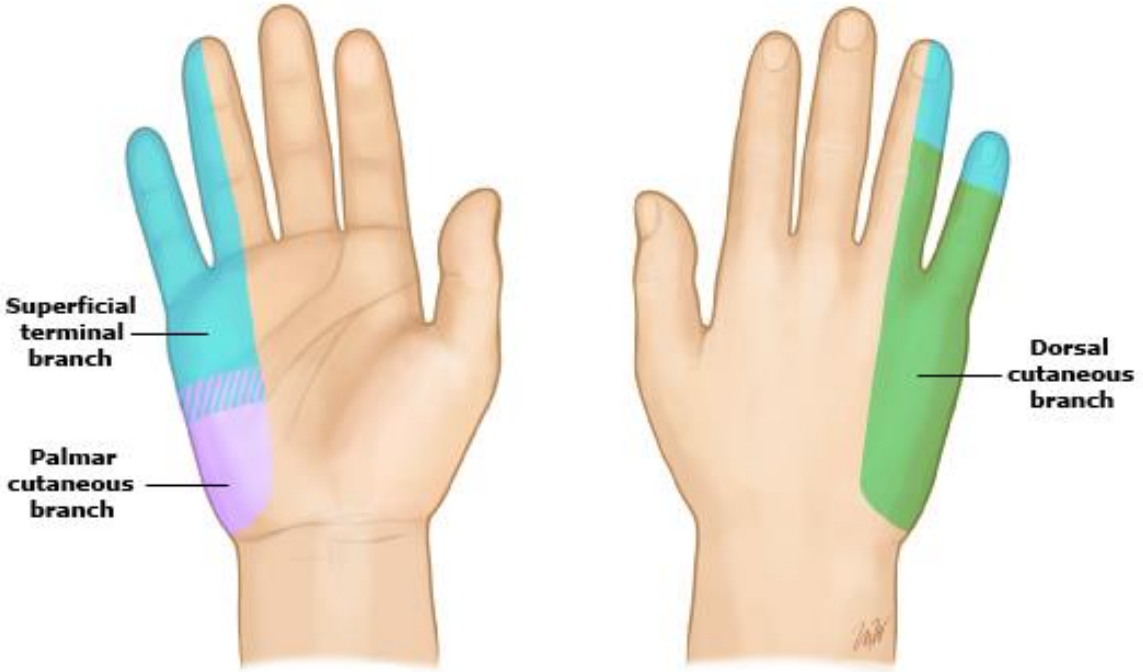


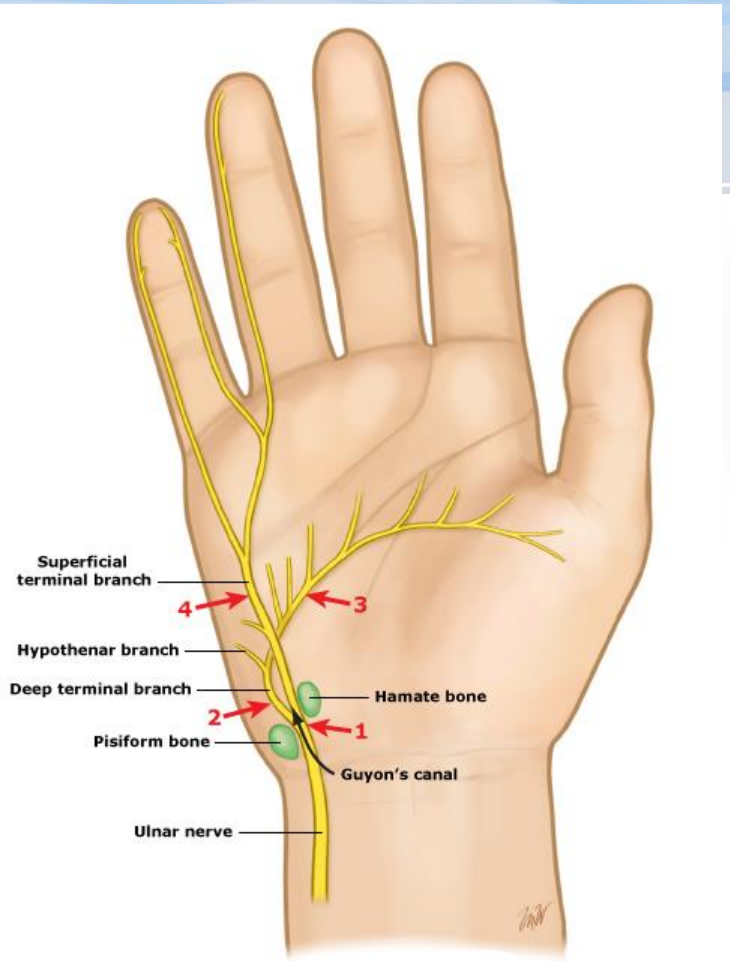

Flexor retinaculum
Ulnar nerve
Ulnar artery
Palmaris longus tendon
Median nerve
Flexor carpi radialis tendon
Flexor digitorum superficialis tendons
Flexor digitorum profundus tendons
Flexor pollicis longus tendon
Hamate
Trapezium
Radial artery
Synovial sheath
Capitate
Trapezoid


Palmar digital
sensory branches
Palmar cutaneous
sensory branch

- Ulnar neuropathy at the elbow is the second most common compression neuropathy affecting the upper extremities. In mild cases, symptoms include sensory loss and paresthesias over digits 4 and 5. In more severe cases, there is weakness of the interosseous muscles of the hand. Compression of the ulnar nerve occasionally occurs in the wrist and may appear clinically similar to that at the elbow. However, the ulnar innervated finger flexors are spared in this syndrome. Mild ulnar neuropathy at the elbow often improves with conservative measures or remains stable. Those with persistent symptoms of weakness and numbness beyond six months should be referred for consideration of surgical intervention.


Medial epicondyle of humerus
Ulnar nerve
Olecranon of ulna
Aponeurosis
Flexor carpi ulnaris muscle


Superficial terminal branch
Palmar cutaneous branch
Dorsal cutaneous branch

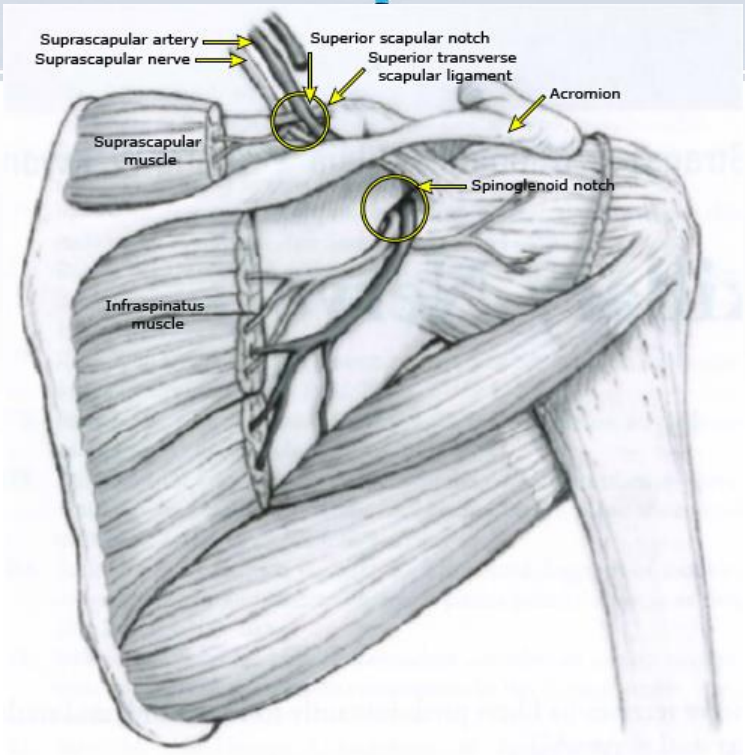

Superficial terminal branch
4
3
Hypothenar branch
Deep terminal branch
Hamate bone
2
1
Pisiform bone
Guyon's canal
Ulnar nerve

- The radial nerve is predisposed to compression in the region where it runs adjacent to the humerus, known as the spiral groove. The triceps retains full strength, but there is weakness of the wrist extensors (ie, wrist drop), finger extensors, and brachioradialis. Sensory loss over the dorsum of the hand, possibly extending up the posterior forearm, may also be present. Conservative treatment is generally the rule for patients with a one-time compression injury to the radial nerve.

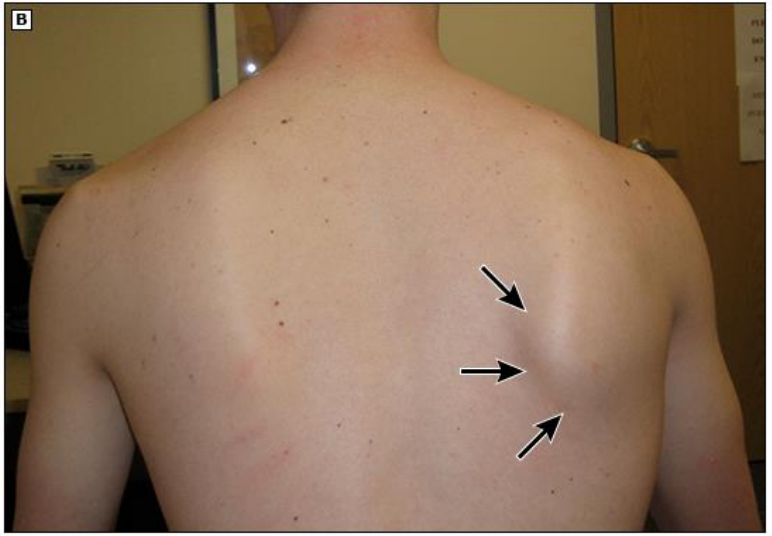
A patient of L.Akhmadeeva

A patient of L. Akhmadeeva

- Proximal focal neuropathies of the upper extremity include suprascapular neuropathy, long thoracic neuropathy, and axillary neuropathy.


Suprascapular artery
Suprascapular nerve
Superior scapular notch
Superior transverse scapular ligament
Acromion
Suprascapular muscle
Spinoglenoid notch
Infraspinatus muscle


A


B

- The brachial plexus is vulnerable to trauma and may be affected secondarily by disorders involving adjacent structures. Most brachial plexus disorders show a regional involvement rather than involvement of the entire brachial plexus.

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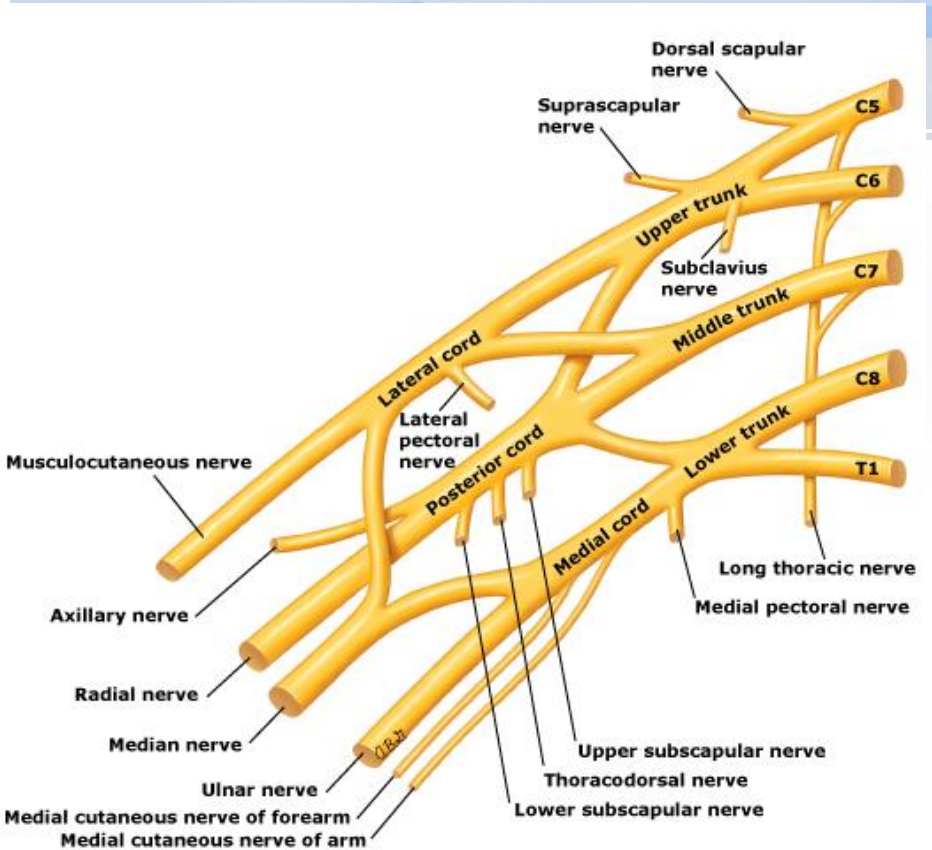

Dorsal scapular nerve
Suprascapular nerve
C5
C6
Upper trunk
Subclavius nerve
C7
Middle trunk
Lateral cord
C8
Lateral pectoral nerve
Lower trunk
Posterior cord
T1
Musculocutaneous nerve
Medial cord
Long thoracic nerve
Medial pectoral nerve
Axillary nerve
Radial nerve
Median nerve
Upper subscapular nerve
Thoracodorsal nerve
Ulnar nerve
Lower subscapular nerve
Medial cutaneous nerve of forearm
Medial cutaneous nerve of arm

- Cervical radiculopathy is a common cause of both acute and chronic neck pain. Most radiculopathies arise from nerve root compression due to cervical spondylosis and/or disc herniation. Lower cervical roots, particularly C7, are more frequently affected by compression. Some causes of noncompressive radiculopathy include infection (especially herpes zoster and Lyme disease), nerve root infarction, infiltration by tumor, infiltration by granulomatous tissue, root avulsion, and demyelination.

Symptoms and signs of cervical root lesions

Root	Pain	Numbness	Weakness	Reflex affected
C5	Neck, shoulder, scapula	Lateral arm (in distribution of axillary nerve)	Shoulder abduction, external rotation, elbow flexion, forearm supination	Biceps, brachioradialis
C6	Neck, shoulder, scapula, lateral arm, lateral forearm, lateral hand	Lateral forearm, thumb and index finger	Shoulder abduction, external rotation, elbow flexion, forearm supination and pronation	Biceps, brachioradialis
C7	Neck, shoulder, middle finger, hand	Index and middle finger, palm	Elbow and wrist extension (radial), forearm pronation, wrist flexion	Triceps
C8	Neck, shoulder, medial forearm, fourth and fifth digits, medial hand	Medial forearm, medial hand, fourth and fifth digits	Finger extension, wrist extension (ulnar), distal finger flexion, extension, abduction and adduction, distal thumb flexion	None
T1	Neck, medial arm and forearm	Anterior arm and medial forearm	Thumb abduction, distal thumb flexion, finger abduction and adduction	None

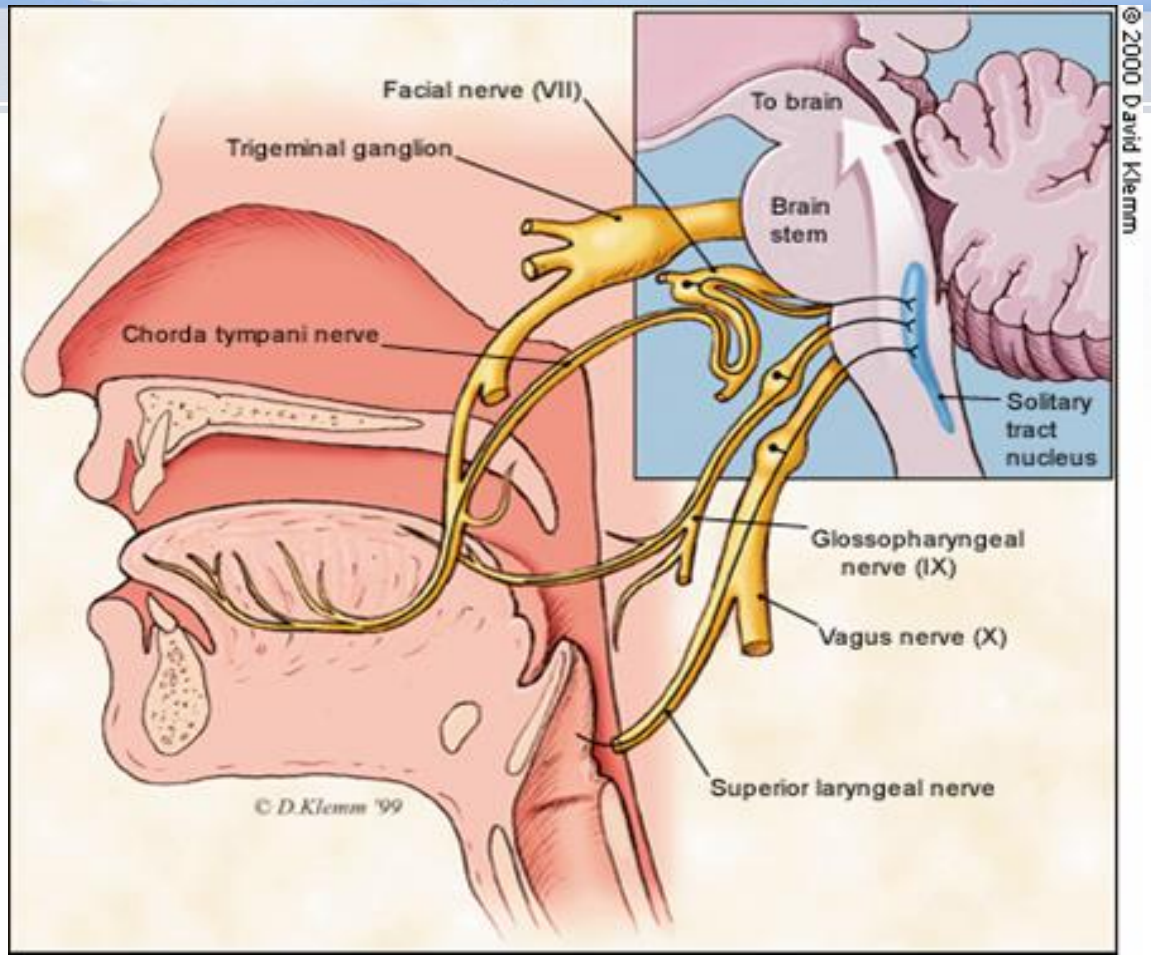
- Additional uncommon peripheral nerve syndromes affecting the upper extremities include focal amyotrophy, mononeuropathy multiplex, multifocal motor neuropathy (MMN), and zoster radiculoganglionitis.

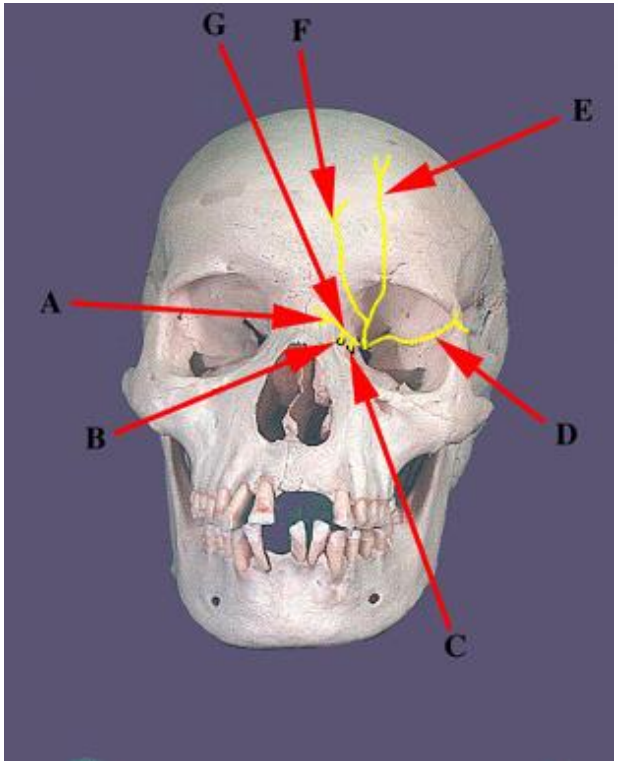

RS
Z 2.0
2D
60%
C 60
P Med
Res

Lower extremity peripheral nerve syndromes

Nerve	Site of injury	Cause	Symptoms	Signs
Common peroneal	Fibular neck, just below the knee	Prolonged lying, leg crossing, squatting, leg cast	Foot drop, paresthesias and/or sensory loss over dorsum of foot and lateral shin	Weakness on foot dorsiflexion and eversion; sensory loss on dorsum of foot; reflexes normal
Deep peroneal	Ankle	Tight fitting shoe rim or strap	Ankle pain, minimal weakness and sensory loss over web space between digits 1 and 2	Minimal
Posterior tibial	Tarsal tunnel of ankle	Fracture or dislocation of talus, calcaneus, medial malleolus, rheumatoid arthritis, tumor	Aching, burning, numbness, tingling on sole of foot, distal foot, toes, and occasionally heel	Positive Tinel's sign over nerve posterior to medial malleolus; sensory loss on sole of foot; atrophy of foot muscles if severe
Sciatic	Sciatic notch/gluteal region	Trauma (hip dislocation, fracture, or replacement), prolonged bed rest, deep-seated pelvic mass, piriformis syndrome	Leg pain and weakness affecting most lower leg muscles	Sensory loss in peroneal, tibial, and sural territories; may spare medial calf and arch of foot; normal knee jerk; absent ankle jerk
	Mid-thigh	Femur fracture, mass, ischemic nerve infarction	Similar to above but sparing hamstrings	Similar to above
Femoral	Pelvis and anterior thigh	Hip or pelvic fracture, hip replacement, lithotomy position, diabetes mellitus	Quadriceps weakness and sensory loss	Quadriceps weakness; sensory loss over anterior and medial thigh extending down medial shin to arch of foot; reduced or unobtainable knee jerk
Lateral femoral cutaneous	Inguinal ligament (meralgia paresthetica)	Obesity, tight fitting belts, idiopathic	Paresthesias and pain radiating down the lateral thigh to knee	Sensory loss on lateral thigh
Lumbosacral radiculopathy	See associated table			

TRIGEMINAL NEURALGIA

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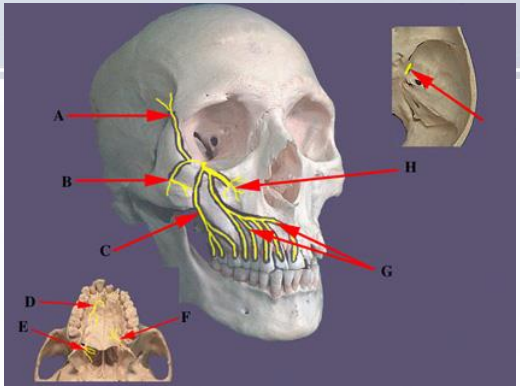
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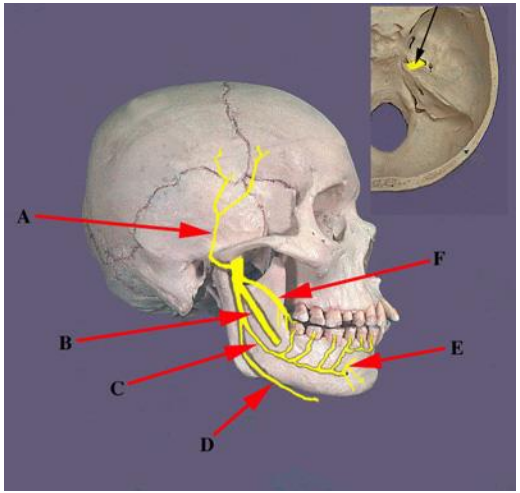
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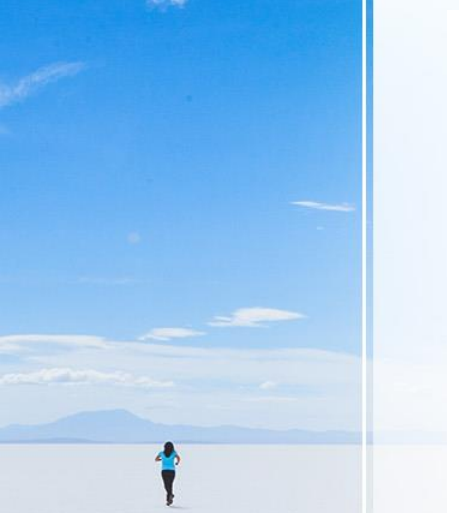

EAN GUIDELINES/CME ARTICLE

European Academy of Neurology guideline on trigeminal neuralgia

L. Bendtsen[a], J. M. Zakrzewska[b,c], J. Abbott[d], M. Braschinsky[e], G. Di Stefano[f], A. Donnet[g], P. K. Eide[h,i], P. R. L. Leal[j,k], S. Maarbjerg[a], A. May[l], T. Nurmikko[m], M. Obermann[n], T. S. Jensen[o] and G. Cruccu[f]

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Keywords:
guideline, management, trigeminal neuralgia

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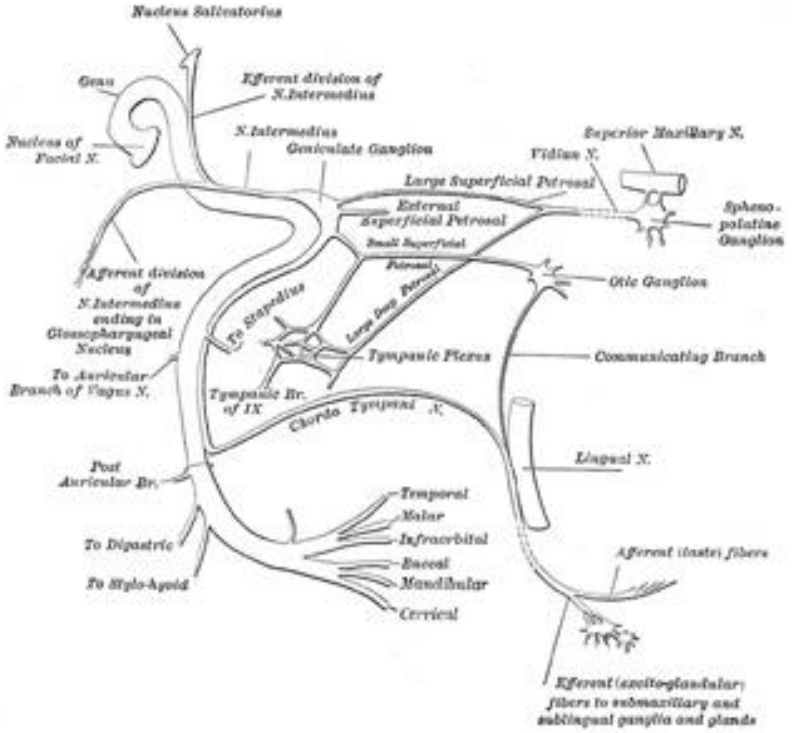
Accepted 8 March 2019

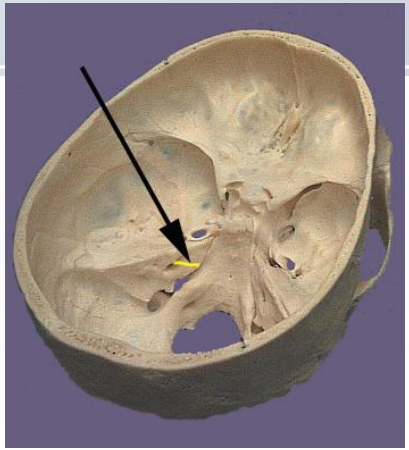
European Journal of Neurology 2019, **26:** 831–849

Background and purpose: Trigeminal neuralgia (TN) is an extremely painful condition which can be difficult to diagnose and treat. In Europe, TN patients are managed by many different specialities. Therefore, there is a great need for comprehensive European guidelines for the management of TN. The European Academy of Neurology asked an expert panel to develop recommendations for a series of questions that are essential for daily clinical management of patients with TN.

Methods: A systematic review of the literature was performed and recommendations was developed based on GRADE, where feasible; if not, a good prac-

Nervus facialis

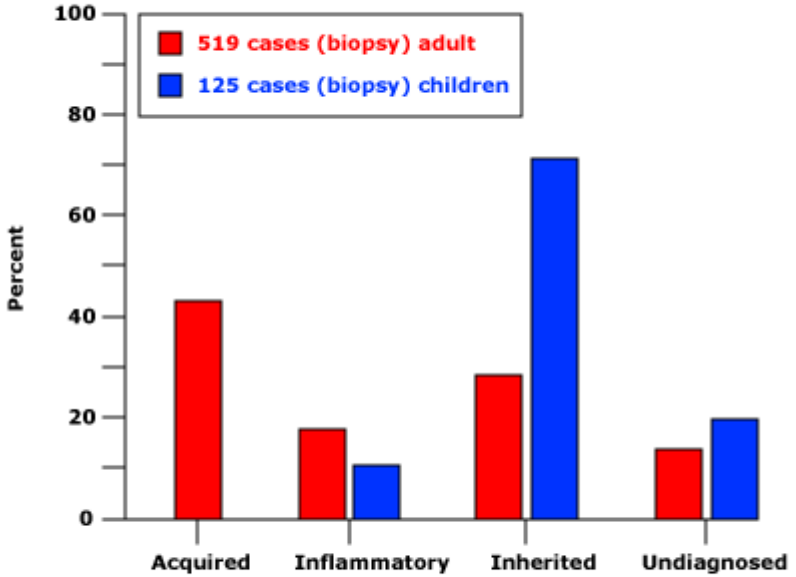




Bell’s palsy

A patient of L. Akhmadeeva

Etiology of peripheral neuropathy



A comparison of the different causes of peripheral neuropathy in adults and children is depicted above.

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GANGLIOPATHIES

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REVIEW

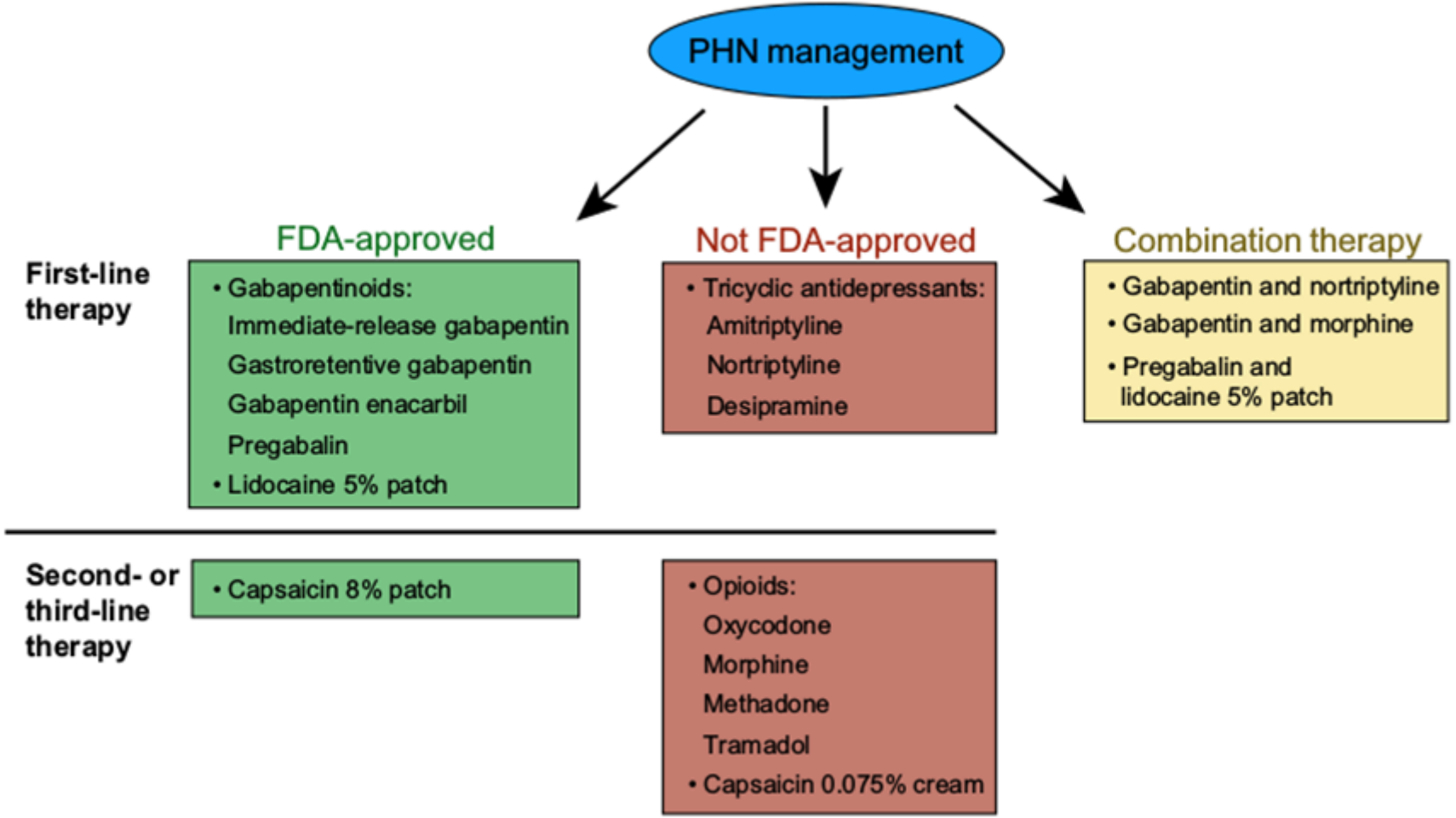
Practical considerations in the pharmacological treatment of postherpetic neuralgia for the primary care provider

This article was published in the following Dove Press journal:
Journal of Pain Research
10 March 2014
Number of times this article has been viewed

Jamie S Massengill[1]
John L Kittredge[2]

[1]JSM Medical, Edmond, OK, USA;

Abstract: An estimated one million individuals in the US are diagnosed with herpes zoster (HZ; shingles) each year. Approximately 20% of these patients will develop postherpetic neuralgia (PHN), a complex HZ complication characterized by neuropathic pain isolated to the


PHN management
FDA-approved
Not FDA-approved
Combination therapy
First-line therapy
• Gabapentinoids:
Immediate-release gabapentin
Gastroretentive gabapentin
Gabapentin enacarbil
Pregabalin
• Lidocaine 5% patch
• Tricyclic antidepressants:
Amitriptyline
Nortriptyline
Desipramine
• Gabapentin and nortriptyline
• Gabapentin and morphine
• Pregabalin and lidocaine 5% patch
Second- or third-line therapy
• Capsaicin 8% patch
• Opioids:
Oxycodone
Morphine
Methadone
Tramadol
• Capsaicin 0.075% cream

American Family Physician www.aafp.org/afp
Volume 83, Number 12 June 15, 2011

Table 3. Medications to Treat Postherpetic Neuralgia

Class	*Medication*	*Dosage*	*Cost of generic (brand)**	*NNT*	*Adverse effects*
Anticonvulsants	Gabapentin (Neurontin)	1,800 to 3,600 mg per day	$93 to $186 ($365 to $729)	2.8-5.3	Somnolence, dizziness, edema, dry mouth
	Pregabalin (Lyrica)	150 to 600 mg per day	NA ($95 to $190)	4.9	
Opioids	Controlled-release oxycodone (Oxycontin)	Variable	NA ($209, 15-mg 12-hour tablets)	2.7	Constipation, nausea, vomiting, sedation, dizziness, dependence
	Long-acting morphine	Variable	$64 ($84), 15-mg 12-hour tablets	2.7	
	Tramadol (Ultram)	100 to 400 mg per day	$34 ($140), 100 mg per day	4.8	Dependence
Topical agents	Capsaicin 0.075% cream (Zostrix)	Applied three or four times per day	NA ($19 to $25, 2 oz)	3.3	Burning skin
	Lidocaine 5% patch (Lidoderm)	Maximum three patches per day	NA ($217, 30 patches)	2.0	Mild skin reaction
Tricyclic antidepressants	Amitriptyline†	Up to 150 mg per day	$17 (NA)	2.6	Sedation, dry mouth, blurred vision, constipation, urinary retention
	Desipramine (Norpramin)	Up to 150 mg per day	$140 ($180)		
	Nortriptyline (Pamelor)†	Up to 150 mg per day	$19 ($1,082)		

RADICULOPATHIES

Symptoms and signs of lumbosacral radiculopathies

Nerve	Symptoms	Signs
L5	Back pain radiating down the lateral leg to foot	Decreased foot dorsiflexion, toe extension, foot inversion and eversion; mild weakness of leg abduction in severe cases
S1	Pain radiating down the posterior leg to foot; leg pain greater than back pain	Decreased leg extension, foot inversion, plantar flexion, and toe flexion; decreased sensation in the posterior leg and lateral foot; loss of ankle jerk
L2-4	Acute back pain radiating around the anterior leg into the knee and possibly foot	Decreased hip flexion, knee extension, leg abduction; decreased sensation in the anterior thigh down the medial aspect of the shin; diminished knee jerk in severe cases
S2-4	Sacral or buttock pain radiating down the posterior leg or into the perineum	Minimal weakness; bowel and bladder dysfunction

Symptoms and signs of cervical root lesions

Root	Pain	Numbness	Weakness	Reflex affected
C5	Neck, shoulder, scapula	Lateral arm (in distribution of axillary nerve)	Shoulder abduction, external rotation, elbow flexion, forearm supination	Biceps, brachioradialis
C6	Neck, shoulder, scapula, lateral arm, lateral forearm, lateral hand	Lateral forearm, thumb and index finger	Shoulder abduction, external rotation, elbow flexion, forearm supination and pronation	Biceps, brachioradialis
C7	Neck, shoulder, middle finger, hand	Index and middle finger, palm	Elbow and wrist extension (radial), forearm pronation, wrist flexion	Triceps
C8	Neck, shoulder, medial forearm, fourth and fifth digits, medial hand	Medial forearm, medial hand, fourth and fifth digits	Finger extension, wrist extension (ulnar), distal finger flexion, extension, abduction and adduction, distal thumb flexion	None
T1	Neck, medial arm and forearm	Anterior arm and medial forearm	Thumb abduction, distal thumb flexion, finger abduction and adduction	None

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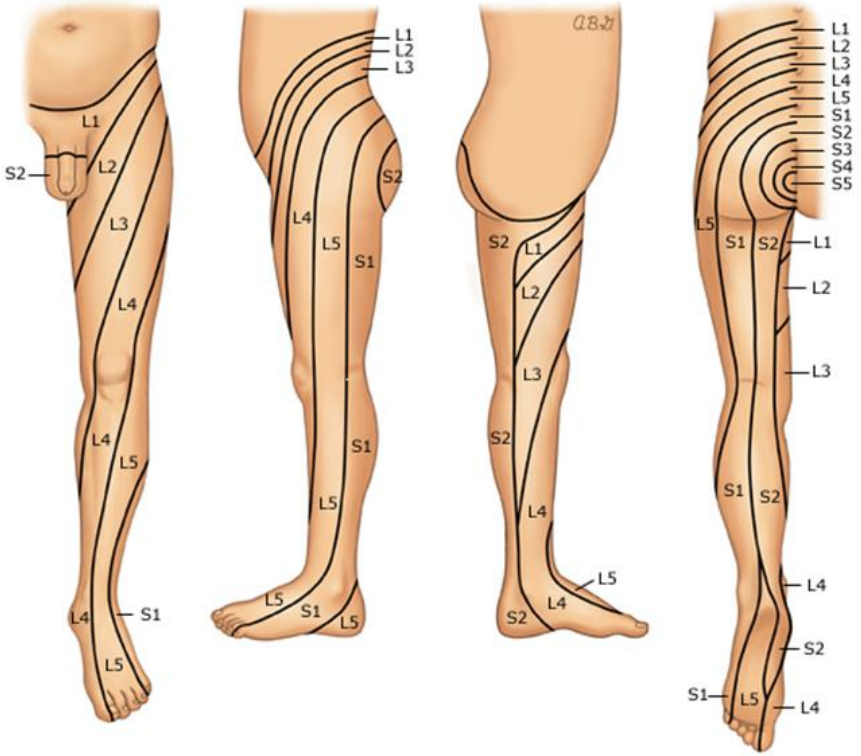
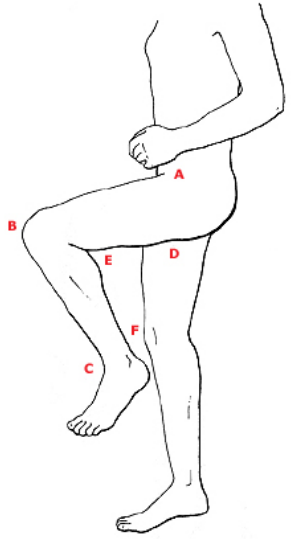
Lumbosacral dermatomes



Schematic representation of the lumbosacral dermatomes. Patients with sciatica may have pain, paresthesias, and diminished sensation in the dermatome of the nerve root that is involved.

Nerve roots and peripheral nerves corresponding to the principal movements of the lower extremity



Movement	Nerve roots	Peripheral nerve
A. Hip flexion	L2-3	Femoral ("nerve to iliopsoas")
B. Knee extension	L3-4	Femoral
C. Ankle dorsiflexion	L4-5	Peroneal
D. Hip extension	L4-5	Gluteal
E. Knee flexion	L5-S1	Sciatic
F. Ankle plantar flexion	S1-2	Tibial

The letters labeling the movements proceed in order from proximal to distal down the front of the limb, and then repeat from proximal to distal down the back of the limb. The nerve roots and peripheral nerves corresponding to each movement are listed below.

Figure redrawn with permission from Gelb DJ. The Neurologic Examination. In: Introduction to Clinical Neurology. Woburn, MA, Butterworth-Heinemann 2000.