

Complex Regional Pain Syndrome: Role of the Sympathetic Nervous System in Pain Medicine

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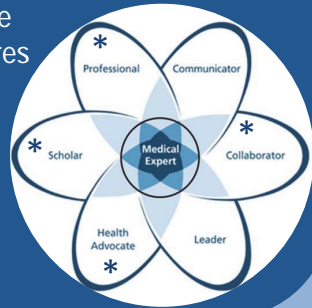
ONLY PRESENTERS COMPLETE THIS SECTION: During my presentation, I intend to make therapeutic recommendations for medications that have not received regulatory approval (i.e., "off-label" use of medications). Yes No
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DECLARATION OF POTENTIAL CONFLICT OF INTEREST

Learning objectives

- Understand the relevance of the autonomous nervous system in the generation and perpetuation of chronic pain syndromes.
- Be able to identify the potential anatomical targets to block the sympathetic chain.
- Appraise the most common pain syndromes where sympathetic procedures could be considered.



Outline

- The case of Beatrice
- Pain and the Sympathetic Nervous System
- Sympathetic blocks: anatomy
- Sympathetic blocks: indication



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Meet Beatrice: 18 y/o girl treated for osteoid osteoma L calcaneum with CT guided RFA

- A: The patient has continuing pain which is disproportionate to the inciting event**
B: No other diagnosis can better explain the signs and symptoms

C: SYMPTOMS: 1 in ≥3 categories		D: SIGNS: 1 in ≥2 categories
hyperaesthesia allodynia	<u>Sensory</u>	hyperalgesia (to pinprick) allodynia (to light touch or deep somatic pressure or joint movement)
temperature asymmetry skin colour changes or asymmetry	<u>Vasomotor</u>	temperature asymmetry skin colour changes or asymmetry
oedema; sweating changes or asymmetry	<u>Sudomotor</u> <u>Oedema</u>	oedema; sweating changes or asymmetry
decreased ROM; dysfunction (weakness, tremor, dystonia) ; trophic changes (hair, nail, skin)	<u>Motor</u> <u>Trophic</u>	decreased ROM; dysfunction (weakness, tremor, dystonia) ; trophic changes (hair, nail, skin)



Harden NR, et al. Validation of proposed diagnostic criteria (the "Budapest Criteria") for Complex Regional Pain Syndrome. Pain. 2010

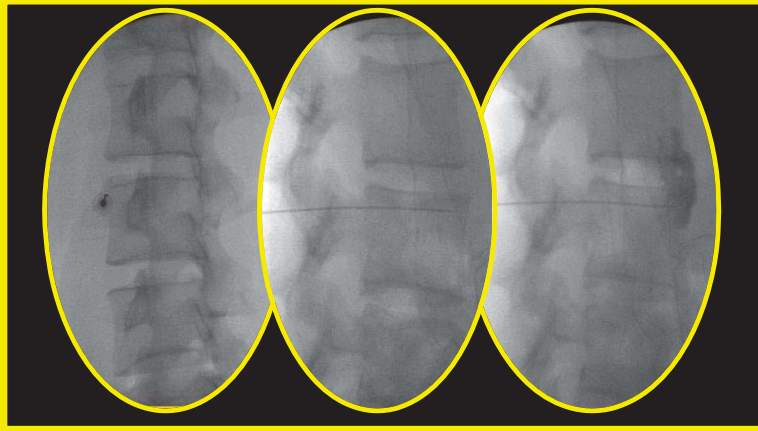


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- Lumbar sympathetic block + Neurolysis
- Graded motor imagery & Intensive rehab therapy at specialized center
- Prednisone, Pregabalin, Duloxetine, Tramadol, Celecoxib
- IV Pamidronate
- 3 years later, pain was more manageable and she was more functional and then...

Similar symptoms at her Left hand

- Stellate ganglion block
- IV ketamine

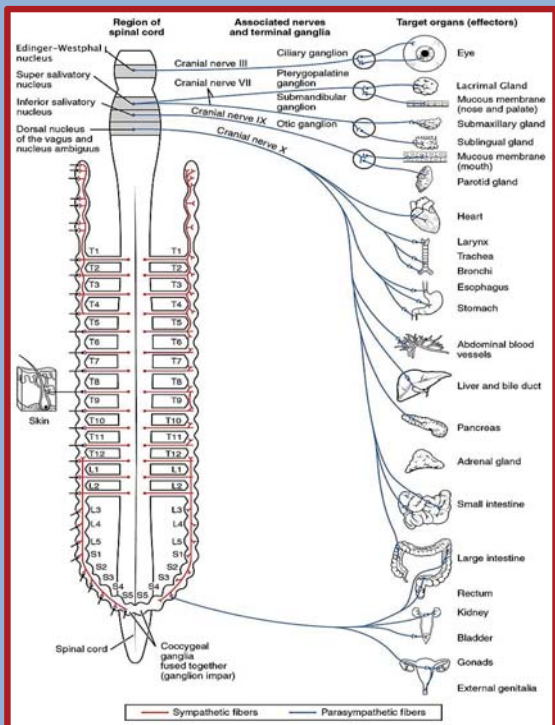
Last visit March 30, 2021: No hand pain. Left foot pain bearable, fully functional yet with some difficulties standing for long.



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The autonomic nervous system is part of the peripheral nervous system that supplies smooth muscle and glands influencing the function of internal organs. It has 3 branches:

- the **sympathetic nervous system**,
- the **parasympathetic nervous system**
- the **enteric nervous system**

The **sympathetic nervous system's** primary process is to stimulate the body's **fight or flight** response. It is constantly active at a basic level to maintain homeostasis and hemodynamics.

Neurons of sympathetic systems exhibit generalized and specific reactions to acute pain. They are organized in spinal cord, brain stem and hypothalamus and are probably best understood as components of the different patterns of defense behavior, such as “fight or flight” and “quiescence”. These stereotyped elementary preprogrammed behaviors and their association with the endogenous control of analgesia enable the organism to cope with dangerous situations that are always accompanied by pain.



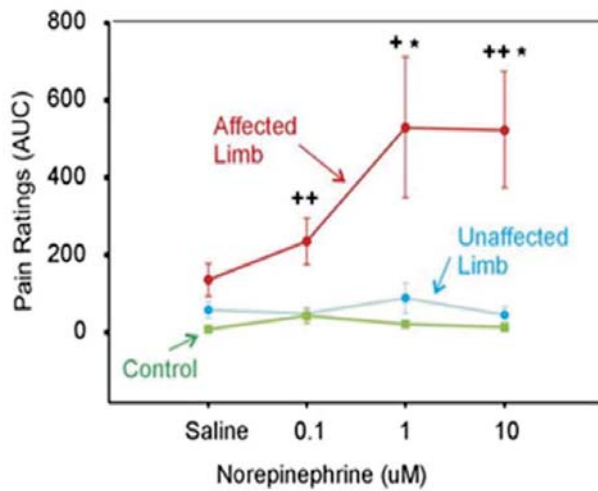
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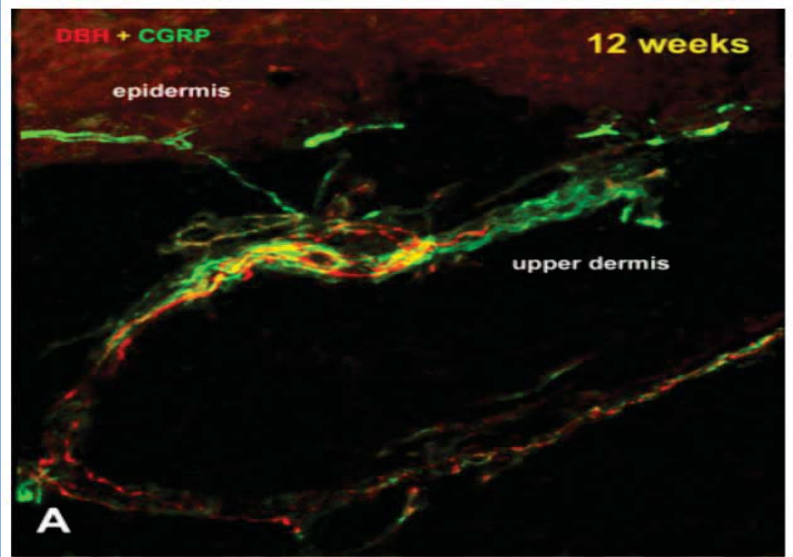
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A Human pain ratings to intradermal injections



Ali Z, et al. Intradermal injection of norepinephrine evokes pain in patients with sympathetically maintained pain. *Pain*. 2000



Yen LD, et al. Sympathetic sprouting and changes in nociceptive sensory innervation in the glabrous skin of the rat hind paw following partial peripheral nerve injury. *J Comp Neurol*. 2006



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Indications of Sympathetic blocks in pain medicine

Peripheral vascular disease

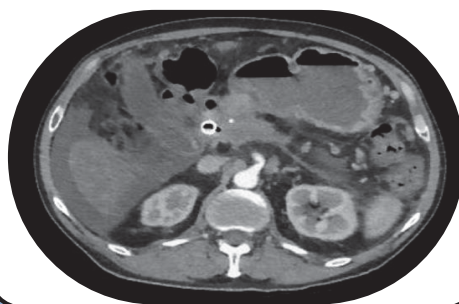
- Acute vascular disorders
- Chronic vasospastic conditions
- Chronic obliterative arterial diseases



Tran DQ, et al. Use of stellate ganglion block to salvage an ischemic hand caused by the extravasation of vasopressors. *Reg Anesth Pain Med*. 2005

Visceral pain

- Abdomino-pelvic cancers
- Perineal cancer
- Chronic pancreatitis
- Chronic pelvic pain sd.
- Refractory angina



Neuropathic pain

- Acute herpes zoster
- Carcinomatous neuropathy
- CRPS

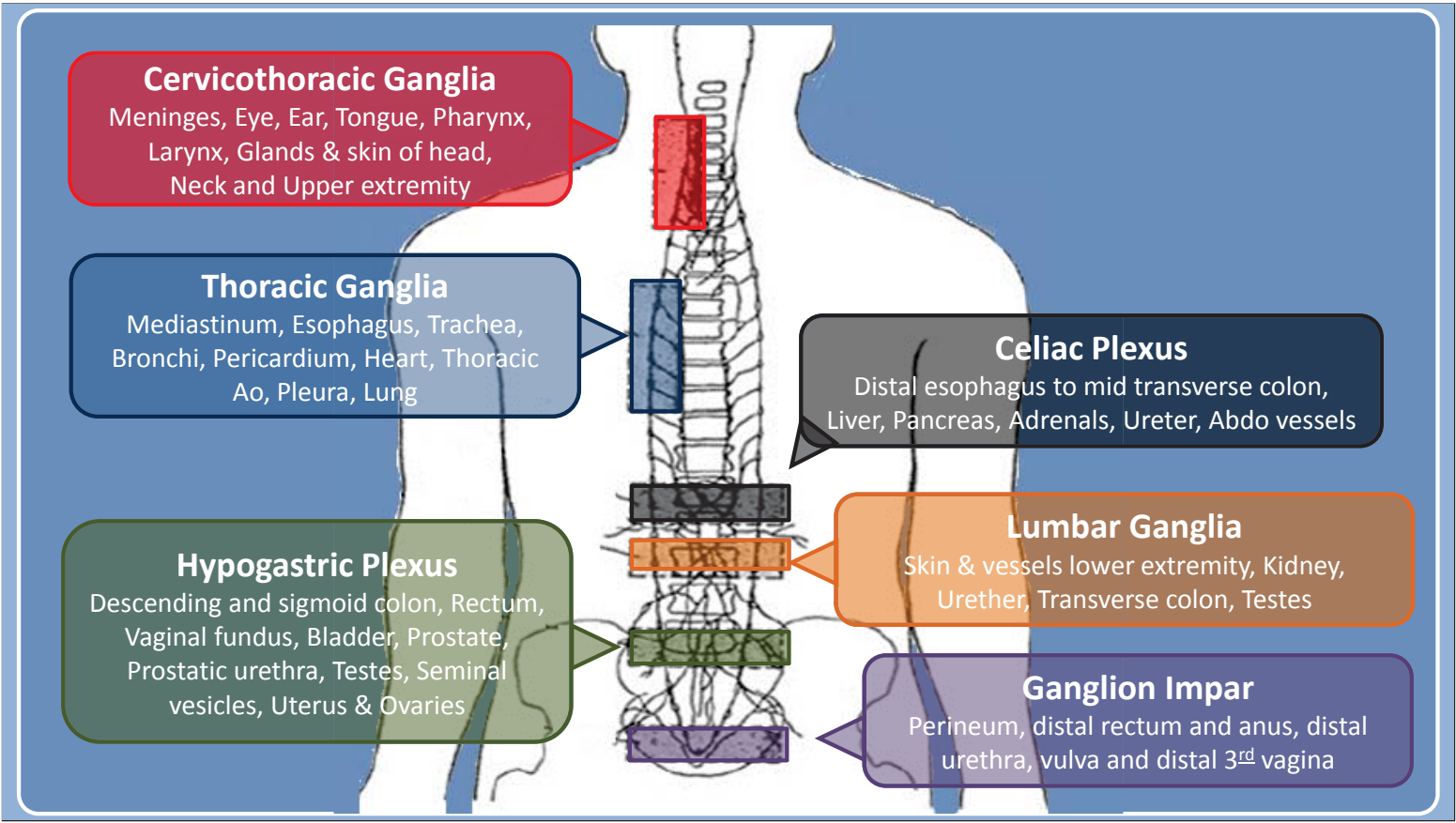


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Cervicothoracic Ganglia

- Superior cervical ganglion
- Longus colli
- Sympathetic trunk
- Middle cervical ganglion
- Scalenus anterior muscle (cut)
- Brachial plexus
- Stellate ganglion
- Vertebral artery
- Common carotid artery

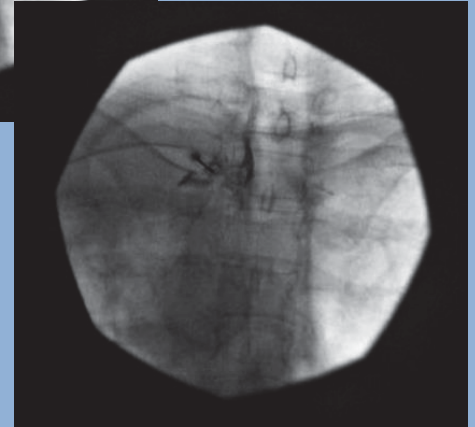
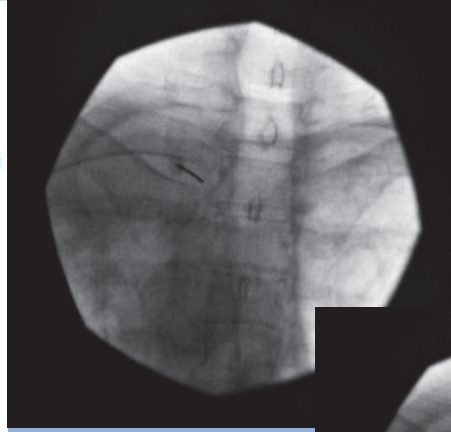
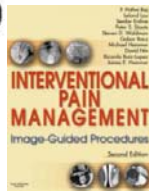
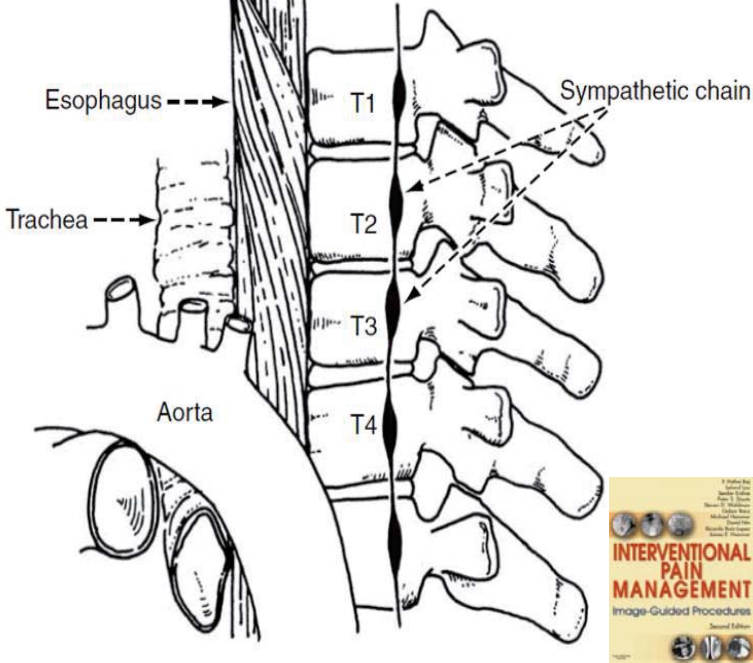
Esophagus

Trachea

Ultrasound for Interventional Pain Management
An Illustrated Procedural Guide
Philip Peng, Roderick Finlayson, Sang Hoon Lee, Anuj Bhatia Editors
Springer

Lateral

Thoracic Ganglia



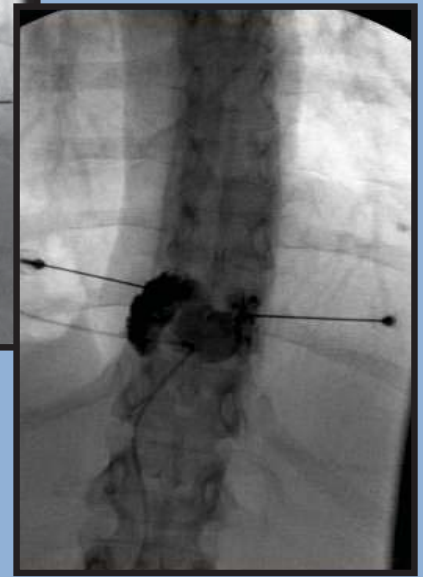
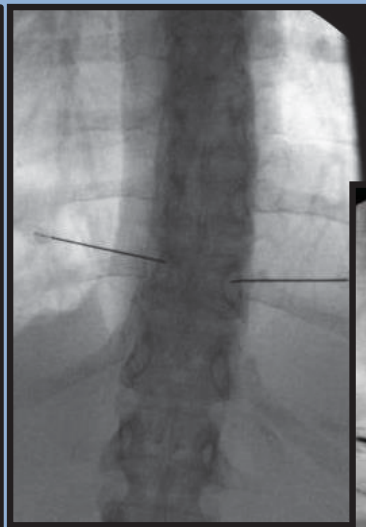
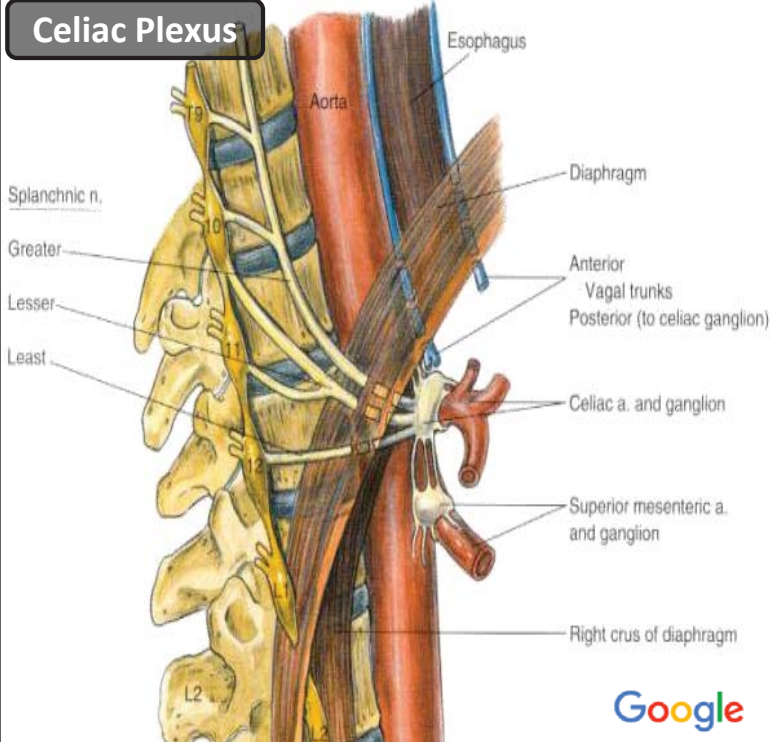
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Celiac Plexus

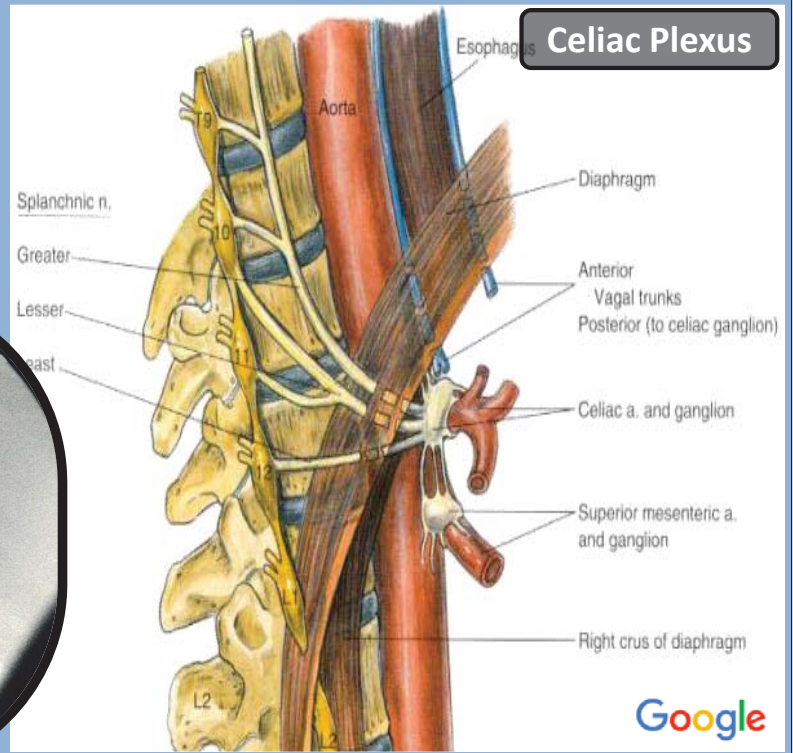
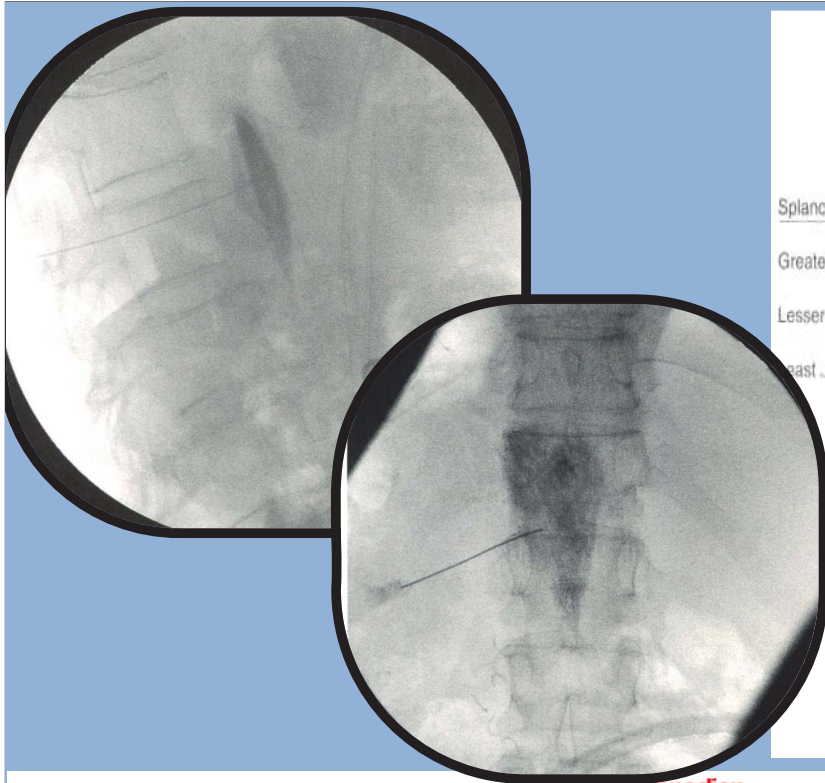


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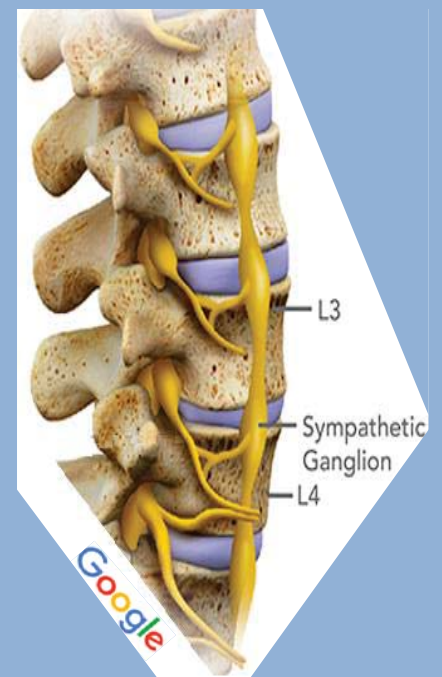
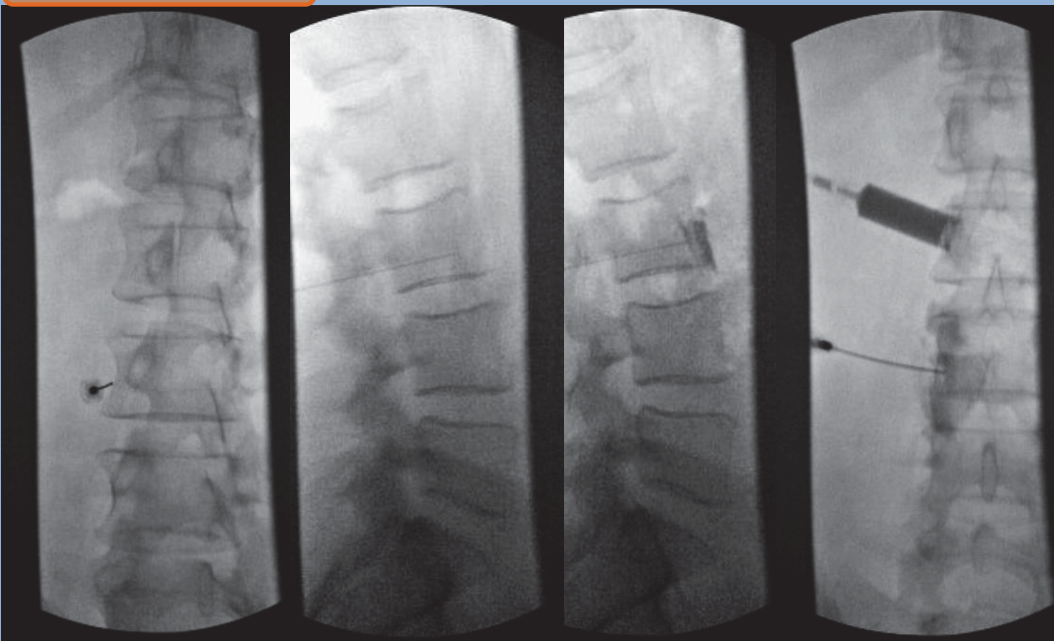
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Lumbar Ganglia

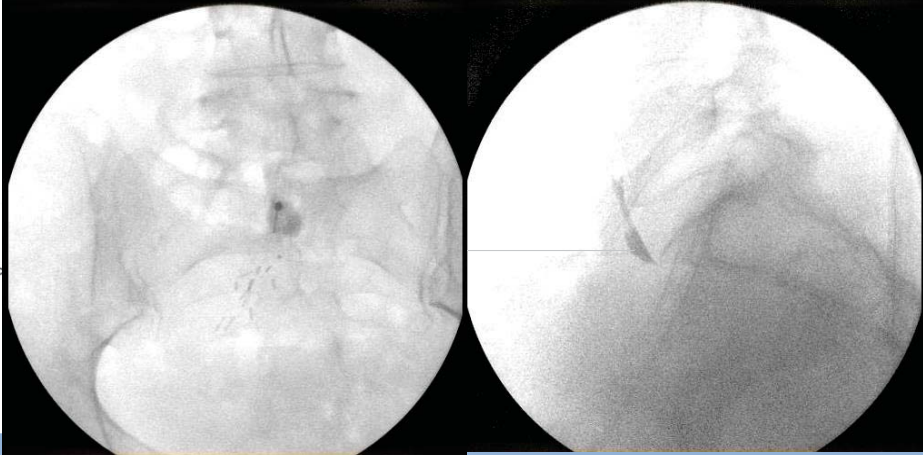
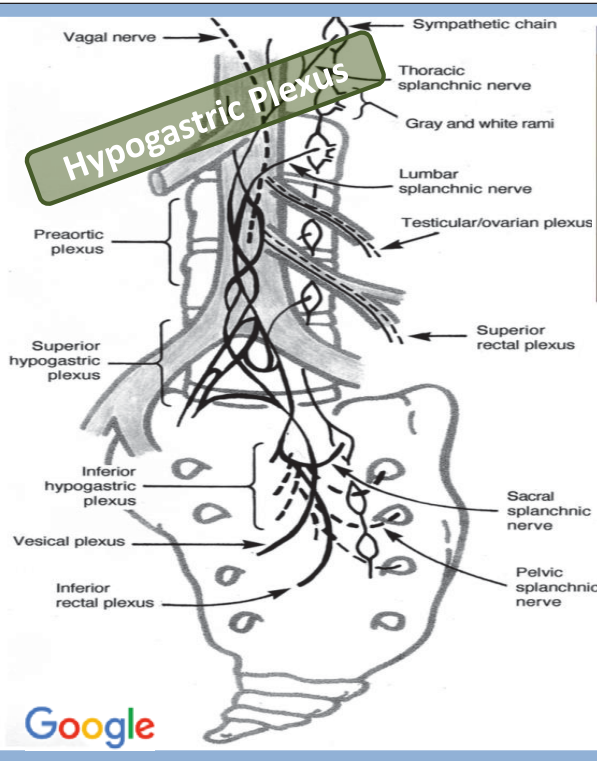
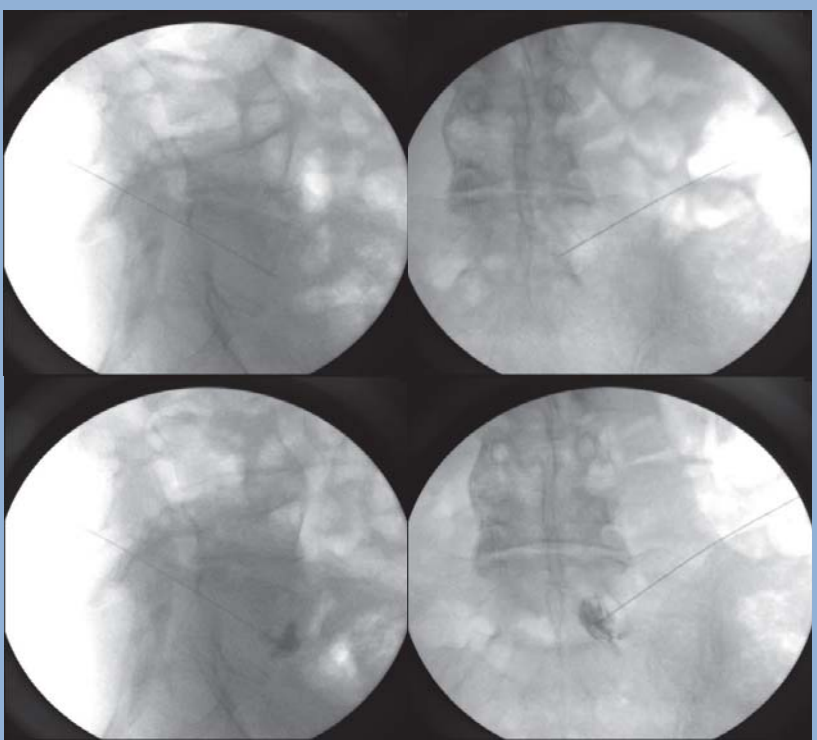
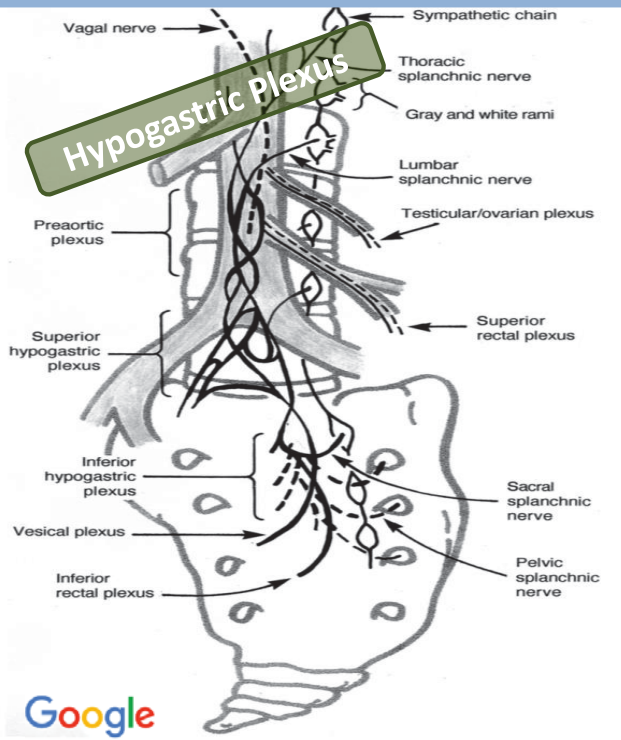


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Ganglion impar

Ganglion impar

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Unité de gestion de la douleur
Alan-Edwards
Pain Management Unit

Indications of Sympathetic blocks in pain medicine

	Nociceptive Pain		Neuropathic Pain
	Somatic Pain	Visceral Pain	
Location	Localized	Generalized	Radiating or specific
Patient Description	Pinprick, stabbing, or sharp	Ache, pressure, or sharp	Burning, prickling, tingling, electric shock-like, or lancinating
Mechanism of Pain	A-delta fiber activity Located in the periphery	C Fiber activity Involved deeper innervation	Dermatomal (periphery), or non-dermatomal (central)

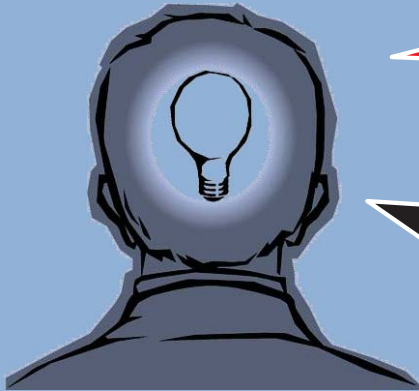
Sympathetic blocks in pain medicine: some final thoughts

The most robust data comes from experimental pain conditions/models

Some patients respond positively
Visceral Cancer Pain are the best, by far, CRPS is controversially positive

Even in interventional pain units, sympathetic blocks are rarely the first therapeutic options

Scientific advance is challenging because * indications are not clear, *outcomes are heavily influenced by placebo response, *blocks are technically challenging and *proper trials require very large number of participants



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THANK YOU

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