Herz-Jesu Krankenhaus Wien

Ultraschall-gezielte invasive Schmerztherapie Kurs B 2025

Prim. Dr. Manfred Greher, MBA
Ärztlicher Direktor und Vorstand der Abteilung für Anästhesie, Intensivmedizin und Schmerztherapie

Herz-Jesu Krankenhaus Wien

Es besteht kein Interessenskonflikt

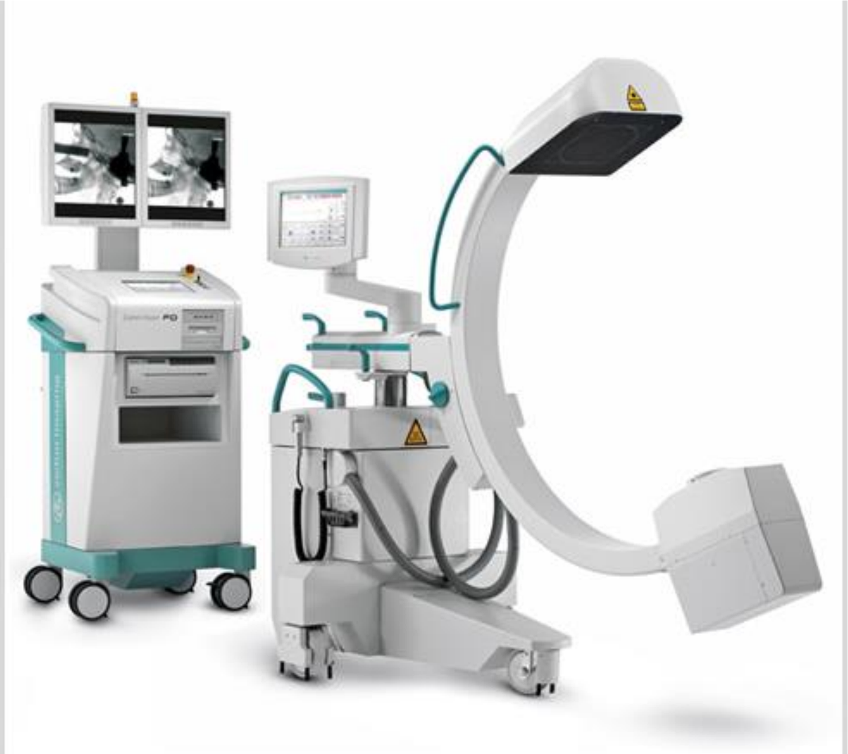
Easter morning 1900: 5th Ave, New York City. Spot the automobile.

Source: US National Archives.

Easter morning 1913: 5th Ave, New York City.
Spot the horse.

Source: George Grantham Bain Collection.

Interventionelle Schmerztherapie 2000



Blinde Infiltration (orthopädisch)
Durchleuchtung
CT
(MRT)

Kassenpatient bekommt zeitnahen MRT Termin.

The Lancet 2004

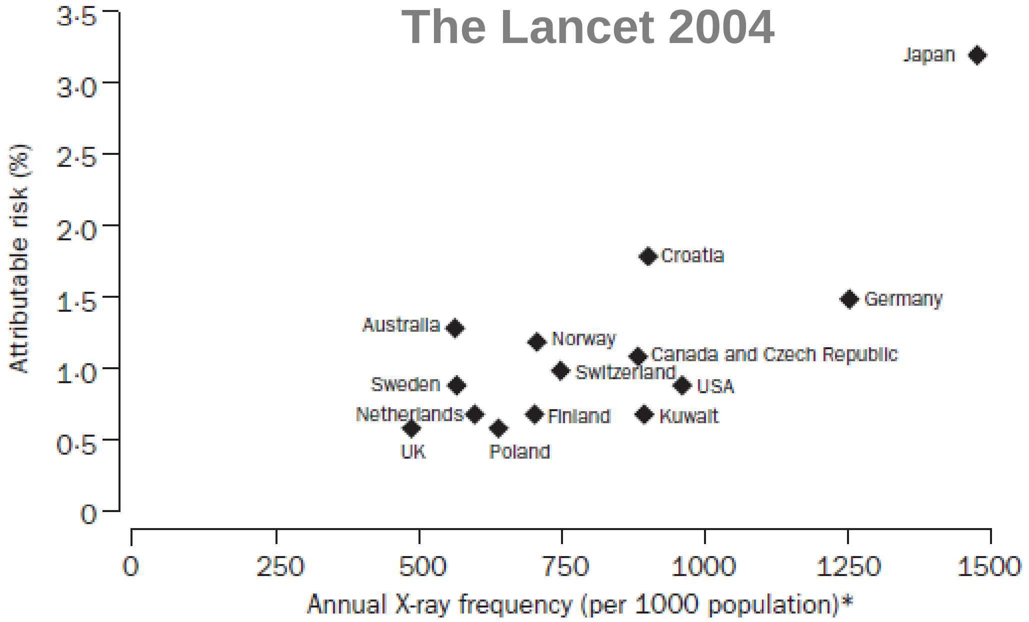


Figure 3: **Risk of cancer attributable to diagnostic X-ray exposures versus annual X-ray frequency**

*Taken from worldwide survey.[1]

Herz-Jesu Krankenhaus Wien

Risk of cancer from diagnostic X-rays: estimates for the UK and 14 other countries

Amy Berrington de González, Sarah Darby

	Cases of radiation-induced cancer per year*			Cases per million examinations*
	Males	Females	Total	
X-ray type				
Abdomen	16	15	31	30
Barium meal	5	6	11	40
Barium enema	27	28	55	170
Chest	1	3	4	1
Coronary angiography	13	28	41	280
CT scan	31	39	70	60
Cerebral angiography	1	1	2	180
Hip or pelvis	28	24	52	30
Lumbar spine	23	16	39	40
Screening mammography	..	8	8	8
Thoracic spine	2	4	6	20
Each other type	<10	<10	<20	..

*Includes only nine cancer sites listed in Table 2. Detailed estimation of number of radiation-induced cases for all cancers is not possible, since estimates of organ-specific doses are not available for other cancers.

Table 3: **Estimated number of radiation-induced cases of cancer per year in the UK by type of X-ray**

Diagnostic X-rays and cumulative cancer risk for 15 countries

	Annual X-rays per 1000*	Males		Females		Total	
		Attributable risk (%)	Cases cancer per year	Attributable risk (%)	Cases cancer per year	Attributable risk (%)	Cases cancer per year
Country							
Australia	565	1·2	204	1·5	227	1·3	431
Canada	892	1·1	406	1·0	378	1·1	784
Croatia	903	1·5	66	2·2	103	1·8	169
Czech Republic	883	0·9	67	1·2	105	1·1	172
Finland	704	0·7	20	0·7	30	0·7	50
Germany	1254	1·3	963	1·7	1086	1·5	2049
Japan†	1477	2·9	3724	3·8	3863	3·2	7587
Kuwait	896	0·7	25	0·6	15	0·7	40
Netherlands	600	0·7	100	0·7	108	0·7	208
Norway	708	1·3	28	1·1	49	1·2	77
Poland	641	0·5	99	0·7	192	0·6	291
Sweden	568	1·1	91	0·8	71	0·9	162
Switzerland	750	1·0	93	1·0	80	1·0	173
UK	489	0·6	341	0·6	359	0·6	700
USA	962	0·9	2573	1·0	3122	0·9	5695

*Taken from worldwide survey.[1] †Estimates assume annual frequency of CT examinations in Japan was equal to that for all health-care level 1 countries. However, number of CT scanners per million population in Japan is 3·7 times that for all health-care level 1 countries. If this number is reflected in annual frequency of CT examinations, then for Japan estimated annual number of X-rays per 1000 increases to 1573 and the attributable risk increases to 4·4%, corresponding to 9905 cases of cancer per year.

Table 6: **Frequency of diagnostic X-rays per 1000 population, percentage of cumulative cancer risk to age 75 years attributable to diagnostic X-rays, and number of radiation-induced cases of cancer per year for 15 countries**

Ultrasound Imaging for Stellate Ganglion Block: Direct Visualization of Puncture Site and Local Anesthetic Spread

A Pilot Study

Stephan Kapral, M.D., Peter Krafft, M.D., Max Gosch, M.D., Dominik Fleischmann, M.D.,* and Christian Weinstabl, M.D.

326 Regional Anesthesia Vol. 20 No. 4 July–August 1995

Table 1. Quality Scores of Stellate Ganglion Block for Both Groups 10 Minutes After the Administration of Local Anesthetic Solution*

	Number of Patients			
	Group A		Group B	
Quality Score	Vasodilation	Horner's syndrome	Vasodilation	Horner's syndrome
0	1	2	0	0
I	11	10	12	12
II	0	0	0	0

*Group A, blind technique; group B, imaging technique.

Table 2. Quality Scores of Stellate Ganglion Block for Both Groups 30 Minutes After the Administration of Local Anesthetic Solution*

	Number of Patients			
	Group A		Group B	
Quality Score	Vasodilation	Horner's syndrome	Vasodilation	Horner's syndrome
0	0	1	0	0
I	9	10	8	8
II	3	1	4	4

*Group A, blind technique; group B, imaging technique.

Anesthesiology 2003; 99:250–1

Is Regional Anesthesia Simply an Exercise in Applied Sonoanatomy?

Aiming at Higher Frequencies of Ultrasonographic Imaging

1997

Manfred Greher, M.D.* **Stephan Kapral, M.D.** *University of Vienna, Vienna General Hospital, Vienna, Austria. manfred.greher@univie.ac.at

Greher et al., Anesthesiology 2004

Herz-Jesu
Krankenhaus Wien

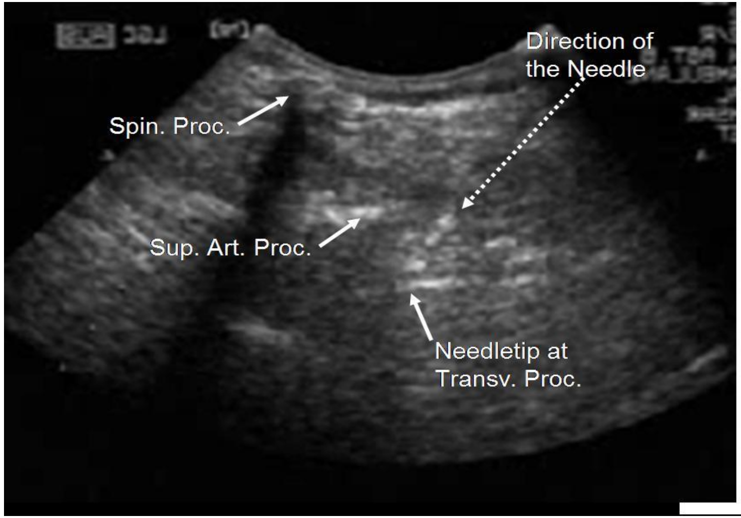
■ PAIN AND REGIONAL ANESTHESIA

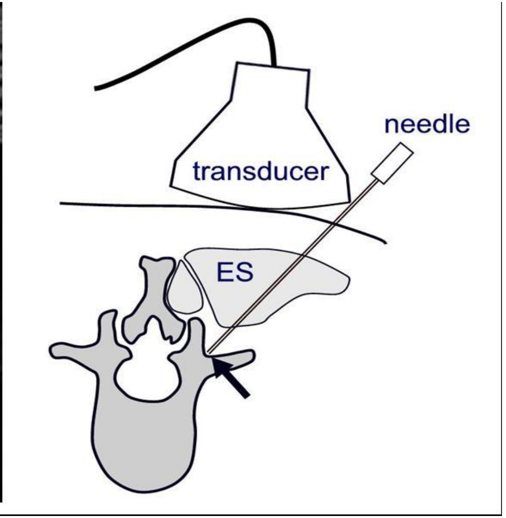
Anesthesiology 2004; 100:1242–8

Ultrasound-guided Lumbar Facet Nerve Block

A Sonoanatomic Study of a New Methodologic Approach

Manfred Greher, M.D., Gisela Scharbert, M.D.,* Lars P. Kamolz, M.D.,† Harald Beck, M.D.,‡ Burkhard Gustorff, M.D.,§ Lukas Kirchmair, M.D.,‖ Stephan Kapral, M.D.#*

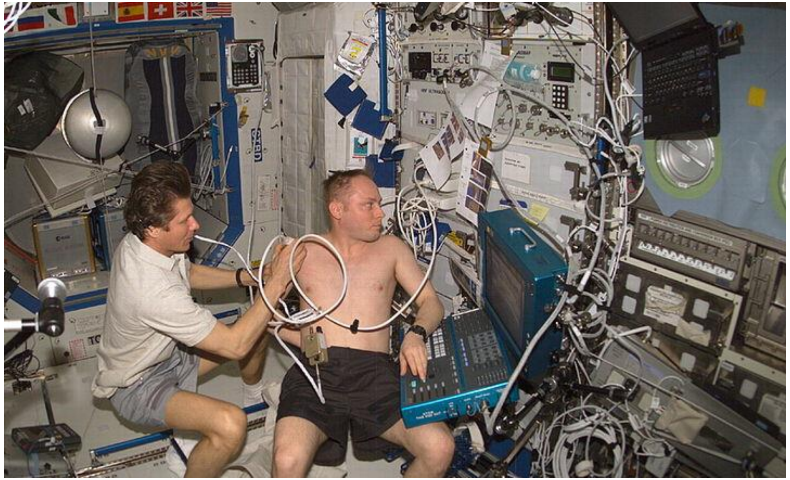




z-Jesu
enhaus Wien

„First they ignore you, then they laugh at you, then they fight you, then you win.“
Mahatma Gandhi

30 Jahre Ultraschall-gezielte Regionalanästhesie und Schmerztherapie (aus Wien um die Welt)



© NASA

© Butterfly-IQ

PubMed®

ultrasound guided pain interventions

Search

Advanced Create alert Create RSS User Guide

Save Email Send to

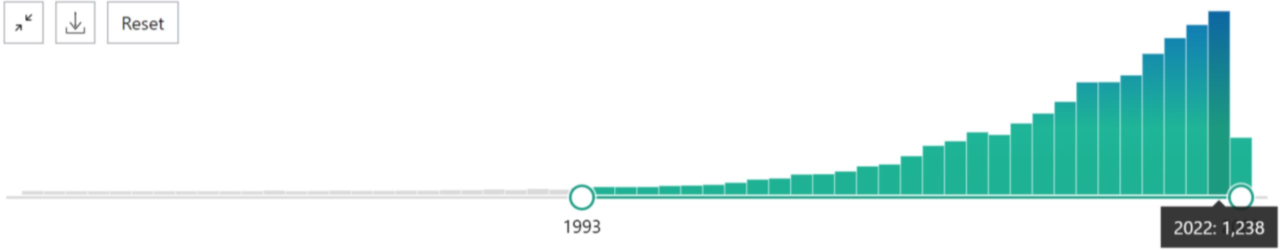
Sorted by: Best match Display options

RESULTS BY YEAR

Reset

10,018 results

Page 1 of 1,002



MY NCBI FILTERS

TEXT AVAILABILITY

- Abstract
- Free full text
- Full text

ARTICLE ATTRIBUTE

- Associated data

1 **Ultrasound-Guided** Nerve Blocks in the Head and Neck for Chronic **Pain** Management: The Anatomy, Sonoanatomy, and Procedure.

Cite

Share

Li J, Szabova A.

Pain Physician. 2021 Dec;24(8):533-548.

PMID: 34793642 Free article. Review.

BACKGROUND: **Ultrasound guided** nerve blocks have become a popular tool in the armamentarium for **pain** physicians because of its advantages over fluoroscopy by offering portable, radiation-free and real-time **imaging**. But **ultrasound guided** pr ...

2 **Ultrasound-guided interventional** procedures around the shoulder.

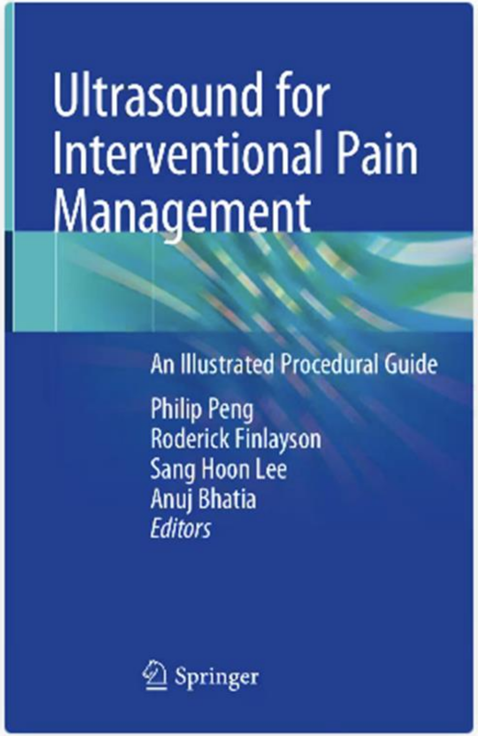
Messina C, Banfi G, Orlandi D, Lacelli F, Serafini G, Mauri G, Secchi F, Silvestri E, Sconfienza LM.

2008: SIG (Special Interest Group) ASRA/ESRA

- „Die 10 glorreichen Sieben“:

- Vincent Chan
- Peter Cheng
- Urs Eichenberger
- Michael Gofeld
- Manfred Greher
- Bernhard Moriggl
- Samer Narouze
- Barry Nichols
- Philip Peng
- Hariharan Shankar

With Ultrasound against Pain



Ultrasound has transformed the practice of regional anaesthesia and has the potential to be of significant benefit in pain medicine.

Ultrasound can improve safety, predictability and accuracy of some diagnostic and therapeutic procedures (e.g. stellate ganglion blocks, peripheral nerve blocks, intra-articular injections).

ULTRASOUND IS NOT SUITABLE FOR TRANSFORAMINAL EPIDURAL INJECTION IN EITHER THE CERVICAL OR LUMBAR SPINE.

ADVANTAGES OF ULTRASOUND IN PAIN MEDICINE

The potential advantages of using ultrasound for interventional pain medicine include:-

- Improved safety and specificity.
- Absence of ionising radiation.
- Improved visibility and resolution.
- The ability to define anatomy and anatomical variation of nerves, vessels, soft tissues, and bone surfaces.
- Appreciation of depth.
- Real time visualisation of needle and injected fluid in relation to the target.
- Portability.
- Relative low cost (compared to fluoroscopy, CT, MRI).
- Ultrasound can assist diagnosis of musculoskeletal pain syndromes (e.g. tendinopathies, peripheral nerve injury, entrapment neuropathies).

Simpson, Krol, et al.

DISADVANTAGES OF ULTRASOUND IN PAIN MEDICINE

Disadvantages of using ultrasound include:-

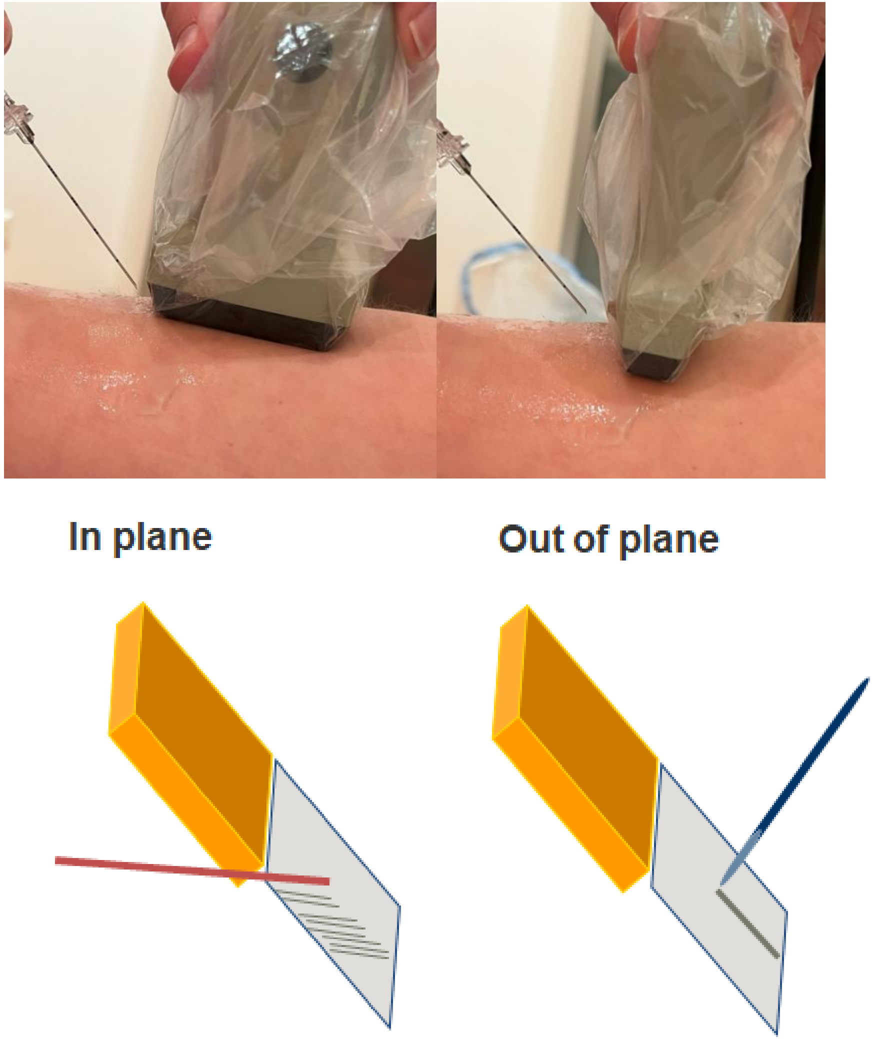
- Lack of evidence to demonstrate superiority with respect to the efficacy and outcomes of already established techniques.
- Limited application in spinal injections and unsuitable for some interventions.
- Access to training and availability of equipment.
- More difficult working under sterile conditions.
- Presence of image artefacts (artefacts are present on every ultrasound image).
- Loss of image resolution with increasing depth of target.
- Inability to entirely exclude vascular uptake.
- Inability to see beyond bone and air.
- Ultrasound in obese patients (depth) and elderly patients (degenerative changes) is challenging.
- Difficulty visualising the needle at increasing depth.
- Difficulty with image storage (medico-legal documentation).

Simpson, Krol, et al.

ULTRASOUND IN PAIN MEDICINE (SWOT ANALYSIS)

STRENGTHS	• Avoids exposure to ionising radiation • Selectivity and precision • Portability • Economics
WEAKNESS	• Increased training and anatomical knowledge required • Inter-observer variation • Obesity and artefacts • Reduced needle visibility with increasing depth • Difficult aseptic technique
OPPORTUNITY	• Less contraindications (e.g. pregnancy) • Better understanding of pain syndromes (diagnosis and treatment) • Imaging and interventions can be performed in the clinic setting • Widespread availability • Developing technology (fusion imaging)
THREATS	• Complications by inexperienced practitioners • Poor documentation and image storage • Misuse/overuse of techniques • Potential infection risks

Simpson, Krol, et al.


In plane
Out of plane


Anisotropie des N. medianus
Richtig
Falsch

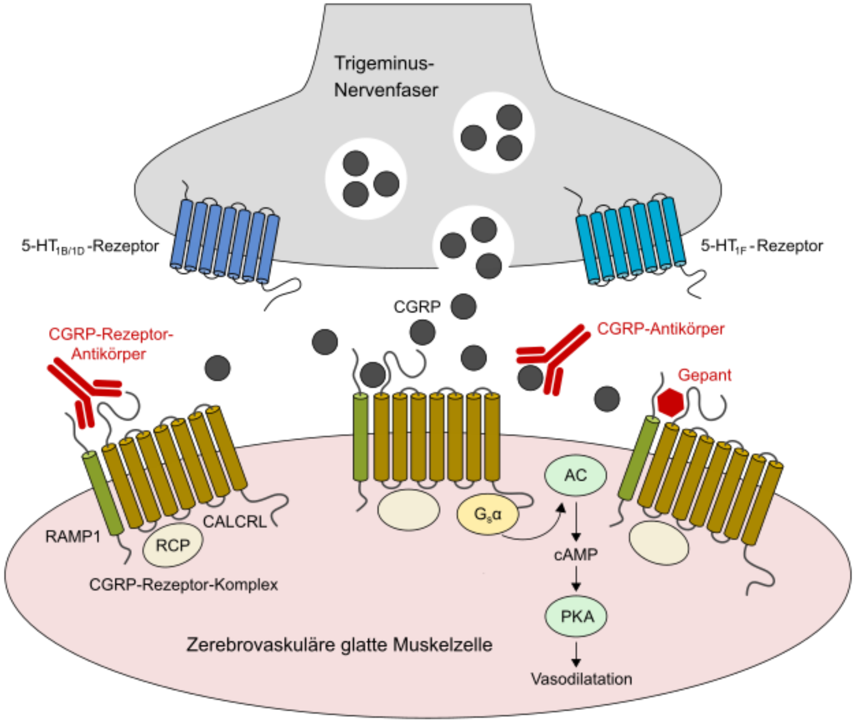
Volkskrankheit Kopfschmerzen

Prävalenz weltweit > 60%, 4% der Menschen an mehr als 15d/ Mo

-

Migräne und CGRP

Herz-Jesu Krankenhaus Wien



Grafik: wikipedia

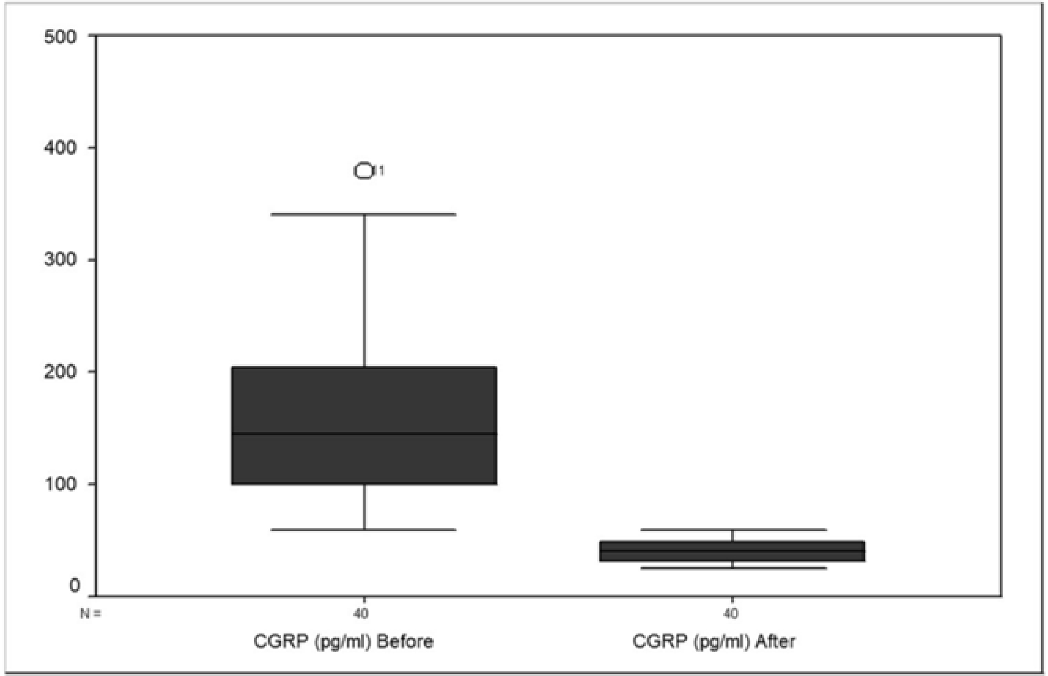
- <u>Monoklonale AK (s.c.):</u>
  - Erenumab (Aimovig)
  - Galcanezumab (Emgality)
  - Fremanezumab (Ajovy)
  - Eptinezumap (Vypepti)

- <u>CGRP-Rezeptorantagonisten/ Gepante:</u>
  - Atogepant

CGRP-Spiegel vor und nach Behandlung

Herz-Jesu Krankenhaus Wien

Neurol. Int. **2022**, *14*



Neurol. Int. **2022**, *14*

Article

Serum CGRP Changes following Ultrasound-Guided Bilateral Greater-Occipital-Nerve Block

Abdelrahman Abbas, Ramez Moustafa *, Ali Shalash, Mahmoud Haroun, Randa Amin, Sherien Borham, Ahmed Elsadek and Shahinaz Helmy

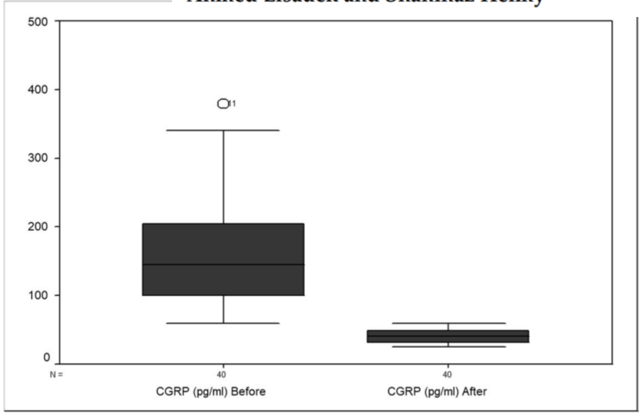


Figure 2. Box plot for interictal CGRP levels in chronic-migraine patients before and after GONB (n = 40).

Table 2. Interictal CGRP levels before and after GONB and its difference among response groups.

		Median	IQR	Kruskal-Wallis Test	
				X^2	p-Value
CGRP (pg/mL) Before	No Response	310	262.5–350	11.839	0.003 *
	Poor Response	135	100–200		
	Good Response	140	80–150		
CGRP (pg/mL) After	No Response	44	38.75–50	1.099	0.577
	Poor Response	41	31–45.75		
	Good Response	36	32.25–50		

* Means p value is significant.

Reduktion der Kopfschmerztage

Herz-Jesu Krankenhaus Wien

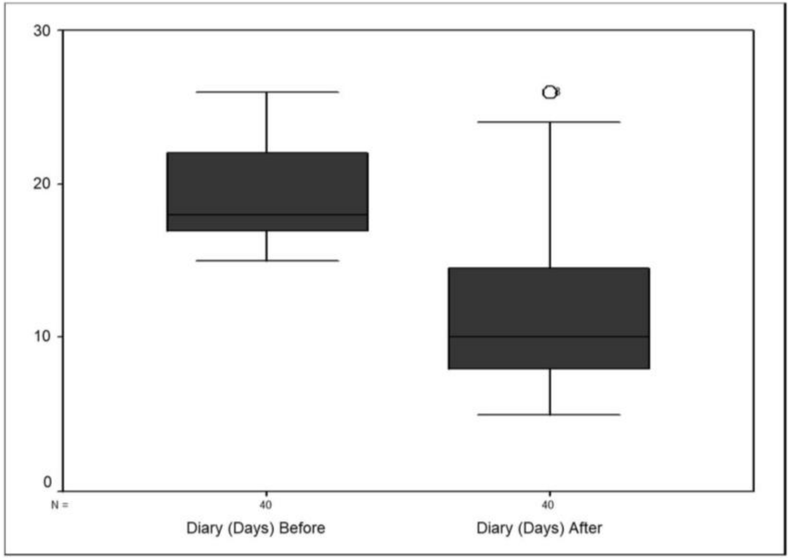


Figure 1. Box plot showing reduction in headache days after GONB (n = 40).

Thirty-four patients (85%) responded to GONB and the remaining six patients (15%) did not notice any response. Sixteen patients (40%) showed a good response while eighteen patients (45%) showed poor response, and there were no side effects reported from the procedure apart from mild injection-site pain in about twenty-four patients.

neurology international

Article

Serum CGRP Changes following Ultrasound-Guided Bilateral Greater-Occipital-Nerve Block

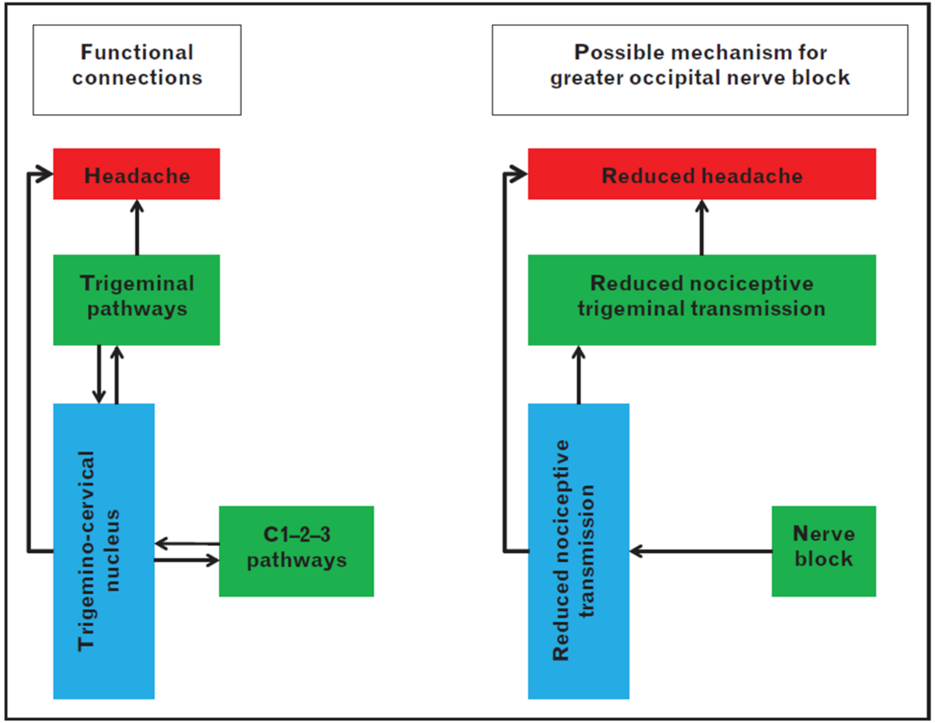
Abdelrahman Abbas, Ramez Moustafa *, Ali Shalash, Mahmoud Haroun, Randa Amin, Sherien Borham, Ahmed Elsadek and Shahinaz Helmy

Department of Neurology, Faculty of Medicine, Ain Shams University, 12th Abbassiya Street, Cairo 08080, Egypt
* Correspondence: ramezm@msn.com

Abstract: Background: Calcitonin-gene-related peptide (CGRP) and CGRP receptors are expressed in trigeminal nerve cells, and treatments targeting CGRP are effective in migraines. For headaches that do not respond to pharmacological treatment, minimally invasive techniques such as greater-occipital-nerve block (GONB) can help relieve the pain and reduce the frequency of headaches. Our study assessed the efficacy of ultrasound-guided greater-occipital-nerve block (USgGONB) in chronic migraines (CM) and its relationship to serum CGRP levels. Methods: Forty chronic migraineurs who underwent bilateral USgGONB using 40 mg triamcinolone and 1 mL lidocaine were recruited and interictal serum CGRP samples were collected immediately before and one month after GONB. The clinical response was evaluated using headache diaries before and one month after USgGONB. The patient response was determined after USgGONB according to the reduction in headache days as a good responder (>50% reduction), poor responder (<50%) or non-responder. Results: Monthly headache days after GONB showed a significant reduction (median, 10 days; range, 8–14.7) compared to before the block (median, 18 days; range, 17–22; $p < 0.001$). Across all patients, interictal serum CGRP levels after USgGONB were significantly lower than before the block (median, 40 pg/mL (range, 25–60) vs. 145 pg/mL (range, 60–380) ($p = 0.001$). The pre-treatment interictal CGRP levels showed a significant difference ($p = 0.003$), as their levels in non-responders (median, 310 pg/mL; interquartile range, 262–350) were significantly higher than those seen in responders, whether poor responders (median, 135 pg/mL; interquartile range, 100–200 pg/mL) or good responders (median, 140 pg/mL; interquartile range, 80–150 pg/mL). Conclusion: the study showed the beneficial effect of USgGONB in chronic migraines that was associated with lowering interictal CGRP levels, implying a potential role for CGRP in the mechanism of action of GONB in CM, and the interictal CGRP level may be used as a predictor for the response to GONB.

Citation: Abbas, A.; Moustafa, R.; Shalash, A.; Haroun, M.; Amin, R.; Borham, S.; Elsadek, A.; Helmy, S. Serum CGRP Changes following Ultrasound-Guided Bilateral Greater-Occipital-Nerve Block. *Neurol. Int.* **2022**, *14*, 199–206. https://doi.org/10.3390/neurolint14010016

Trigemino-cervicaler Komplex



Curatolo M, Curr Opin Anesth 2016

Greater occipital nerve block modulates nociceptive signals within the trigeminocervical complex

Herz-Jesu Krankenhaus Wien

Jan Hoffmann [1,2] Jan Mehnert [1] Elena M Koo,[1] Arne May [1]

[1]Department of Systems Neuroscience, University Medical Center Hamburg-Eppendorf, Hamburg, Germany
[2]Wolfson Centre for Age-Related Diseases, Institute of Psychiatry, Psychology and Neuroscience, King's College London, London, UK

Correspondence to
Arne May, Systems Neuroscience, University Hospital Hamburg Eppendorf Clinic and Department of Neurology, Hamburg 20246, Germany; a.may@uke.de

JH and JM contributed equally.

Received 18 February 2021
Accepted 28 June 2021

ABSTRACT

Introduction The pharmacological block of the greater occipital nerve has been proven effective in numerous headache and facial pain syndromes. This clinical effect supports the hypothesis of a strong functional interaction between the occipital and trigeminal nerves which has been proposed in neurophysiological in vivo experiments in rodents. Although it is likely that the interaction has to occur in the central nervous system, the exact site and the mechanisms of the interaction remain largely unknown.

Methods Focusing on these questions we investigated in a double-blind, placebo-controlled, randomised study the influence of an occipital nerve block with lidocaine 1% on neuronal activation in the trigeminocervical complex using high-resolution functional magnetic resonance on a 3T scanner. In order to investigate potential clinical effects on the trigeminal nerve, we further performed quantitative sensory testing and analysed a potential shift in thermal detection and pain thresholds.

Results The pharmacological block of the greater occipital nerve induced an occipital anaesthesia ipsilateral to the block. Functional imaging revealed that the occipital injection of lidocaine but not placebo significantly reduced nociceptive trigeminal activation.

Conclusions These data suggest that the functional inhibition of the occipital nerve block on trigeminal nociceptive activity is likely to occur at the C2 level where the occipital nerve enters the trigeminocervical complex and converges on the same central nuclei before the signal crosses the midline at that level and is then transmitted to higher processing centres.

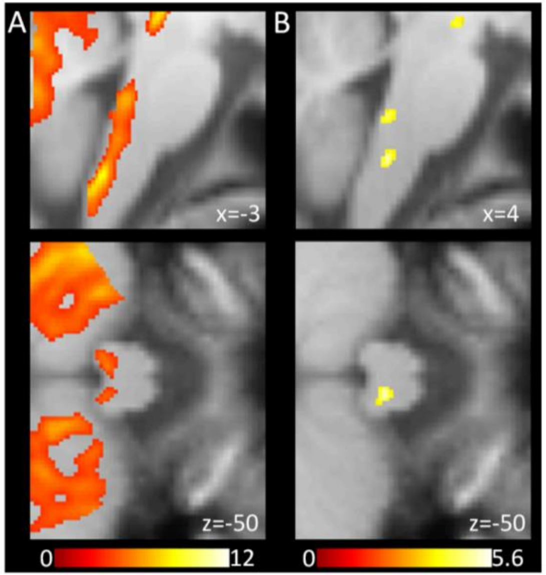


Figure 4 Activation of the spinal trigeminal nuclei in response to a nociceptive trigeminal stimulus (A) and its alteration after performing a block of the greater occipital nerve with lidocaine (B). Subfigure (A) shows the results for the main effect at a visualisation threshold of $p<0.001$ (uncorrected), while (B) displays results for the contrast placebo <lidocaine at the same threshold. Coordinates of the sagittal planes (top) were chosen for the individual peak voxel and for the transverse planes at the height of the lidocaine effect (bottom). T-values are colour-coded.

Rev Bras Anestesiol. 2016;66(5):445–450

Sociedade Brasileira de Anestesiologia

REVISTA BRASILEIRA DE ANESTESIOLOGIA

Publicação Oficial da Sociedade Brasileira de Anestesiologia
www.sba.com.br

SCIENTIFIC ARTICLE

Bilateral greater occipital nerve block for treatment of post-dural puncture headache after caesarean operations

CrossMark

Esra Uyar Türkyilmaz[a,*], Nuray Camgöz Eryilmaz[a], Nihan Aydin Güzey[a], Özlem Moraloğlu[b]

[a] *Zekai Tahir Burak Womens' Health Training and Research Hospital, Department of Anesthesiology and Reanimation, Ankara, Turkey*
[b] *Zekai Tahir Burak Womens' Health Training and Research Hospital, Department of Obstetrics and Gynecology, Ankara, Turkey*

Received 3 December 2014; accepted 23 March 2015
Available online 21 January 2016

KEYWORDS
Post-dural puncture headache;
Caesarean operations;
GON block

Abstract
Background: Post-dural puncture headache (PDPH) is an important complication of neuroaxial anesthesia and more frequently noted in pregnant women. The pain is described as severe, disturbing and its location is usually fronto-occipital. The conservative treatment of PDPH consists of bed rest, fluid theraphy, analgesics and caffeine. Epidural blood patch is gold standard theraphy but it is an invasive method. The greater occipital nerve (GON) is formed of sensory fibers that originate in the C2 and C3 segments of the spinal cord and it is the main sensory nerve of the occipital region. GON blockage has been used for the treatment of many kinds of headache. The aim of this retrospective study is to present the results of PDPH treated with GON block over 1 year period in our institute.
Methods: 16 patients who had been diagnosed to have PDPH, and performed GON block after caesarean operations were included in the study. GON blocks were performed as the first treatment directly after diagnose of the PDPH with levobupivacaine and dexamethasone.
Results: The mean VAS score of the patients was 8.75 (±0.93) before the block; 3.87 (±1.78) 10 min after the block; 1.18 (±2.04) 2 h after the block and 2.13 (±1.64) 24 h after the block. No adverse effects were observed.
Conclusions: Treatment of PDPH with GON block seems to be a minimal invasive, easy and effective method especially after caesarean operations. A GON block may be considered before the application of a blood patch.

Herz-Jesu Krankenhaus Wien

Open Access

Original Article

Ultrasound-guided bilateral greater occipital nerve block for the treatment of post-dural puncture headache

Fethi Akyol[1], Orhan Binici[2], Ufuk Kuyrukluyildiz[3], Guldane Karabakan[4]

ABSTRACT
Background and Objective: Post-dural puncture headache (PDPH) is one of the complications frequently observed after spinal or epidural anesthesia with dural penetration. For PDPH patients who do not respond to conservative medical treatment, alternative treatments such as bilateral occipital nerve block should be considered.In this study the efficacy of bilateral occipital nerve block was retrospectively evaluated in patients with post-dural puncture headache.
Methods: Ultrasound-guided bilateral occipital nerve block was administrated in 21 patients who developed PDPH after spinal anesthesia, but did not respond to conservative medical treatment within 48 hours between January 2012 and February 2014. The study was conducted at Erzincan University Faculty of Medicine Gazi Mengucek Education and Research Hospital
Results: Mean Visual Analog Scale (VAS) pain scores at 10 minutes and 6, 10, 15 and 24 hours after the block were significantly improved compared to the patients with a pre-block VAS score between 4 and 6 as well as patients with a pre-block VAS score between 7 and 9 (p<0.01). After 24 hours of the block applied, VAS pain score dropped to 1 for all 12 patients who had a pre-block VAS score between 4 and 6. Whereas, VAS score decreased to 2 at 24 hours after the block in only one of the patients with a pre-block VAS between 7 and 9. For the patients with a pre-block VAS score between 7 and 9, there was no significant improvement in the mean VAS score 24 hours after the block.
Conclusions: For patients with PDPH and a pre-block VAS score between 4 and 6 who do not respond to conservative medical treatment, an ultrasound-guided bilateral occipital nerve block may be effective.

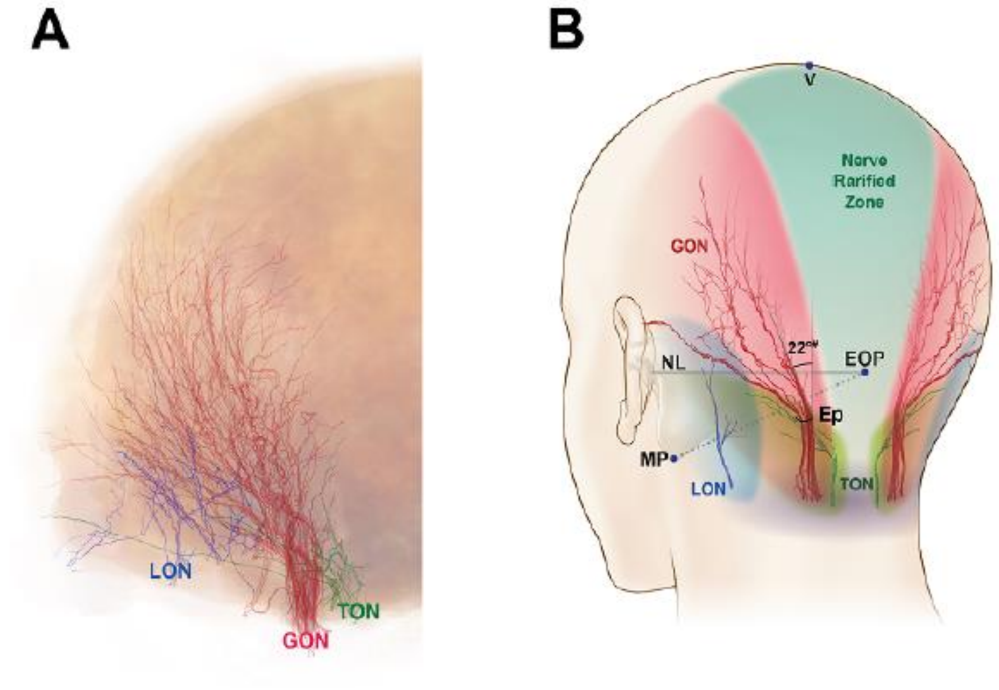
KEY WORDS: Greater occipital nerve, Post-dural pain headache, Ultrasound.

doi: http://dx.doi.org/10.12669/pjms.311.5759

How to cite this:
Akyol F, Binici O, Kuyrukluyildiz U, Karabakan G. Ultrasound-guided bilateral greater occipital nerve block for the treatment of post-dural puncture headache. Pak J Med Sci 2015;31(1):111-115. doi: http://dx.doi.org/10.12669/pjms.311.5759

Nervus occipitalis major GON (und minor LON)

Journal of Pain Research 2018:11 2023–2031



Sonographic visualization and ultrasound-guided blockade of the greater occipital nerve: a comparison of two selective techniques confirmed by anatomical dissection

Herz-Jesu Krankenhaus Wien

M. Greher[1]*, B. Moriggl[2], M. Curatolo[4], L. Kirchmair[3] and U. Eichenberger[4]

[1]*Department of Anaesthesiology, Perioperative Intensive Care and Pain Therapy, Herz-Jesu Hospital, A-1030 Vienna, Austria.* [2]*Department of Anatomy, Histology and Embryology and* [3]*Department of Anaesthesia and Intensive Care, Innsbruck Medical University, A-6020 Innsbruck, Austria.* [4]*University Department of Anaesthesiology and Pain Therapy, University Hospital of Bern, Inselspital, CH-3010 Bern, Switzerland*

**Corresponding author. E-mail: manfred.greher@kh-herzjesu.at*

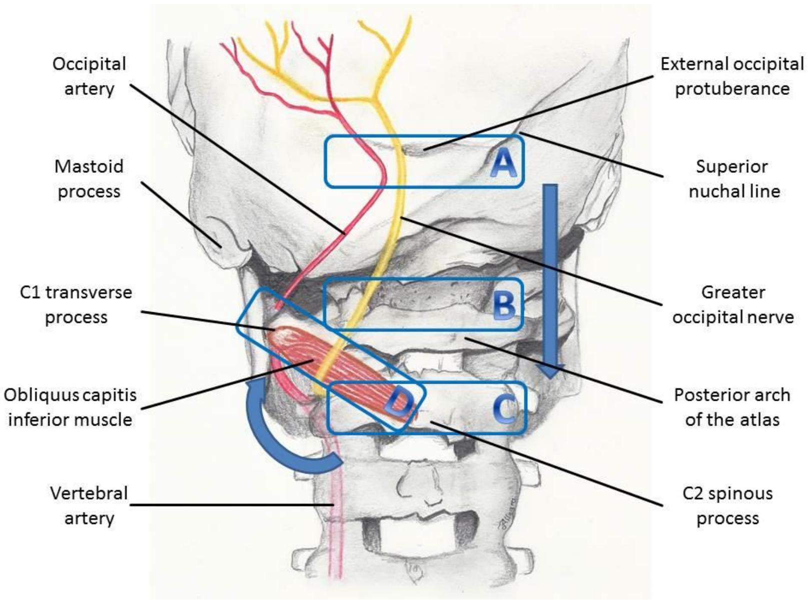
Background. Local anaesthetic blocks of the greater occipital nerve (GON) are frequently performed in different types of headache, but no selective approaches exist. Our cadaver study compares the sonographic visibility of the nerve and the accuracy and specificity of ultrasound-guided injections at two different sites.

Methods. After sonographic measurements in 10 embalmed cadavers, 20 ultrasound-guided injections of the GON were performed with 0.1 ml of dye at the classical site (superior nuchal line) followed by 20 at a newly described site more proximal (C2, superficial to the obliquus capitis inferior muscle). The spread of dye and coloration of nerve were evaluated by dissection.

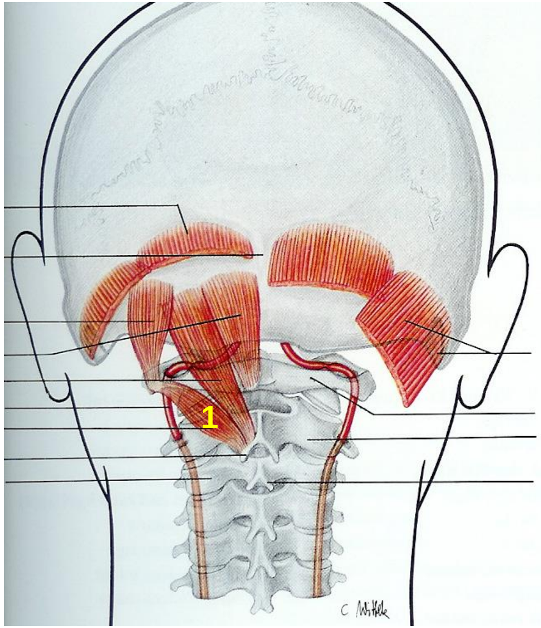
Results. The median sonographic diameter of the GON was 4.2×1.4 mm at the classical and 4.0×1.8 mm at the new site. The nerves were found at a median depth of 8 and 17.5 mm, respectively. In 16 of 20 in the classical approach and 20 of 20 in the new approach, the nerve was successfully coloured with the dye. This corresponds to a block success rate of 80% (95% confidence interval: 58–93%) *vs* 100% (95% confidence interval: 86–100%), which is statistically significant (McNemar's test, P=0.002).

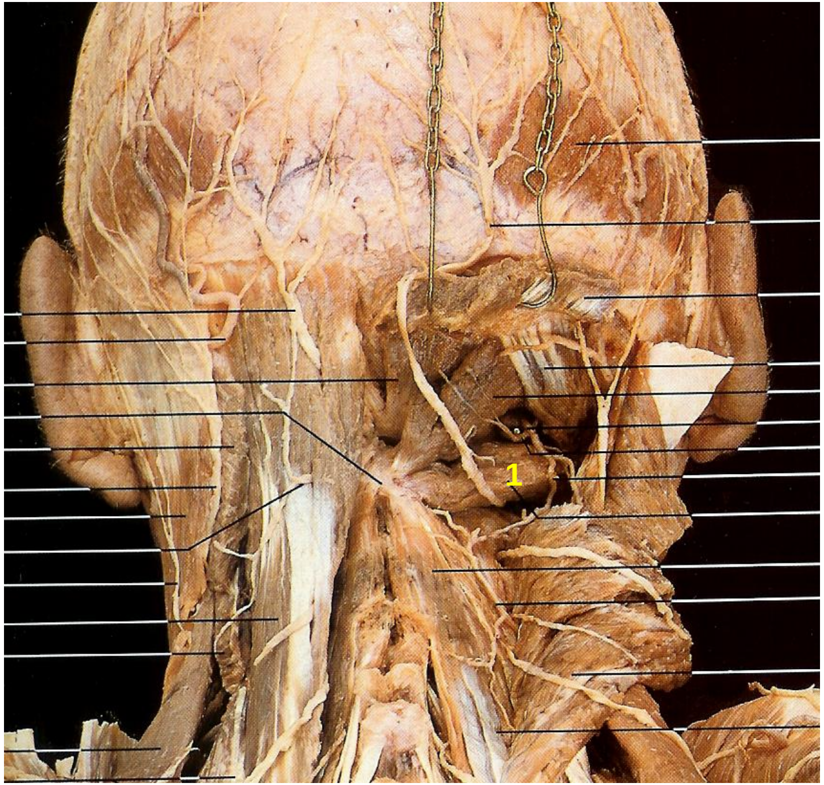
Conclusions. Our findings confirm that the GON can be visualized using ultrasound both at the level of the superior nuchal line and C2. This newly described approach superficial to the obliquus capitis inferior muscle has a higher success rate and should allow a more precise blockade of the nerve.

Br J Anaesth 2010

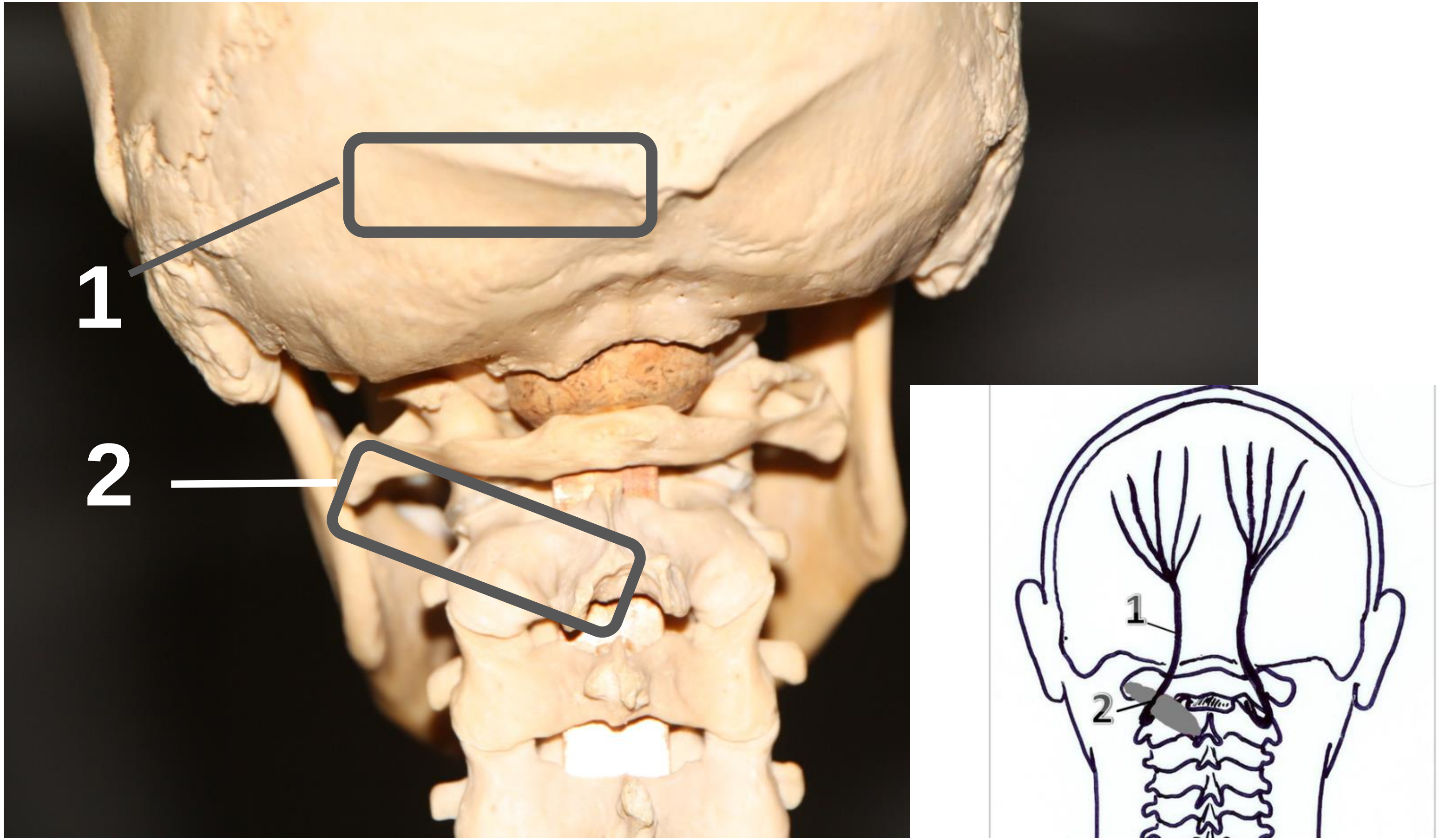


GON





1 = M. obliquus capitis inferior


1
2
1
2

GON-Block:
Egal wo und ob mit Ultraschall?

Comparative Effectiveness of Landmark-guided Greater Occipital Nerve (GON) Block at the Superior Nuchal Line Versus Ultrasound-guided GON Block at the Level of C2

A Randomized Clinical Trial (RCT)

Kissoon, Narayan R. MD[*,†]; O'Brien, Travis G. MD[‡]; Bendel, Markus A. MD[*]; Eldrige, Jason S. MD[§]; Hagedorn, Jonathan M. MD[*]; Mauck, William D. MD[*]; Moeschler, Susan M. MD[*]; Olatoye, Oludare O. MD[*]; Pittelkow, Thomas P. DO, MPH[*]; Watson, James C. MD[*,†]; Pingree, Matthew J. MD[*]

Author Information

The Clinical Journal of Pain 38(4):p 271-278, April 2022. | *DOI:* 10.1097/AJP.0000000000001023

Objectives:

The purpose of this single center, prospective randomized controlled trial was to compare clinical outcomes between an ultrasound-guided greater occipital nerve block (GONB) at the C2 vertebral level versus landmark-based GONB at the superior nuchal line.

Methods:

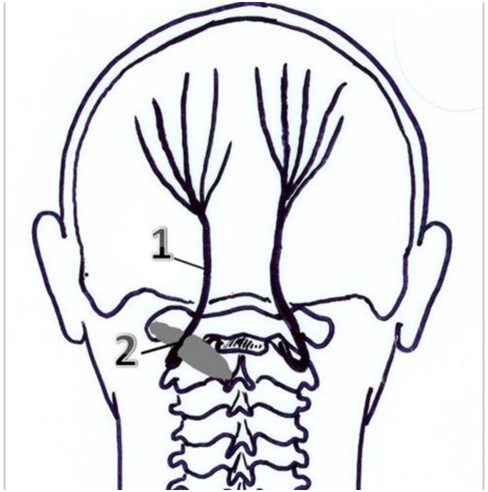
Patients with occipital neuralgia or cervicogenic headache were randomized to receive either a landmark-based GONB with sham ultrasound at the superior nuchal line or ultrasound-guided GONB at the C2 vertebral level with blinding of patients and data analysis investigators. Clinical outcomes were assessed at 30 minutes, 2 weeks, and 4 weeks postinjection.

Results:

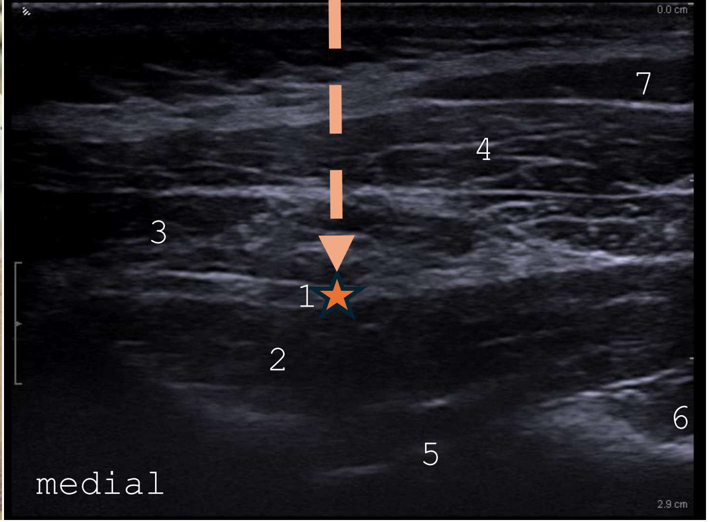
Thirty-two patients were recruited with 16 participants in each group. Despite randomization, the ultrasound-guided GONB group reported higher numeric rating scale (NRS) scores at baseline. Those in the ultrasound-guided GONB group had a significant decrease in NRS from baseline compared with the landmark-based GONB group at 30 minutes (change of NRS of 4.0 vs. 2.0) and 4-week time points (change of NRS of 2.5 vs. −0.5). Both groups were found to have significant decreases in Headache Impact Test-6. The ultrasound-guided GONB had significant improvements in NRS, severe headache days, and analgesic use at 4 weeks when compared with baseline. No serious adverse events occurred in either group.

Conclusions:

Ultrasound-guided GONBs may provide superior pain reduction at 4 weeks when compared with landmark-based GONBs for patients with occipital neuralgia or cervicogenic headache.



N. occipitalis major Block



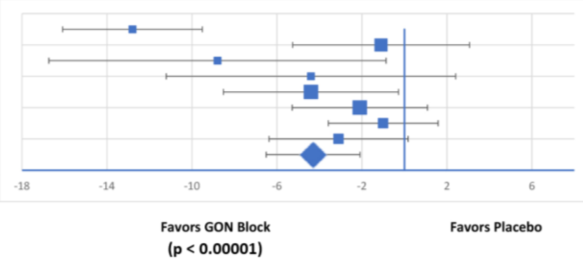
- 1: N. occip. major
- 2: M. obliquus cap. Inf.
- 3: M. semispin. capitis
- 4: M.splenius capitis
- 5: Lamina C2
- 6: Art. vertrebralis
- 7: M. sternocleidomast.
- 1.5-3ml LA, OOP

Meta-Analyse: GON-Block bei chronischer Migraine
Shauly, Plast Reconstr Surgery 2019; n=417

Herz-Jesu
Krankenhaus Wien

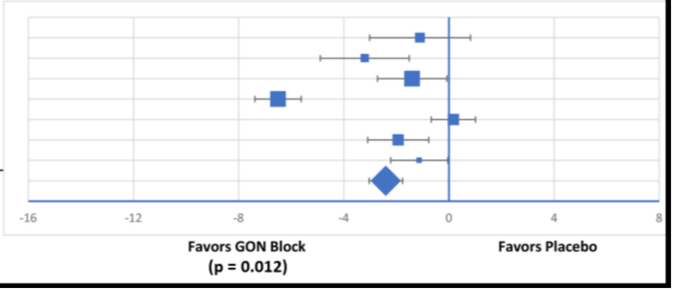
Pooled mean difference of -3.6 monthly headache days (95% CI = -1.39 - -5.81).

Weight	Mean Difference (95% CI)	
11%	-12.8	(-16.09 - -9.51)
15%	-1.1	(-5.26 - 3.06)
9%	-8.8	(-16.74 - -0.86)
9%	-4.4	(-11.21 - 2.41)
17%	-4.4	(-8.52 - -0.28)
17%	-2.1	(-5.29 - 1.09)
12%	-1	(-3.58 - 1.58)
11%	-3.1	(-6.37 - 0.17)
100%	**-4.3**	**(-6.51 - -2.09)**



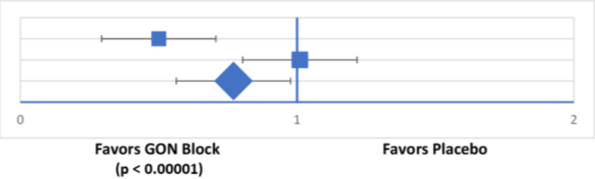
Pooled mean difference of -2.2 VAS pain scores; scale of 0-10 (95% CI = -1.56 - -2.84).

Weight	Mean Difference (95% CI)	
13%	-1.1	(-3.02 - 0.82)
11%	-3.2	(-4.89 - -1.51)
21%	-1.4	(-2.72 - -0.08)
21%	-6.5	(-7.38 - -5.62)
14%	0.2	(-1.04 - 0.64)
14%	-1.9	(-3.06 - -0.74)
7%	-1.1	(-2.18 - -0.02)
100%	**-2.4**	**(-3.04 - -1.66)**



Average risk ratio was found to be 0.76 in the 50% reduction of headache frequency in favor of GON blockade.

Risk Ratio (95% CI)		Weight
0.50	(0.39 - 0.61)	48%
1.01	(0.71 - 1.31)	52%
0.77	**(0.56 - 0.96)**	**100%**



GON block was found to significantly reduce pain intensity and frequency of migraine headaches in patients that experience chronic migraines.

GON block should be recommended for prophylactic use in chronic migraine patients.

Neurologia 2017

Herz-Jesu Krankenhaus Wien

REVIEW

Consensus recommendations for anaesthetic peripheral nerve block☆

S. Santos Lasaosa[a,*], M.L. Cuadrado Pérez[b], A.L. Guerrero Peral[c], M. Huerta Villanueva[d], J. Porta-Etessam[b], P. Pozo-Rosich[e], J.A. Pareja[f]

Table 1 Anaesthetic block for migraine.

Indications	Level of evidence and grade of recommendation	Nerves treated with blockade	Type of study	Authors
CM prevention	Level II of evidence Grade B of recommendation	GON, SON	Prospective, open study, $n = 60$; single intervention, assessment at 3 months	Ruiz Piñero et al.[7], 2015
		GON	Prospective, blinded study, $n = 84$; blockades administered weekly for 4 weeks, monthly for 2 months	Inan et al.[8], 2015
EM prevention	Level IV of evidence GECSEN grade of recommendation	GON	Prospective, blinded study, $n = 37$; blockades administered monthly for 2 months, assessment after 2 months	Piovesan et al.[6], 2001
Symptomatic treatment	Level IV of evidence GECSEN grade of recommendation	GON	Case series	Young et al.[13], 2004 Ashkenazi et al.[14], 2005 Young et al.[15], 2008 Rozen[16], 2007 Baron et al.[17], 2010 Casas-Limón et al.[18], 2015

Levels of evidence and grades of recommendation.
GECSEN: study group for headaches, Spanish Society of Neurology (SEN); EM: episodic migraine; CM: chronic migraine; GON: greater occipital nerve; SON: supraorbital nerve.

Table 2 Anaesthetic block for trigeminal autonomic cephalalgias.

Indications	Level of evidence and grade of recommendation	Nerves treated with blockade	Type of study	Authors
CH	Level II of evidence Grade B of recommendation	GON	Case series, $n = 19$ Case series, $n = 15$ Retrospective, $n = 60$ Prospective, open, $n = 14$ Prospective, open, $n = 83$ Prospective, blind, $n = 23$ Prospective, blind, $n = 83$	Afridi et al.[27], 2006 Busch et al.[21], 2007 Gantenbein et al.[23], 2012 Peres et al.[19], 2002 Lambru et al.[24], 2014 Ambrosini et al.[20], 2005 Leroux et al.[22], 2011
HC	Level IV of evidence GECSEN grade of recommendation	GON, SON	Case series	Afridi et al.[27], 2006 Guerrero et al.[26], 2012
SUNCT, PH	Level IV of evidence GECSEN grade of recommendation	GON	Case series	Afridi et al.[27], 2006 Porta-Etessam et al.[28], 2010

Levels of evidence and grades of recommendation.
CH: cluster headache; GECSEN: study group for headaches, Spanish Society of Neurology; HC: hemicrania continua; PH: paroxysmal hemicrania; GON: greater occipital nerve; SON: supraorbital nerve; SUNCT: short-lasting unilateral neuralgiform headache attacks with conjunctival injection and tearing.

Fernandes L, *et al*. *Pract Neurol* 2021;**21**:30–35. doi:10.1136/practneurol-2020-002612

Table 1 Evidence base for the efficacy of peripheral nerve block in treating different headache disorders

Headache disorder	Type of nerve block studied	Evidence level*
Acute migraine	GON	2B[8]
Chronic migraine	GON	2A[9 10]
Cluster headache	GON, suboccipital	1B[11 12]
Occipital neuralgia	GON	2B[13]
Chronic daily headache	GON	2B[14]
Other trigeminal autonomic cephalalgias		
SUNCT/SUNA	Supraorbital, supratrochlear	4[5]
Paroxysmal hemicrania/ hemicrania continua	Supraorbital, supratrochlear	4[15]
Other painful cranial neuralgias	Supraorbital, auriculotemporal	4[16 17]

*Based on the Oxford Centre for Evidence-based Medicine Levels of Evidence.
GON, greater occipital nerve; SUNCT, short-lasting unilateral neuralgiform headache attacks with conjunctival injection and tearing; SUNA, short-lasting unilateral neuralgiform headache attacks with cranial autonomic features.

Key points

- Peripheral nerve blocks have a role in acute and transitional treatment of acute migraine, chronic migraine, cluster headache and painful cranial neuralgias.
- Patient position and anatomical landmarks are key for their successful delivery.
- Corticosteroids are frequently used for greater occipital nerve blocks but may also be used for lesser occipital nerve blocks.
- Supraorbital, supratrochlear and auriculotemporal nerve blocks involve a combination of lidocaine and/ or bupivacaine.
- Uncommon but important adverse effects include transient dizziness, light-headedness, transient headache exacerbation, and rarely localised lipoatrophy and alopecia with corticosteroids.

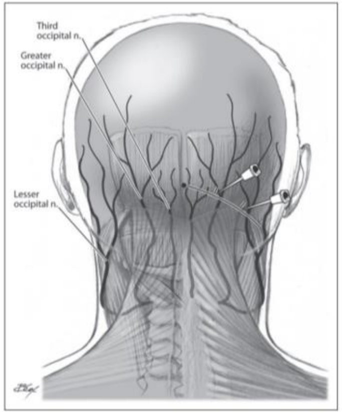


Fig 1.—Greater and lesser occipital nerve blocks.

Headache
ISSN 0017-8748
doi: 10.1111/head.12053
Published by Wiley Periodicals, Inc.

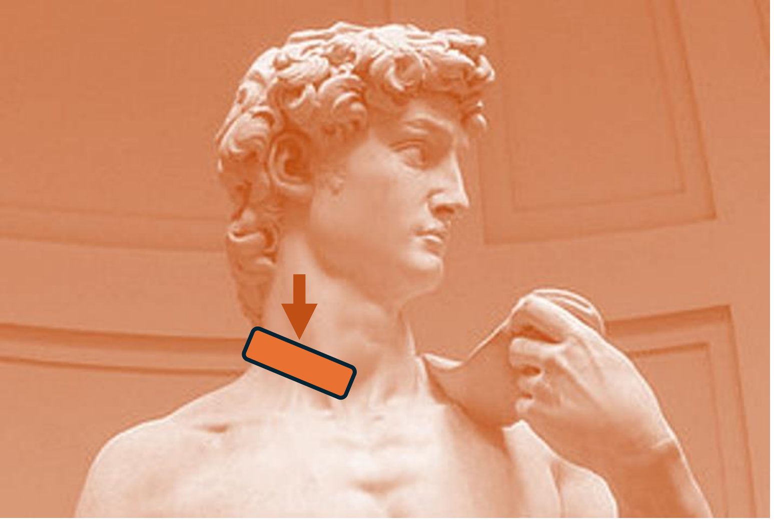
Review Article

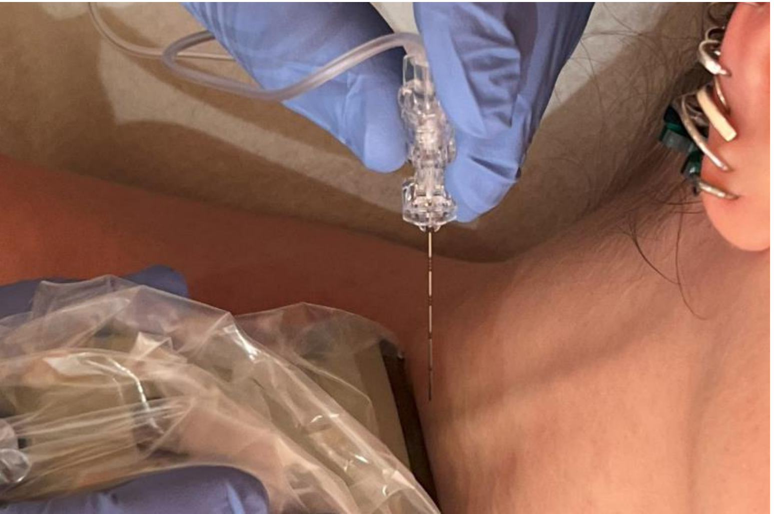
Expert Consensus Recommendations for the Performance of Peripheral Nerve Blocks for Headaches – A Narrative Review

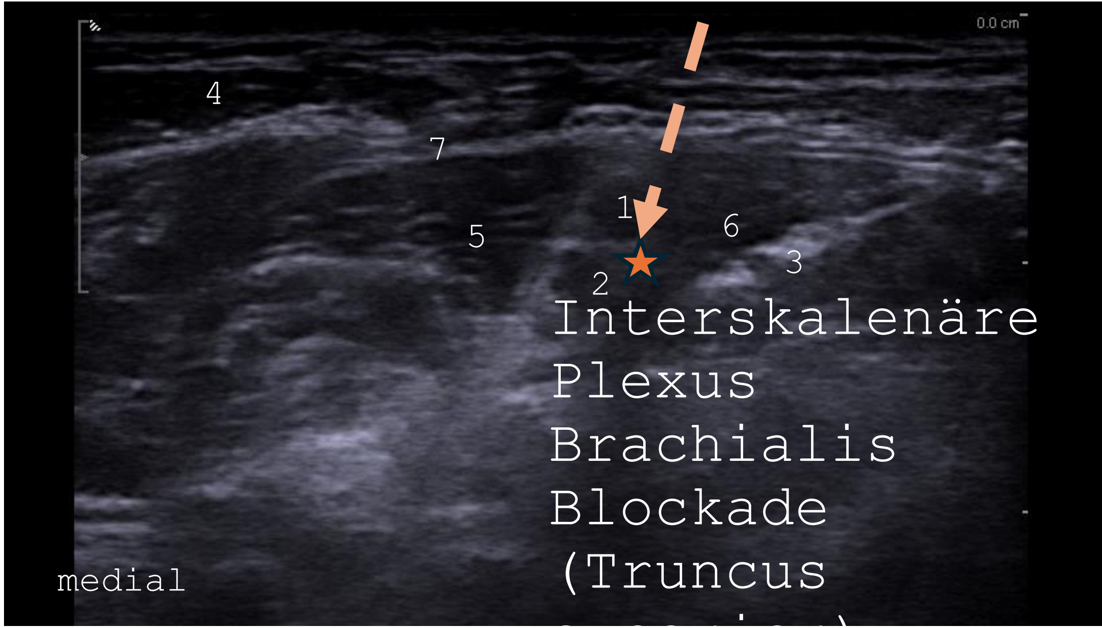
Andrew Blumenfeld, MD; Avi Ashkenazi, MD; Uri Napchan, MD; Steven D. Bender, DDS; Brad C. Klein, MD; Randall Berliner, MD; Jessica Ailani, MD; Jack Schim, MD; Deborah I. Friedman, MD, MPH; Larry Charleston IV, MD; William B. Young, MD; Carrie E. Robertson, MD; David W. Dodick, MD; Stephen D. Silberstein, MD; Matthew S. Robbins, MD

Headache Disorder	Nerve(s) Blocked	Evidence
Primary headache disorders		
Migraine	GON, STN, SON	Retrospective[23-25] Prospective, noncontrolled[12,26]
Cluster headache	GON	Case series[4,13] Open label[14] Retrospective[15] Double blind, placebo controlled[7,8]
Chronic daily headache	GON	Case series[4] Open label[27] Prospective, noncontrolled[28] Prospective, randomized controlled[20]
Hemicrania continua	GON, SON	Case series[4,18]
New daily persistent headache	GON	Case series[4,29]
Secondary headache disorders		
Cervicogenic headache	GON, LON, SON	Case series[30,31] Retrospective[25] Prospective, noncontrolled[32] Prospective, comparative[33] Double blind, placebo controlled[34]
Post-traumatic headache	GON	Retrospective[35]
Post-dural puncture headache	GON, LON	Prospective, comparative[36]
Cranial neuralgias		
Supraorbital neuralgia	SON	Case series[37-39]
Auriculotemporal neuralgia	ATN	Case series[40]

ATN = auriculotemporal nerve; GON = greater occipital nerve; LON = lesser occipital nerve; SON = supraorbital nerve; STN = supratrochlear.nerve.







Interskalenäre Plexus Brachialis Blockade (Truncus

- 1: Ramus ant. Radix C5
- 2: Ramus ant. Radix C6
- 3: N. dorsalis scapulae
- 4: M. sternocleidomastoideus
- 5: M. scalenus anterior
- 6: M. scalenus medius
- 7: N. phrenicus

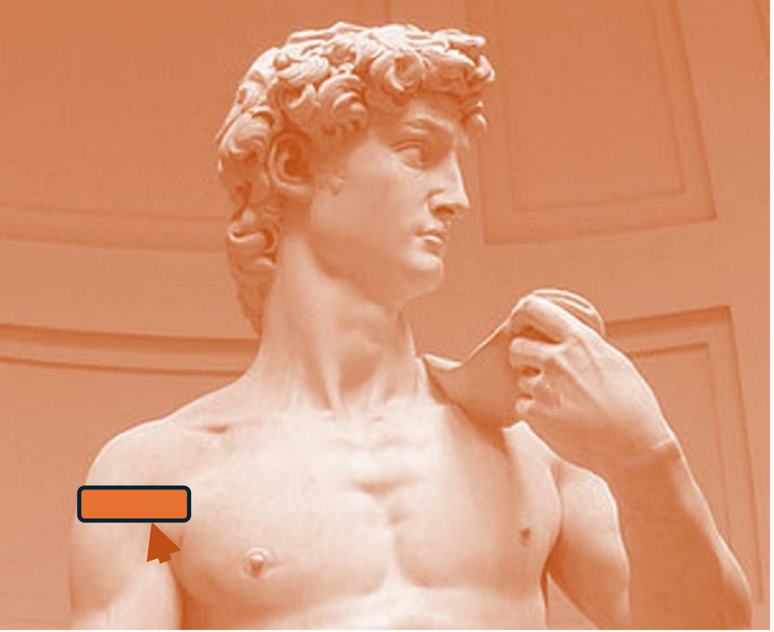
Reposition Schulterluxation

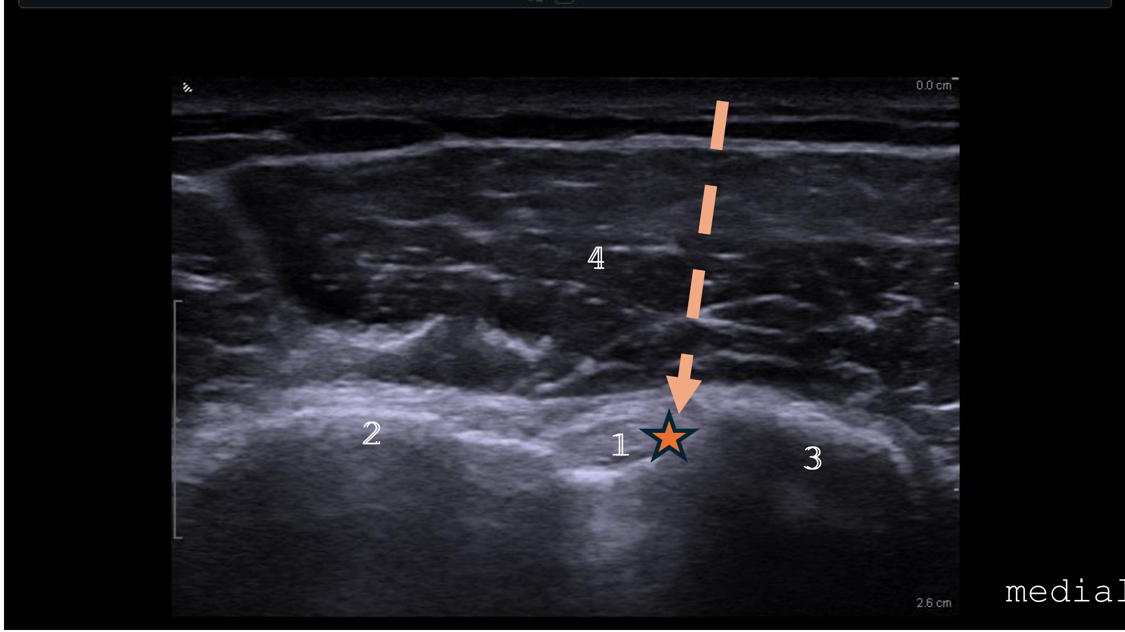
- LT: OOP, bei IP von lat. Cave Nn. dors. scap. et thorac. long.
- Vol: 5-10ml LA
- Phrenicusparese als NW häufig
- Dexamethason 4-8mg i.v. verlängert die Wirkung

Supraclaviculäre Plexus Brachialis Blockade

- 1: Art. subclavia
- 2: Vena subclavia
- 3: 1. Rippe
- 4: Pleura
- 5: Plexus brachialis
- 6: M. scalenus anterior
- 7: M. sternocleidomastoideus

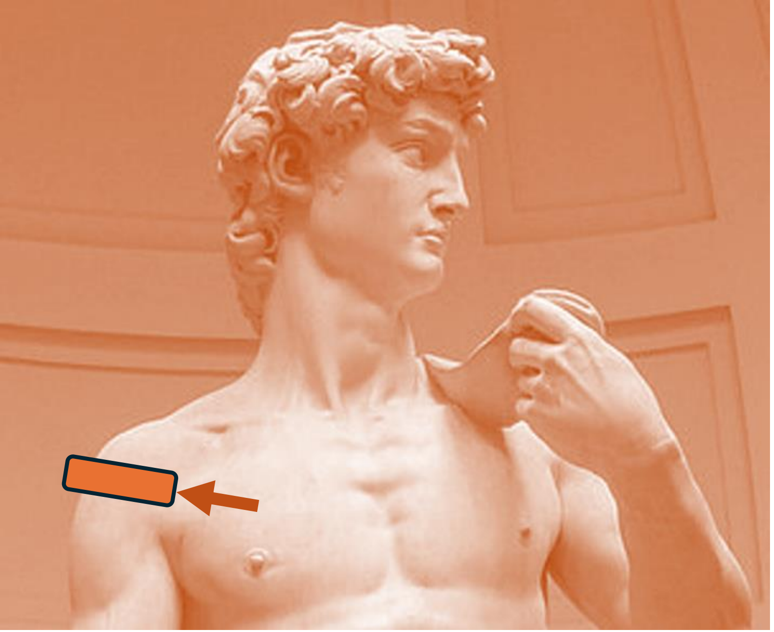
- I: Arm- und Hand-OPs, "Spinale des Armes"
- LT: IP, kurzer Schallkopf
- Vol: 15-20ml LA
- Nadelposition unterhalb Plexus
- Cave Pleuranähe

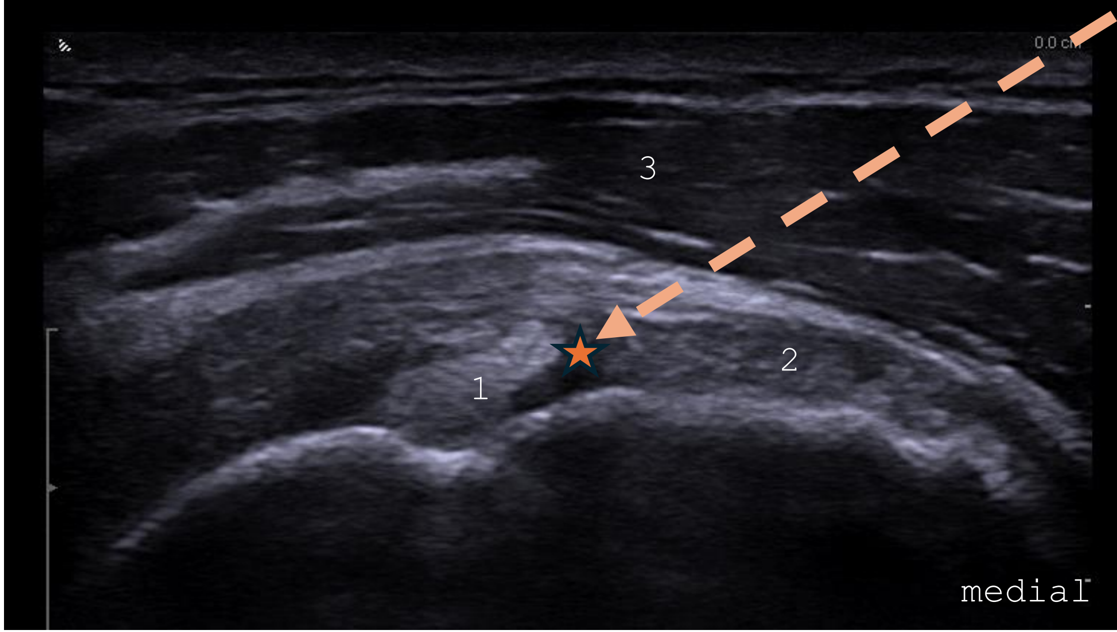




Sehnenscheiden-Infiltration des langen Bizepskopfes

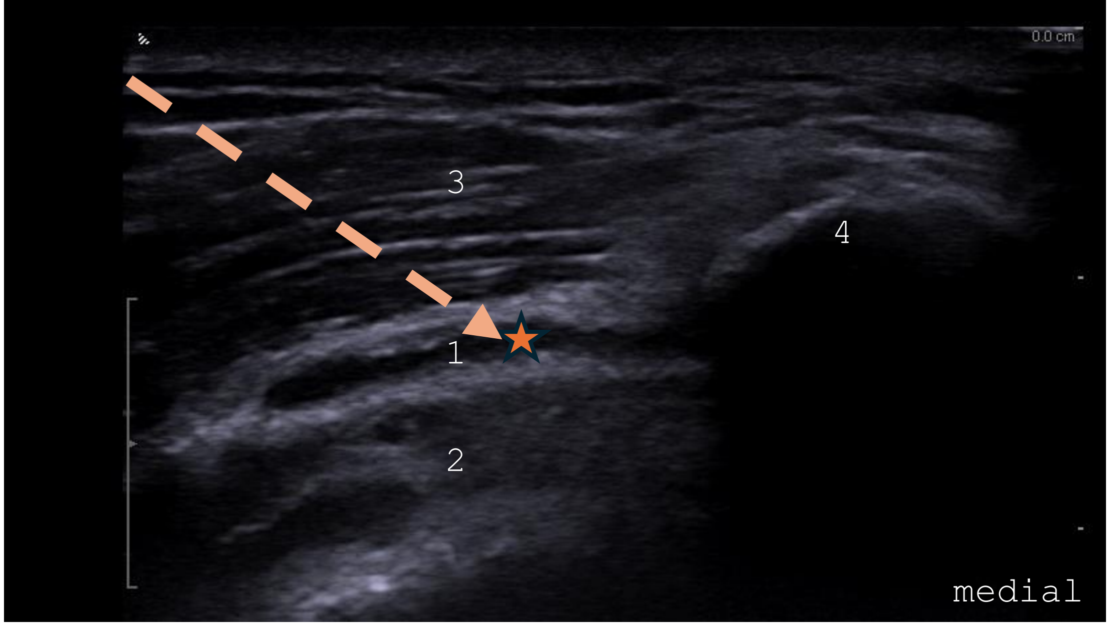
- 1: Sehne, 2: Tub. majus, 3: Tub. minus, 4: M. deltoideus
- Axiale Ultraschallebene
- Out-of-plane Stichtechnik, G25 Nadel, 2-4ml LA+Steroid
- Art. circumflexa humeri ant. lateral der Sehne vermeiden





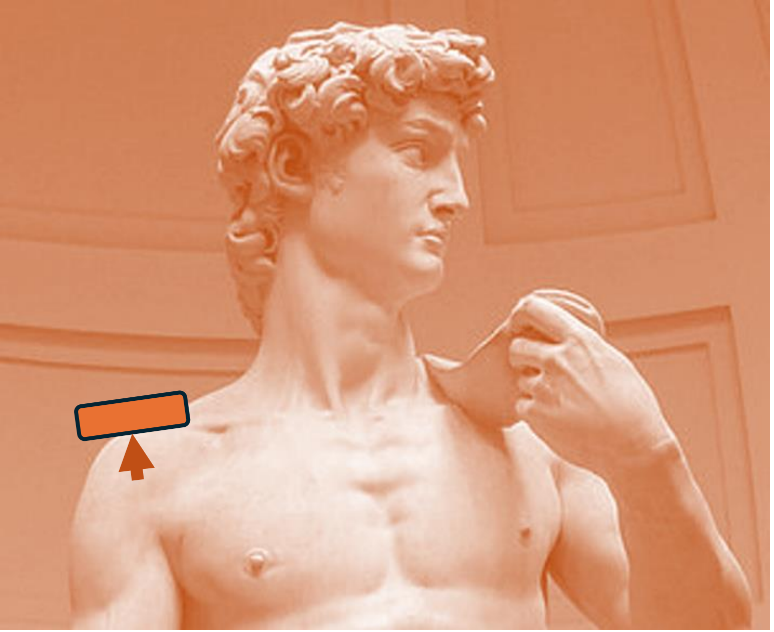
Anteriore Schultergelenks-Infiltration (Rotatorenmanschetten- Intervall)

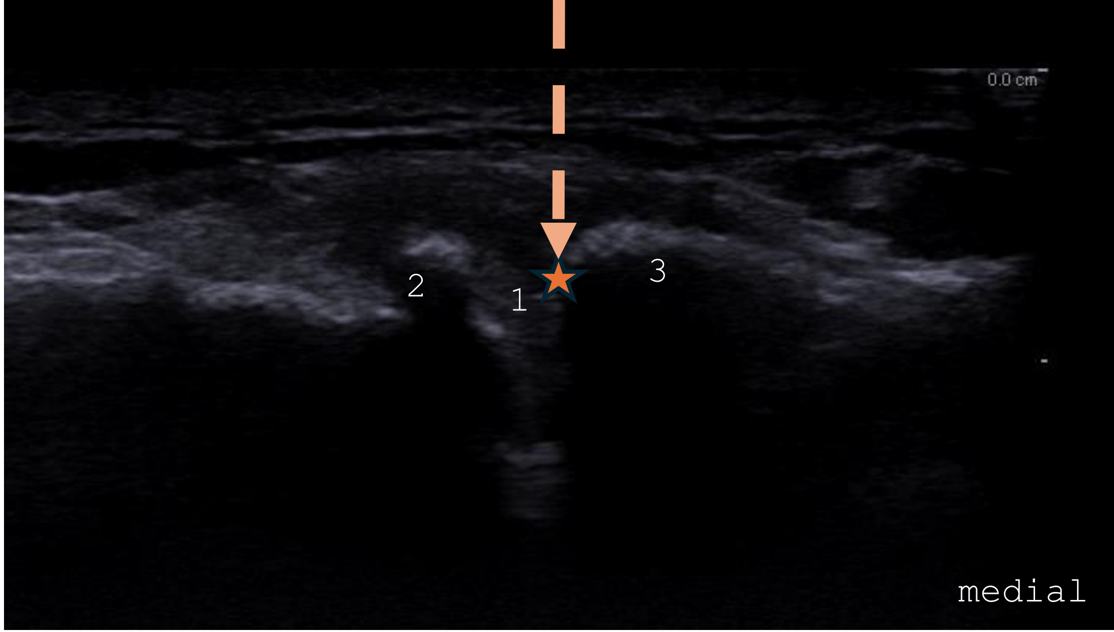
- 1: Bicepsehne, 2: M. subscapularis, 3: M. deltoideus
- Axiale Ultraschallebene, leicht rotiert
- In-plane Stichtechnik, G22-25 Nadel, 10 ml LA+Steroid
- Bei Frozen Shoulder Widerstand↑, bei Bursainjektion↓



Infiltration der Bursa subacromialis/ subdeltoidea

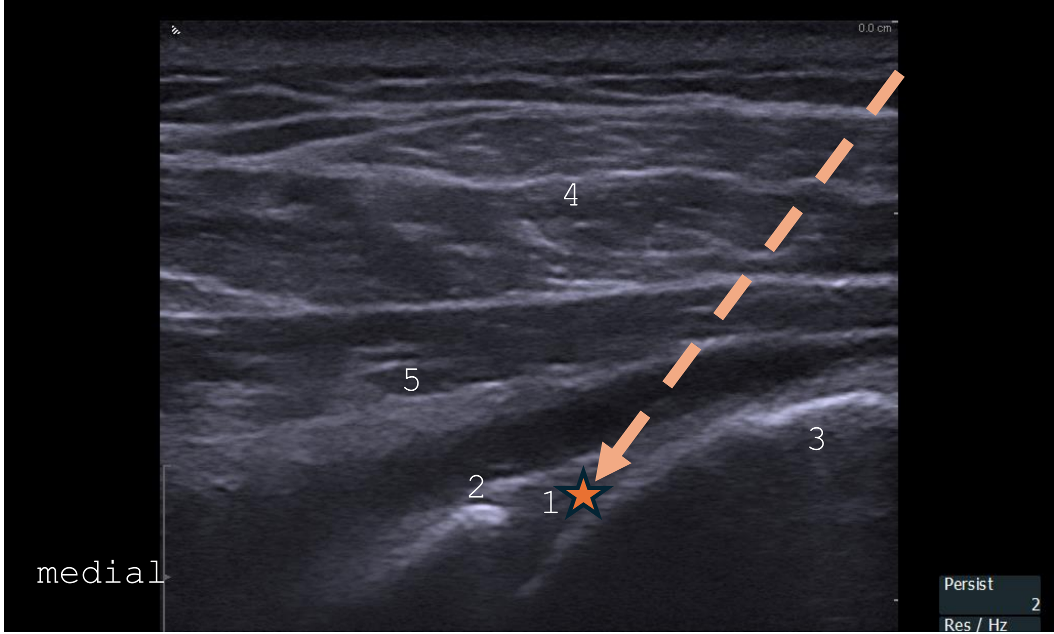
- 1: Bursa, 2: M. supraspinatus, 3: M. deltoideus, 4: Acromion
- Coronare Ultraschallebene, leicht rotiert
- In-plane Stichtechnik, G25 Nadel, 4 ml LA+Steroid
- Schnelle Hydrodissektion verifiziert die Nadellage, Barbotage bei Kalkschulter und Impingement möglich





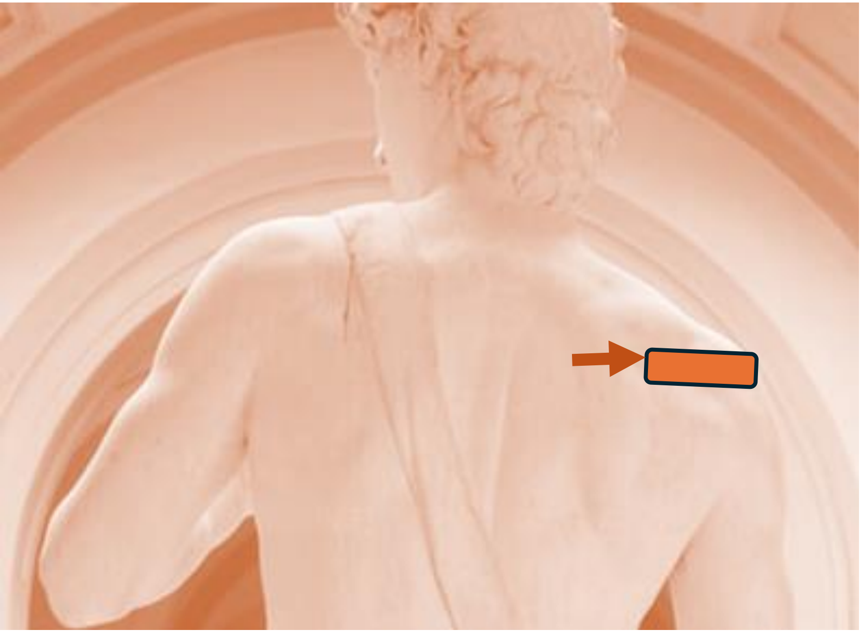
Infiltration des Acromioclavicular-Gelenkes

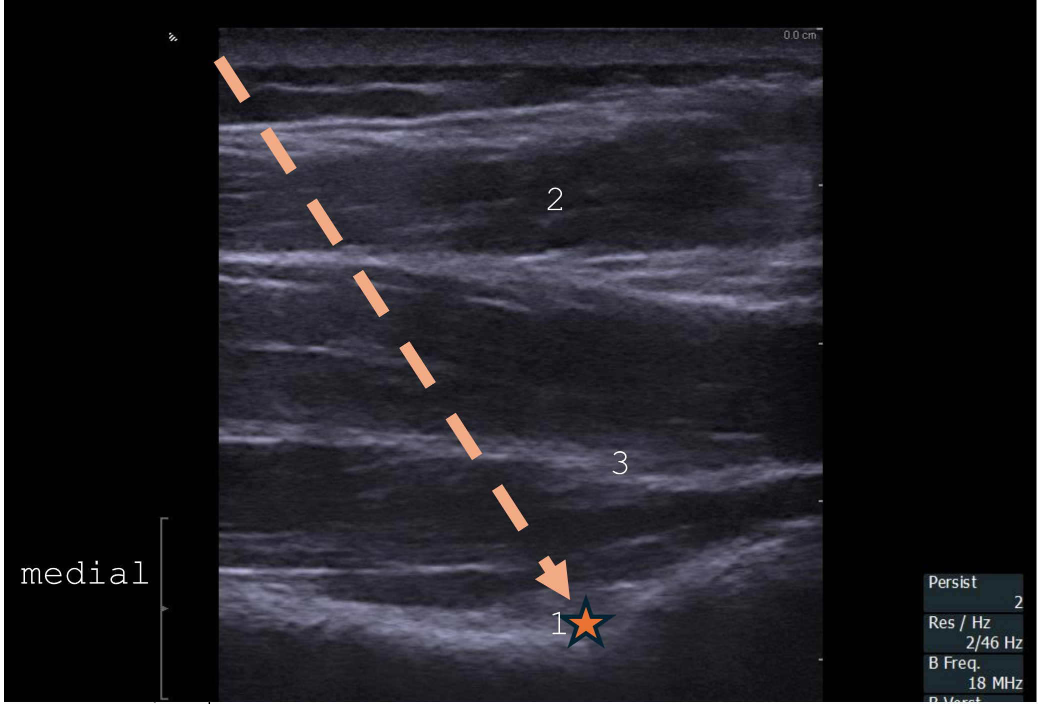
- 1: Discus, 2: Acromion, 3: Clavicula
- Coronare Ultraschallebene
- Out-of-plane Stichtechnik, G25 Nadel, 1.5-2 ml LA+Steroid
- Gelenksdiscus vermeiden, Nadel max. 1cm tief



Posteriore Schultergelenks-Infiltration (Gleno-humeral-Gelenk)

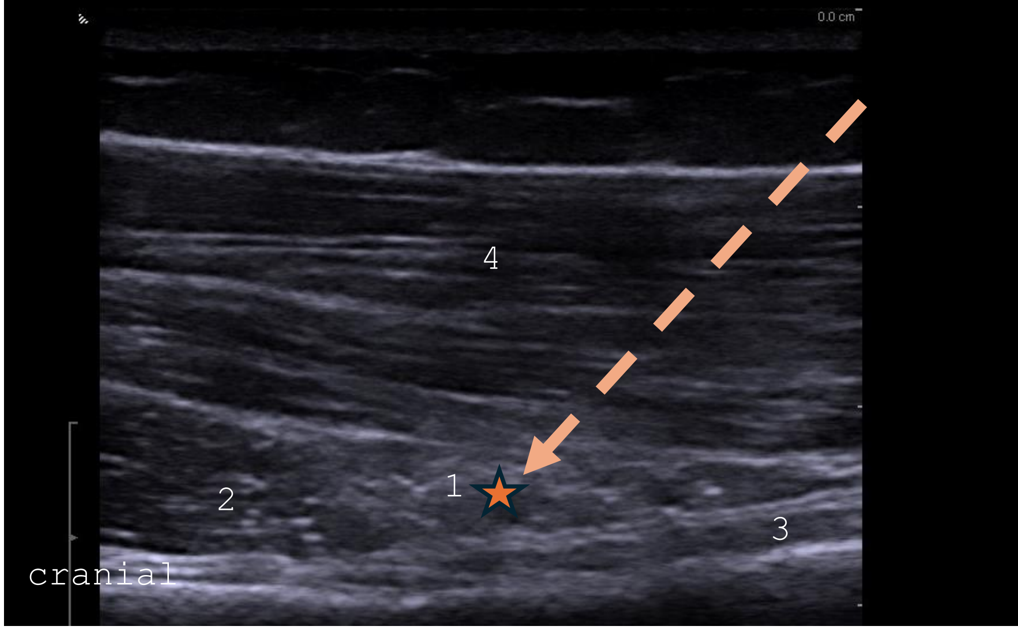
- 1: Labrum, 2: Glenoid, 3: Humeruskopf, 4: M. deltoideus, 5: M. infraspinatus
- Axiale Ultraschallebene
- In-plane Stichtechnik, G25 Nadel, 4-5 ml LA+Steroid
- Labrum und Gelenksknorpel vermeiden





Posteriore Nervus suprascapularis Blockade

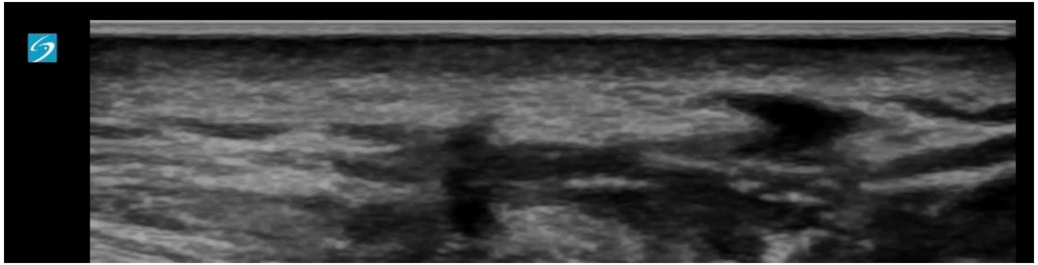
- supraspinatus
- Axiale Ultraschallebene, zur Spina scapulae leicht rotiert
- In-plane Stichtechnik, G22-25 Nadel, 4-8 ml LA (+Steroid?)
- Am Boden der Fossa suprascapularis- nicht an der Inzisura scapulae (Cave Pleura ventral)

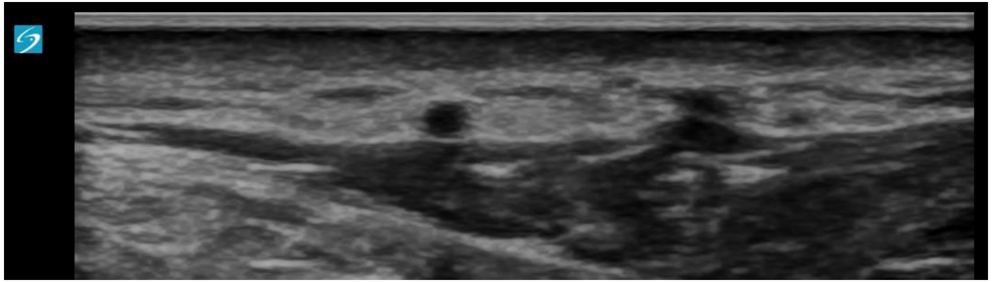


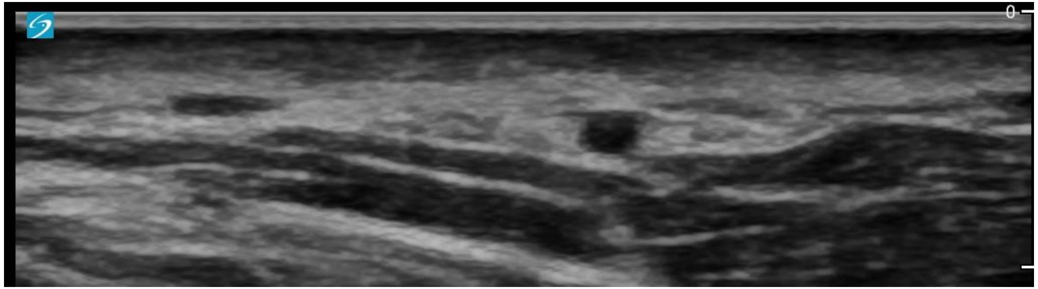
Posteriore Nervus axillaris Blockade

- 1: N. axillaris, 2: M. teres minor, 3: M. triceps, 4: M. deltoideus
- Sagittale Ultraschallebene
- In-plane Stichtechnik, G22-25 Nadel, 2-5 ml LA (+Steroid?)
- Arteria circumflexa humeri posterior vermeiden

Greater auricular nerve







Herz-Jesu
Krankenhaus Wien

Ganglion stellatum Blockade

44 F. M. M. Alshuraim and D. Flamer

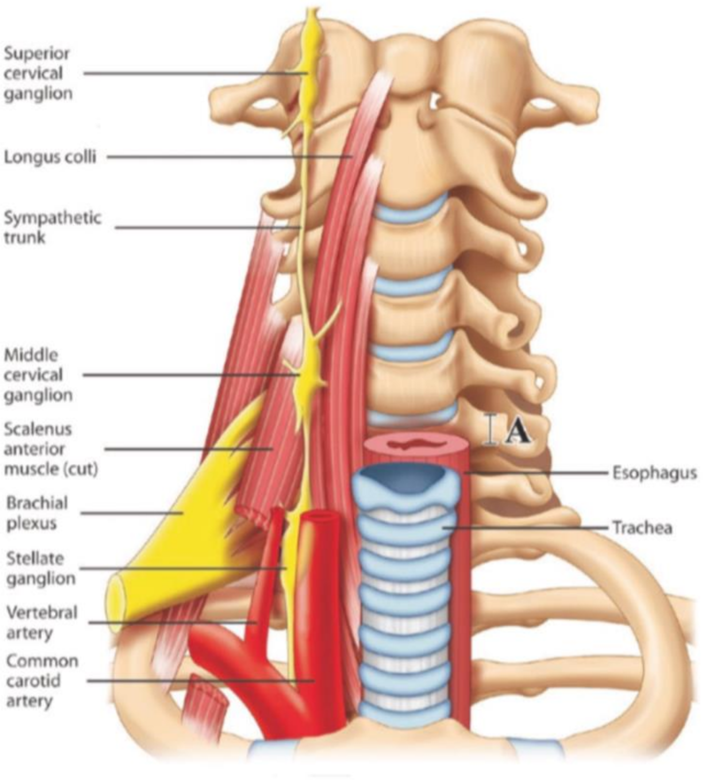
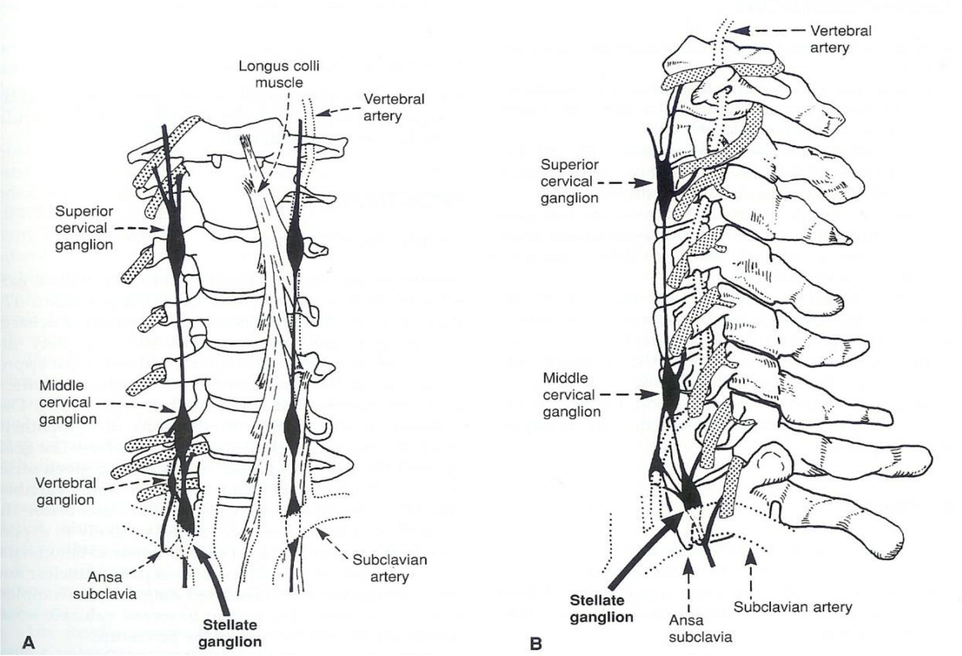
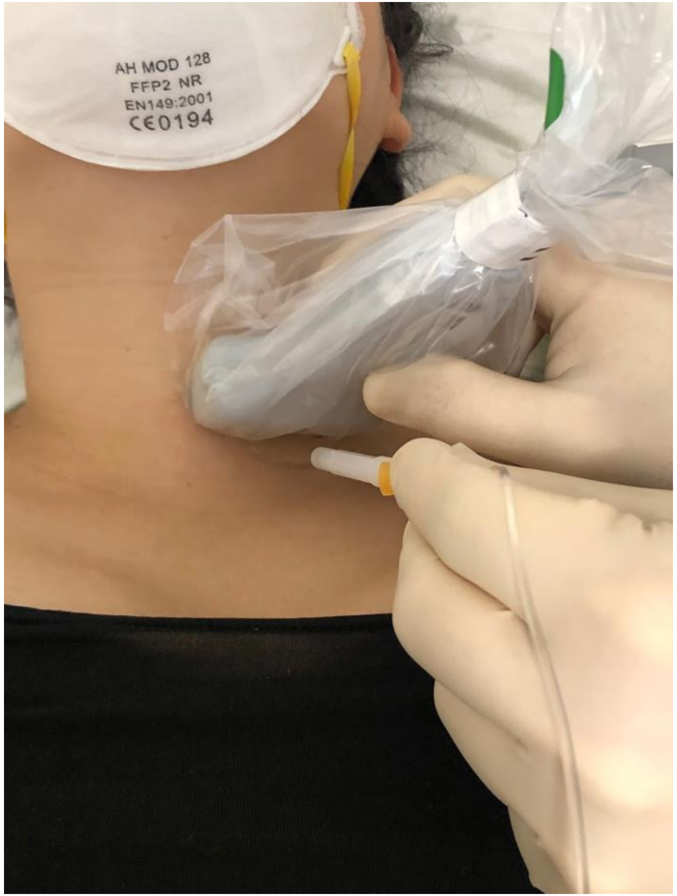


Fig. 3.1 Anatomy of cervical sympathetic chain. (Reprint with permission from Philip Peng Educational Series)



OOP medial der Carotis

Herz-Jesu Krankenhaus Wien



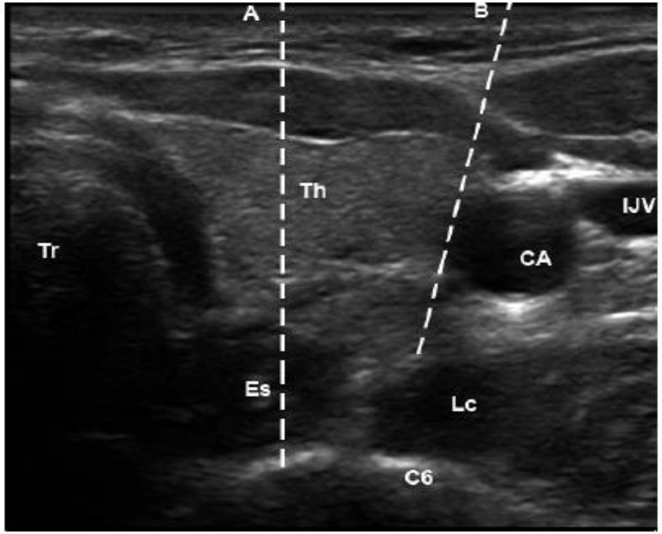
-Pain Physician 2007; 10:747-752 • ISSN 1533-3159

Herz-Jesu
Krankenhaus Wien

Technical Report

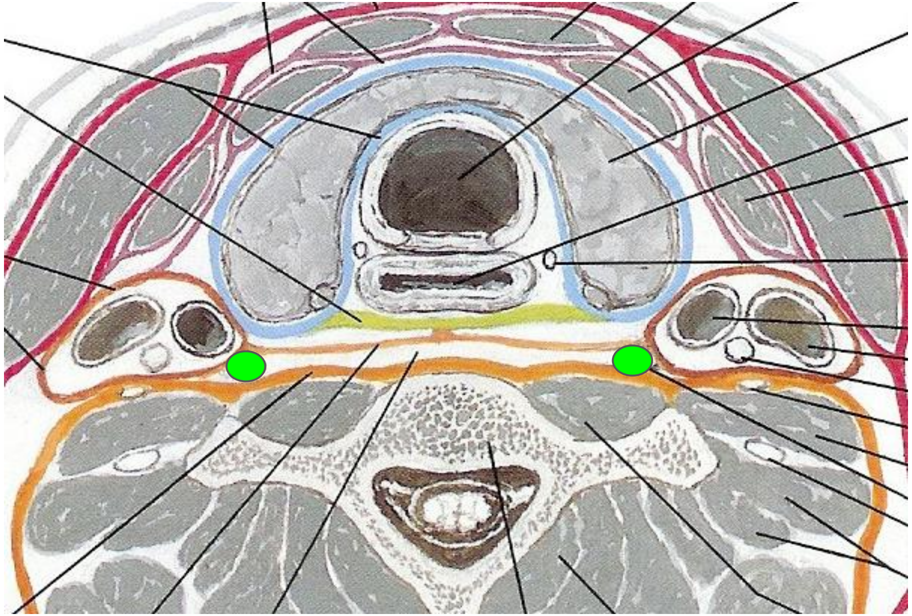
Ultrasound-guided Stellate Ganglion Block Successfully Prevented Esophageal Puncture

Samer Narouze, MD, Amaresh Vydyanathan, MD, and Nilesh Patel, MD



Ultrasound-guided stellate ganglion block may improve the safety of the procedure by direct visualization of the related anatomical structures and accordingly the risk of thyroid gland and vessels, vertebral artery, or esophagus injury may be minimized. Also ultrasound guidance will allow direct monitoring of the spread of the LA and hence complications like RLN palsy, intrathecal, epidural, or intravascular spread may be minimized as well.

Richtige Schichte:
Prävertebrale Faszie über dem M. longus colli



Herz-Jesu
Krankenhaus Wien

Horner Syndrom:
Ptosis, Myosis, Enophthalmus

Herz-Jesu Krankenhaus Wien

CRPS 1: Morbus Sudeck

Randomized Trial

Effect of Early Stellate Ganglion Blockade for Facial Pain from Acute Herpes Zoster and Incidence of Postherpetic Neuralgia

Mohamed Y. Makharita, MD[1], Yasser Mohamed Amr, MD[2], and Youssef El-Bayoumy, MD[1]

Pain Physician: November/December 2012; 15:467-474

Table 1. *Demographic data and patient's outcome in the studied groups. Values are in mean ±SD and in number (%). Group 1: placebo group. Group 2: stellate ganglion block group.*

Groups	Group 1 (n=30)	Group 2 (n=31)	*P* value
Age (years)	59.6 ± 3.2	60.6±2.2	0.14
Sex (male/ female)	14/16	13/18	0.71
Side (right/ left)	16/14	17/14	0.91
Incidence of PHN			
3 months	8/30 (26.7%)	2/31* (6.5%)	0.043
6 months	4/30 (13.3%)	0/31 * (0 %)	0.035
Patient Satisfaction Score			
3 months	2.2 ± 1.3	2.8 ± 1.1*	0.03
6 months	2.4 ± 0.5	3 ± 0.0*	0.004
Time of first block (days)	5.17 ± 0.8	6.26 ± 0.6	0.63
Duration of pain (days)	43.6 ± 28.7	23.8 ± 18*	0.002

* Significant when compared to the other group

Table 2. *Visual Analogue Score in the studied groups. Values are in mean ± SD. Group 1: placebo group. Group 2: stellate ganglion block group.*

	Basal	1 week	2 weeks	3 weeks	4 weeks	6 weeks	2 months	3 months	6 months
Group1	7.1 ± 1.1	4.7 ± 1.1	3.8 ± 1.3	2.8 ± 1.8	1.8 ± 2	1.1 ± 1.9	1.1 ± 1.9	1.1 ± 1.8	0.4 ± 1.1
Group2	7 ± 0.9	2.9 ± 0.6*	1.7 ± 0.8*	0.7 ± 1*	0.1 ± 0.6*	0.2 ± 0.7*	0.2 ± 0.5*	0.13 ± 0.5*	0 ± 0*
P value	0.79	< 0.001	< 0.001	< 0.001	< 0.001	0.014	0.015	0.007	0.042

* Significant when compared to the other group

KJP The Korean Journal of Pain
| Review Article |

Korean J Pain 2017 January; Vol. 30, No. 1: 3-17
pISSN 2005-9159 eISSN 2093-0569
https://doi.org/10.3344/kjp.2017.30.1.3

Effects of applying nerve blocks to prevent postherpetic neuralgia in patients with acute herpes zoster: a systematic review and meta-analysis

[1]Department of Preventive Medicine, College of Medicine, Korea University,
[2]Department of Anesthesiology and Pain Medicine, Asan Medical Center, University of Ulsan College of Medicine, Seoul,
[3]Department of Anesthesiology and Pain Medicine, Kangwon National University Hospital, Chuncheon, Korea

Hyun Jung Kim[1,*], Hyeong Sik Ahn[1,*], Jae Young Lee[2], Seong Soo Choi[2], Yu Seon Cheong[3], Koo Kwon[2], Syn Hae Yoon[2], and Jeong Gill Leem[2]

Background: Postherpetic neuralgia (PHN) is a common and painful complication of acute herpes zoster. In some cases, it is refractory to medical treatment. Preventing its occurrence is an important issue. We hypothesized that applying nerve blocks during the acute phase of herpes zoster could reduce PHN incidence by attenuating central sensitization and minimizing nerve damage and the anti-inflammatory effects of local anesthetics and steroids.

Methods: This systematic review and meta-analysis evaluates the efficacy of using nerve blocks to prevent PHN. We searched the MEDLINE, EMBASE, Cochrane Library, ClinicalTrials.gov and KoreaMed databases without language restrictions on April, 30 2014. We included all randomized controlled trials performed within 3 weeks after the onset of herpes zoster in order to compare nerve blocks vs active placebo and standard therapy.

Results: Nine trials were included in this systematic review and meta-analysis. Nerve blocks reduced the duration of herpes zoster-related pain and PHN incidence of at 3, 6, and 12 months after final intervention. Stellate ganglion block and single epidural injection did not achieve positive outcomes, but administering paravertebral blockage and continuous/repeated epidural blocks reduced PHN incidence at 3 months. None of the included trials reported clinically meaningful serious adverse events.

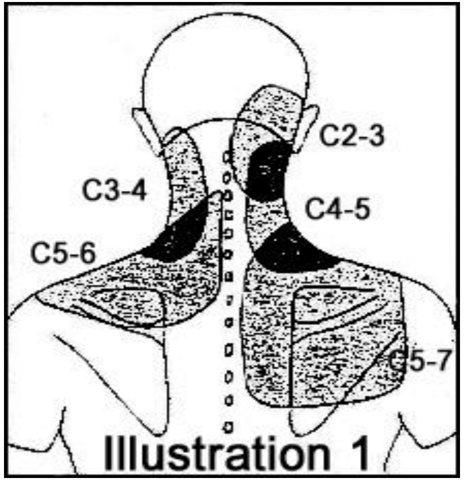
Conclusions: Applying nerve blocks during the acute phase of the herpes zoster shortens the duration of zoster-related pain, and somatic blocks (including paravertebral and repeated/continuous epidural blocks) are recommended to prevent PHN. In future studies, consensus-based PHN definitions, clinical cutoff points that define successful treatment outcomes and standardized outcome-assessment tools will be needed. (Korean J Pain 2017; 30: 3-17)

Breiteste Indikationen (to be discussed!):

Sympathisch unterhaltener Schmerz (CRPS)
Postzoster Neuralgie
Persistierender idiopathischer Gesichtsschmerz
Posttraumatisches Stresssyndrom (PTSD)
Tinnitus
Hot flashes (postmenopausale „Wallungen“)
Therapierefraktäre VTs
Colitis ulcerosa
Post Covid Syndrom

Akutschmerztherapie?

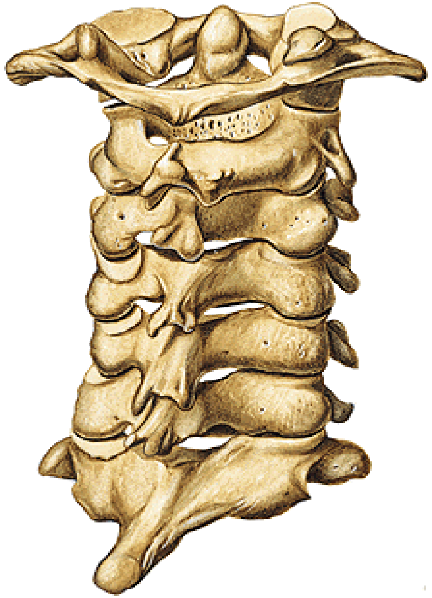
Diagnosing
facet joint derived pain

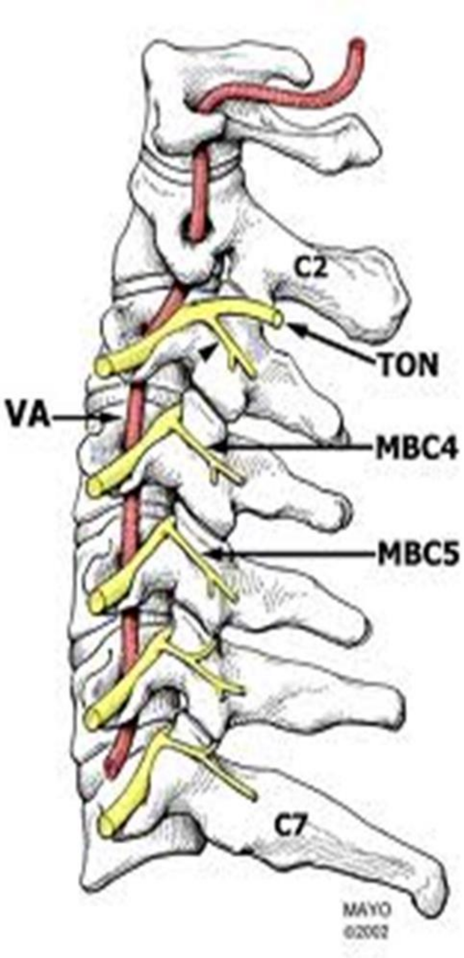


- Referred pain“ areas in healthy volunteers after provocation

Dwyer et al. Spine 1990

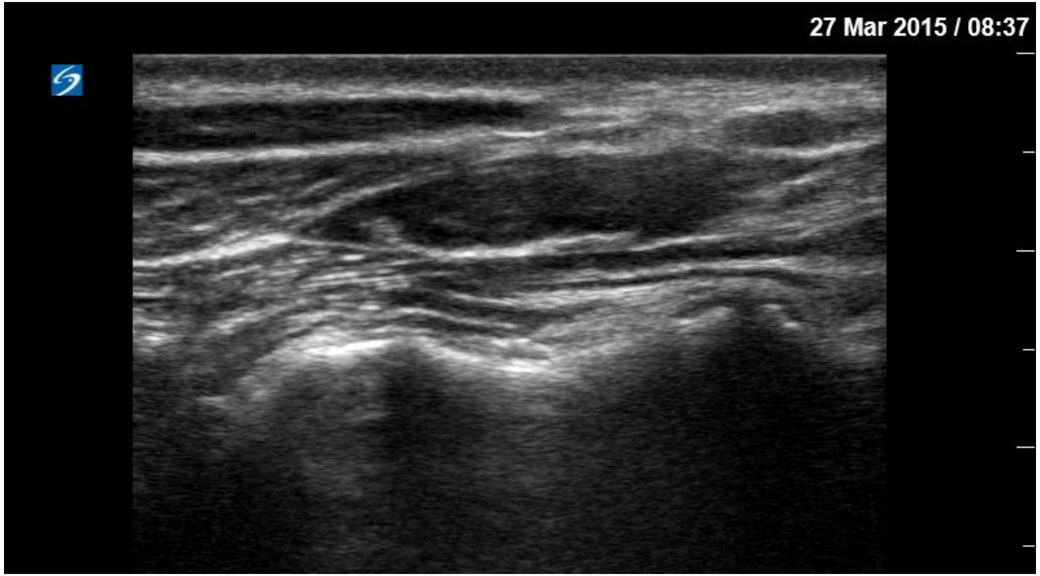
Cervical paravertebral region





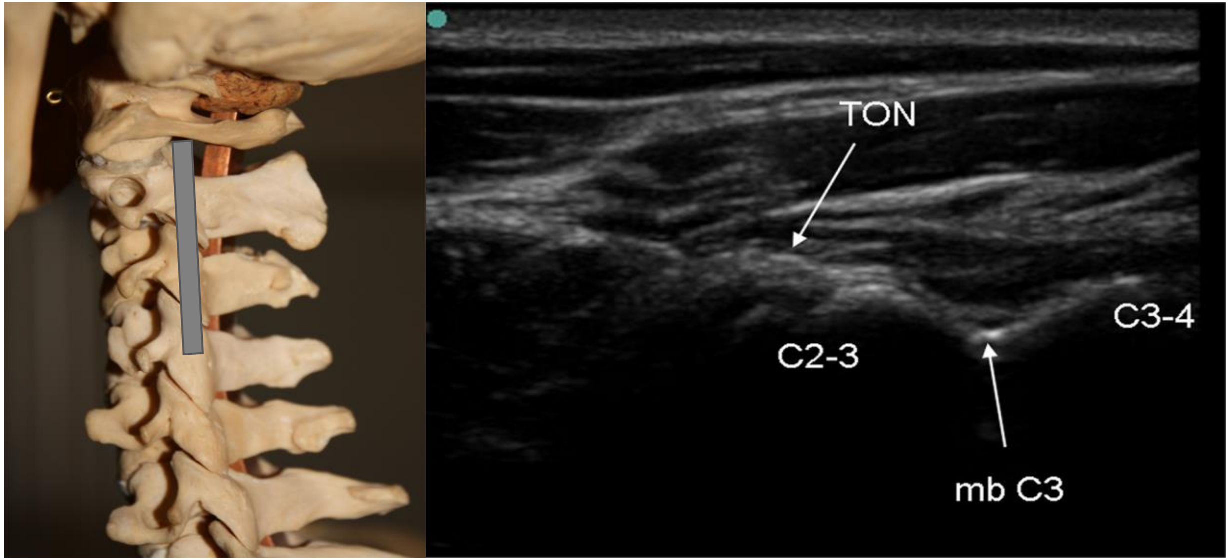
M.Greher

Cervicale Facetten



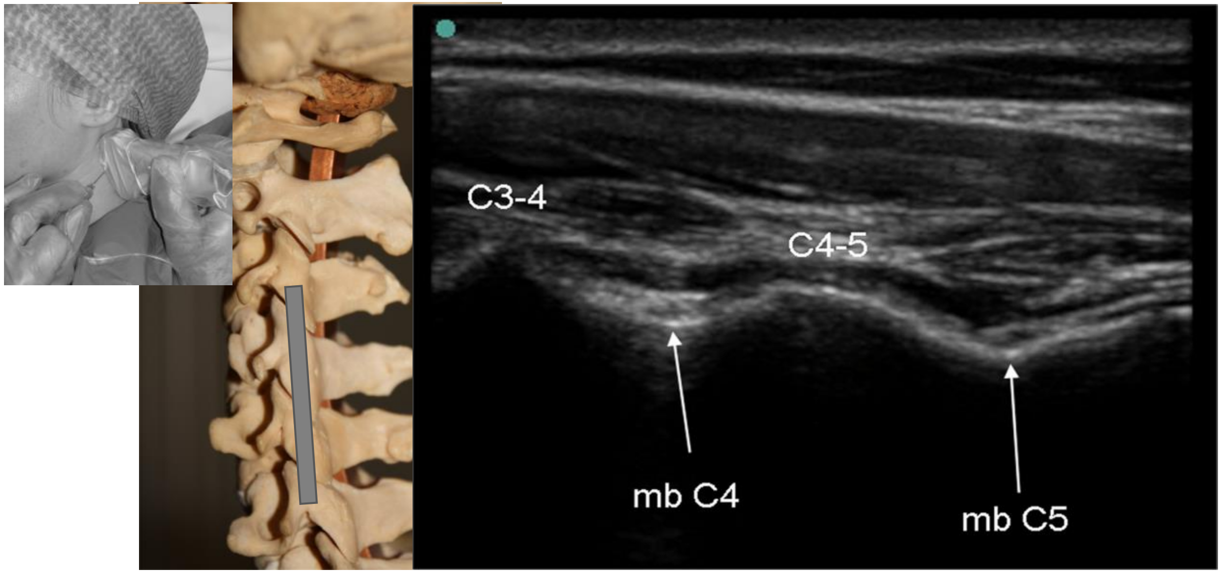
Third occipital nerve (TON)

Ultrasound spine - Eichenberger



Medial branches (mb) C4 and C5

Ultrasound spine - Eichenberger



Accuracy of Ultrasound-guided Nerve Blocks of the Cervical Zygapophysial Joints

Andreas Siegenthaler, M.D.,* Sabine Mlekusch, M.D.,† Sven Trelle, M.D.,‡
Juerg Schliessbach, M.D.,† Michele Curatolo, M.D., Ph.D.,§ Urs Eichenberger, M.D., Ph.D.||

Results: One hundred eighty needles were placed in 60 volunteers. Raw agreement was 87% (95% CI 81–91%), κ was 0.74 (0.64–0.83), and Φ 0.99 (0.99–0.99). Accuracy varied significantly between the different cervical nerves: it was low for the C7 medial branch, whereas all other levels showed very good accuracy.
Conclusions: Ultrasound-imaging is an accurate technique for performing cervical zygapophysial joint nerve blocks in volunteers, except for the medial branch blocks of C7.

 Anesthesiology 2012; 117:347–52

Anesthesiology, V 117 • No 2

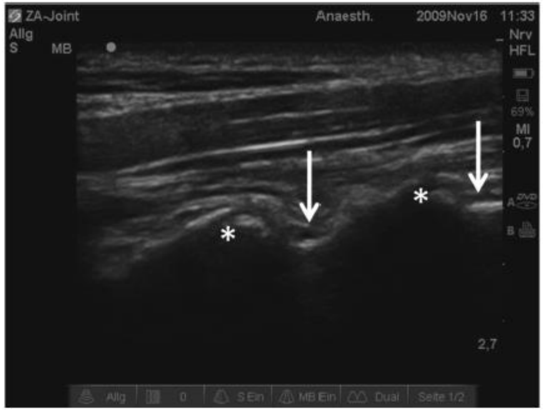


Fig. 1. Sonoanatomy of the cervical zygapophysial joint region cut in a longitudinal cranio-caudal plane. *Facet joint cleft. Bony target (*arrowhead*) for medial branch block (*i.e.*, the “groove” between two facet joints).

M.Greher

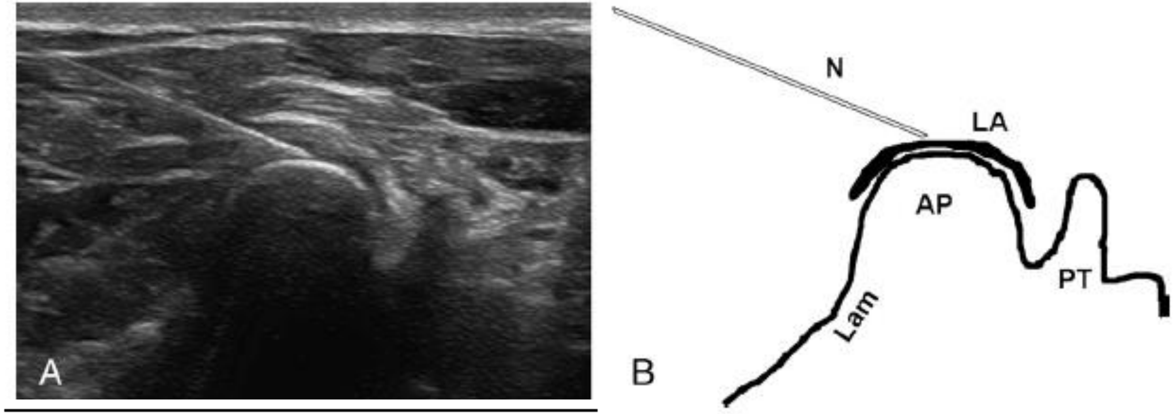


TABLE 2. Phase 1 and Phase 2 Results for Each Block Level

	Phase 1	Phase 2
C2–C3	NA	100%
C3	82%/18%/0	100%
C4	85%/15%/0	97.7%
C5	85%/15%/0	91.4%
C6	67%/33%/0	84.9%

Phase 1: proportion of the needle tips in each of the 3 zones: 1/2/3.
Phase 2: success rate for each level according to the blinded observer.

Finlayson et al., RAPM 2012

„It´s tough to make predictions, especially about the future….“

Yogi Berra, baseball-playing philosopher

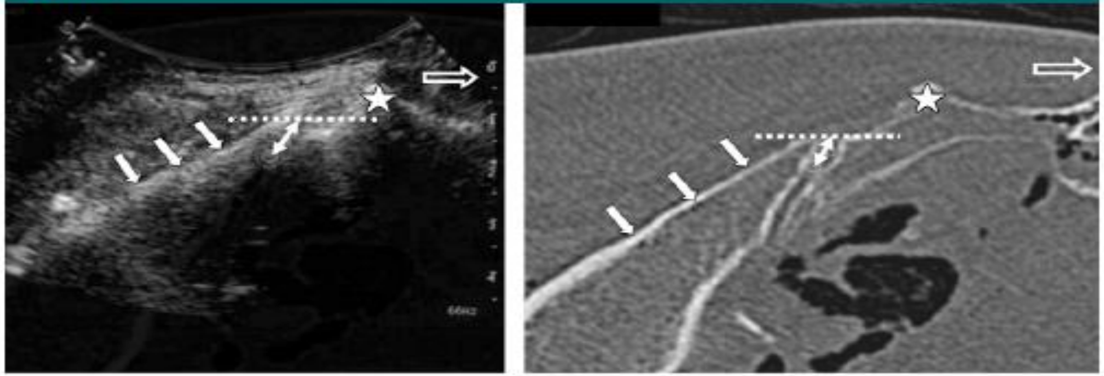
Fusion of Real-time US with CT Images to Guide Sacroiliac Joint Injection in Vitro and in Vivo[1]

Herz-Jesu Krankenhaus Wien

Radiology: Volume 256: Number 2—August 2010 ▪ *radiology.rsna.org*

Andrea S. Klauser, MD
Tobias De Zordo, MD
Gudrun M. Feuchtner, MD
Gabriel Djedovic, MD
Rosa Bellmann Weiler, MD
Ralph Faschingbauer, MD
Michael Schirmer, MD
Bernhard Moriggl, MD

Figure 3

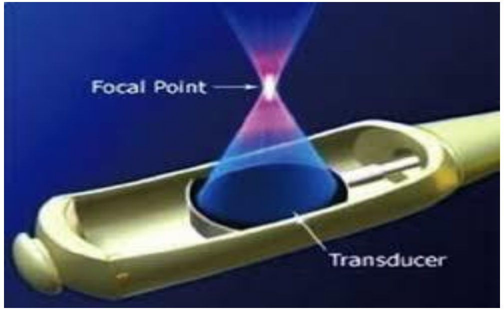


a. b.

Figure 3: **(a)** US image with fused CT data superimposed in a cadaveric specimen and **(b)** corresponding CT image show intraarticular positioning of an ROI. The distance between bony entrance to the sacroiliac joint (dotted line) and intraarticular ROI can be measured (double arrow). After needle insertion into the hypoechoic cleft with real-time US guidance, the measurement reflects how much more the needle should be introduced to reach the intraarticular space. Open arrow = direction to the spinous process (not shown), solid arrows = dorsal cortical line of iliac bone, ★ = left median sacral crest.

M. Greher

HiFu
High intensity focused ultrasound



US-guided percut. nervestimulation

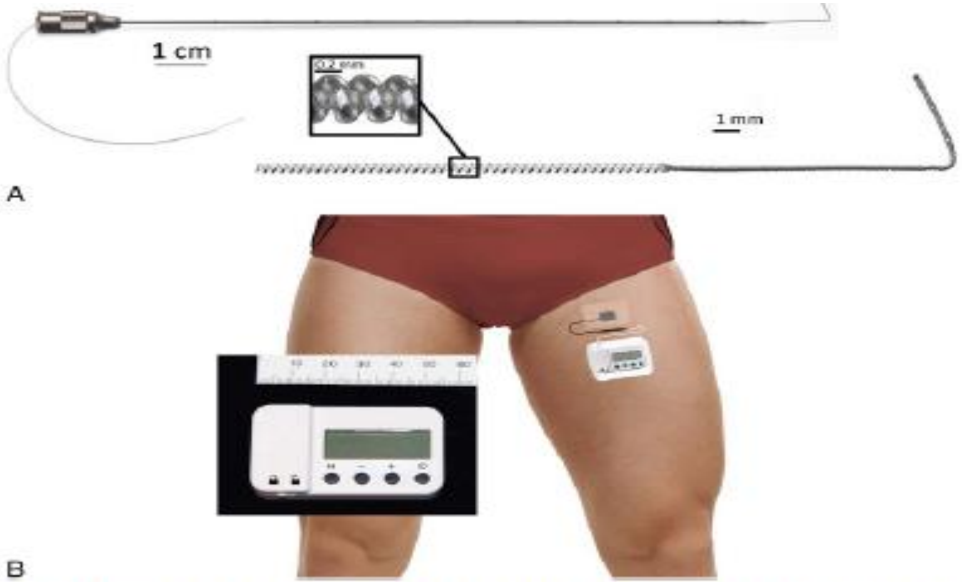
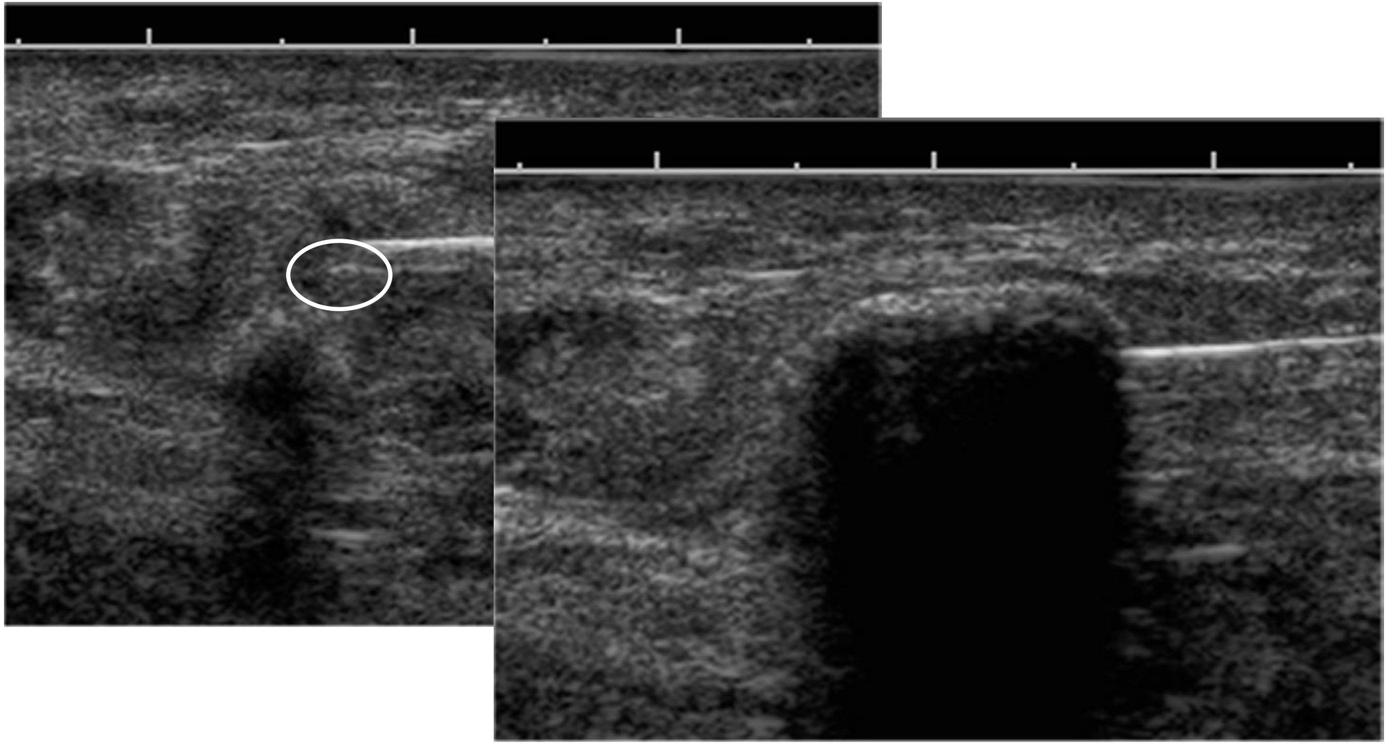


FIGURE 1. The PNS equipment used for this study: A 12.5-cm, 20-gauge needle with a preloaded helically coiled monopolar insulated electrical lead (A; MicroLead, SPR Therapeutics, Inc; illustration used with permission from B.M.I.) and a stimulator attached to the surface return electrode (B; SPR Therapeutics, Inc; illustration used with permission from B.M.I.). The power source (battery) for the pulse generator is integrated into the white surface return electrode pad.



M. Greher

Herz-Jesu Krankenhaus Wien

Observational Study

Medicine®

OPEN

The comparison of measurement between ultrasound and computed tomography for abnormal degenerative facet joints

A STROBE-compliant article

Wen Shi, MD[a], Dan Tian, MD[a], Da Liu, PhD[b], Jing Yin, MD[a], Ying Huang, PhD[a,*]

Abstract

Besides the study on examining facet joints of lumbar spine by ultrasound in normal population, there has not been any related report about examining normal facet joints of lumbar spine by ultrasound so far. This study was aimed to explore the feasibility of ultrasound assessment of lumber spine facet joints by comparing ultrasound measure values of normal and degenerative lumber spine facet joints, and by comparing measure values of ultrasound and computed tomography (CT) of degenerative lumber spine facet joints.

This study included 15 patients who had chronic low back pain because of degenerative change in lumbar vertebrae, and 19 volunteers who did not have low back pain or pain in the lower limb. The ultrasound measure values (height [H] and width [W]) of normal and degenerative lumber spine facet joints were compared. And the differentiation between measure values (H and W) of ultrasound and CT of degenerative lumber spine facet joints was also analyzed.

The ultrasound clearly showed abnormal facet joints lesion, which was characterized by hyperostosis on the edge of joints, bone destruction under joints, and thinner or thicker articular cartilage. There were significant differences between the ultrasound measure values of the normal (H: 1.26 ± 0.03 cm, W: 0.18 ± 0.01 cm) and abnormal facet joints (H: 1.43 ± 0.05 cm, W: 0.15 ± 0.02 cm) (all $P < .05$). However, there were no significant differences between the measure values of the ultrasound (H: 1.43 ± 0.17 cm, W: 0.15 ± 0.03 cm) and CT (H: 1.42 ± 0.16, W: 0.14 ± 0.03) of the degenerative lumber spine facet joints (all $P > .05$).

Ultrasound can clearly show the structure of facet joints of lumbar spine. It is precise and feasible to assess facet joints of lumbar spine by ultrasound. This study has important significance for the diagnosis of lumbar facet joint degeneration.

Abbreviations: H = height, MRI = magnetic resonance imaging, W = width.

Keywords: computed tomography, lumber spine facet joint, ultrasound

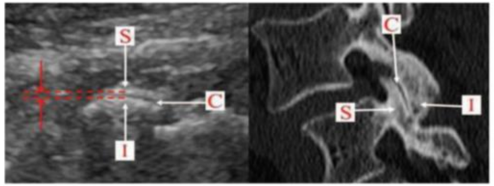


Figure 5. Pictures of abnormal facet joint on the parasagittal plane. Notes: In the left sonogram, S indicates superior articular process, I indicates inferior articular process, and C indicates articular cartilage. The articular cartilage turns thinner obviously and joint space turns narrow. The right picture is the corresponding CT image.

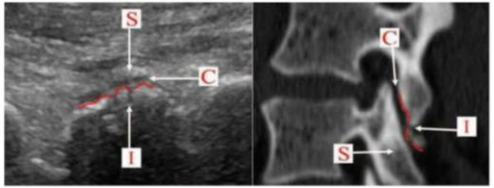


Figure 6. Pictures of abnormal facet joint on the parasagittal plane. Notes: In the left sonogram, S indicates superior articular process, I indicates inferior articular process, and C indicates articular cartilage. The bone of the inferior articular process is destroyed, so the continuity of articular surface is broken. The right picture is the corresponding CT image.

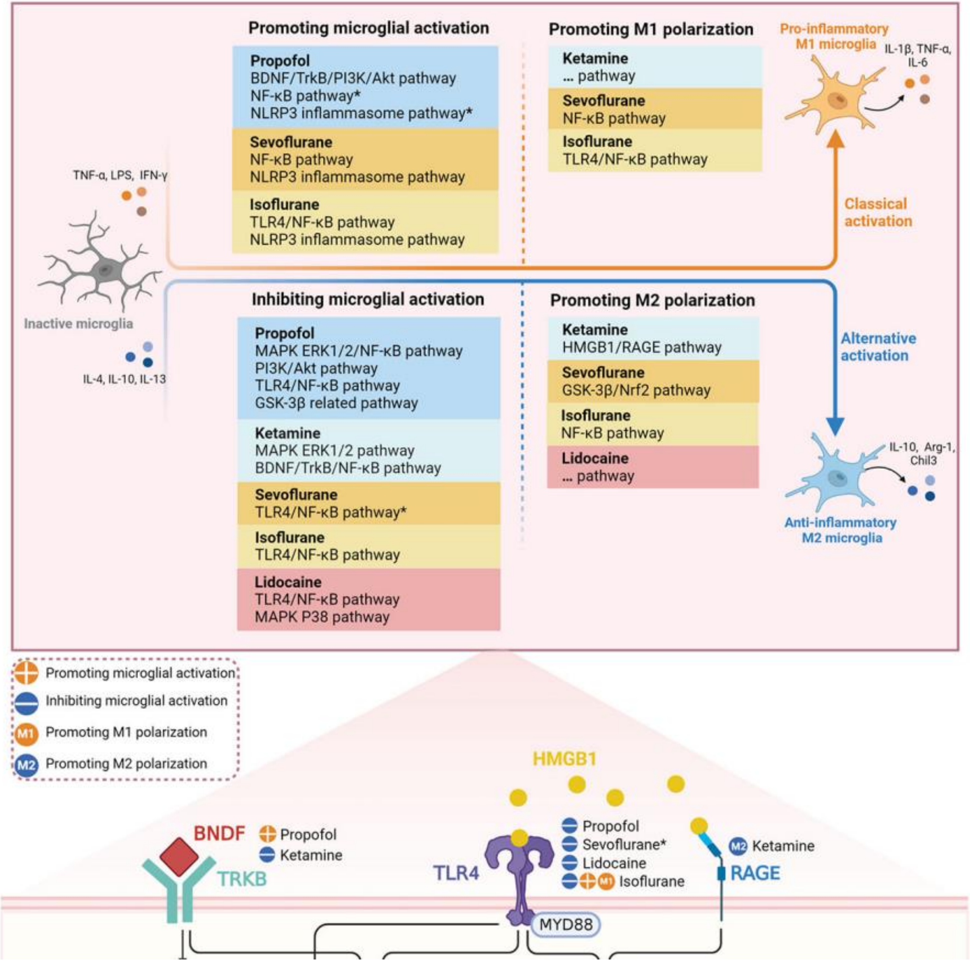
M. Greher 2024

Dual roles of anesthetics in postoperative cognitive dysfunction: Regulation of microglial activation through inflammatory signaling pathways

Mengxue Zhang[1,2,3] and Yiqing Yin[1,2,3*]

[1]Department of Anesthesiology, Tianjin Medical University Cancer Institute and Hospital, National Clinical Research Center for Cancer, Tianjin, China, [2]Tianjin's Clinical Research Center for Cancer, Tianjin, China, [3]Key Laboratory of Cancer Prevention and Therapy, Tianjin, China

Postoperative cognitive dysfunction (POCD) is a prevalent clinical entity following surgery and is characterized by declined neurocognitive function. Neuroinflammation mediated by microglia is the essential mechanism of POCD. Anesthetics are thought to be a major contributor to the development of POCD, as they promote microglial activation and induce neuroinflammation. However, this claim remains controversial. Anesthetics can exert both anti- and pro-inflammatory effects by modulating microglial activation, suggesting that anesthetics may play dual roles in the pathogenesis of POCD. Here, we review the mechanisms by which the commonly used anesthetics regulate microglial activation *via* inflammatory signaling pathways, showing both anti- and pro-inflammatory properties of anesthetics, and indicating how perioperative administration of anesthetics might either relieve or worsen POCD development. The potential for anesthetics to enhance cognitive performance based on their anti-inflammatory properties is further discussed, emphasizing that the beneficial effects of anesthetics vary depending on dose, exposure time, and patients' characteristics. To minimize the incidence of POCD, we recommend considering these factors to select appropriate anesthetics.



Zhang et al. Ibrain 2022:
Ganglion stellatum Blockade gegen POCD?

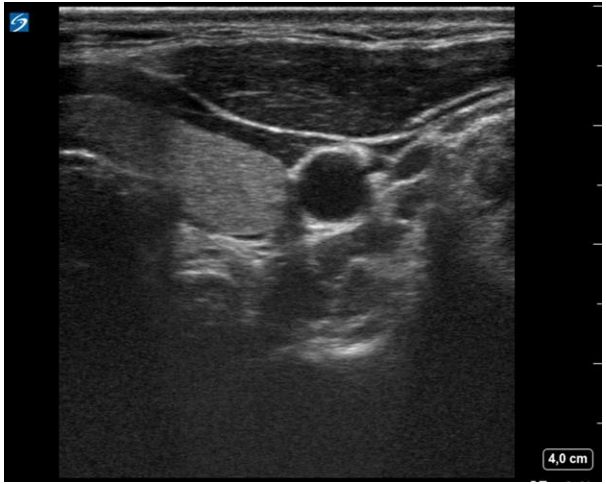
The SGB also has a potential impact on alleviating POCD. In Zhang's research,[53] elderly patients undergoing coronary artery bypass graft under cardiopulmonary bypass (CPB) who were performed right SGB before anesthesia induction, improving cerebral oxygen metabolism. After right SGB, the right side regional cerebral oxygen saturation (rSO_2) was significantly higher than the left side, and the left side rSO_2 of participants after SGB was significantly higher than that of the control group.[53] Simultaneously, the incidence of POCD in the SGB group was significantly lower than that in the control group within 7 days after surgery.[53]

53. Zhang Y, Qian Y, Bao H, Shi H, Zhou J. Effect of stellate ganglion block on bilateral regional cerebral oxygen saturation and postoperative cognitive function. *Sheng Wu Yi Xue Gong Cheng Xue Za Zhi*. 2016;33(1):132-135.
54. Zhang Y, Cheng H, Xu C, et al. Effects of ultrasound-guided stellate ganglion block on cerebral oxygen metabolism and postoperative cognitive dysfunction in the elderly. *Sheng Wu Yi Xue Gong Cheng Xue Za Zhi*. 2014;31(5):1107-1110.

Stellate ganglion block alleviates postoperative cognitive dysfunction via inhibiting TLR4/NF-κB signaling pathway

Kun Yu et al. Neurosci Letter 2023

We found that the development of POCD was associated with the activation of toll-like receptor 4/nuclear factor kapa-B (TLR4/NF-κB) signaling pathway in the microglia in dorsal hippocampus, which induced the production of pro-inflammatory mediators (TNF-α, IL-1β, IL-6) and promoted neuroinflammation. More importantly, we showed evidence that preoperative treatment with SGB could inhibit microglial activation, suppress TLR4/NF-κB-mediated neuroinflammation and effectively attenuate cognitive decline after the surgery.

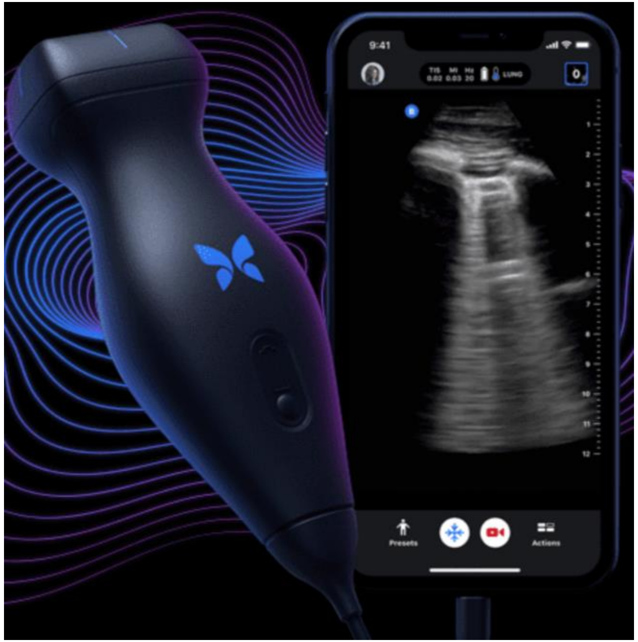


COMPARING THE USE OF FLUOROSCOPY VERSUS ULTRASOUND FOR PAIN INTERVENTIONS

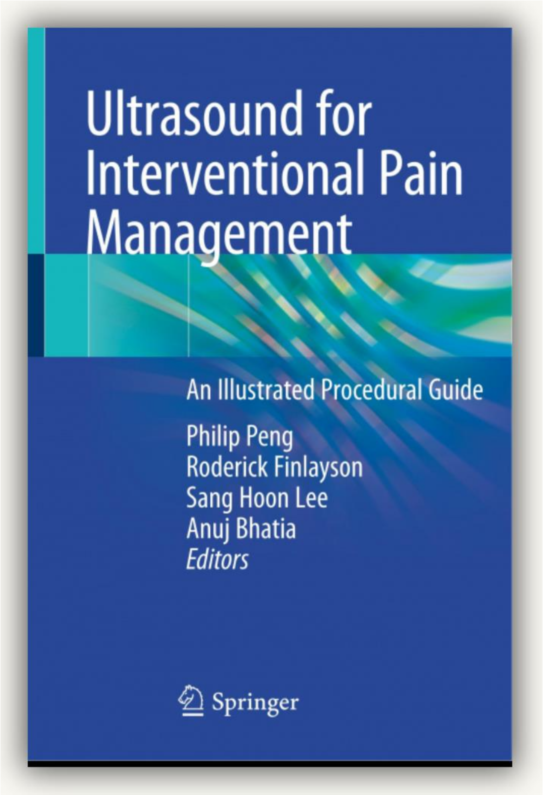
INTERVENTION	FLUOROSCOPY	ULTRASOUND
SPINAL INJECTIONS		
Cervical MBB/FJI	++	++
Cervical transforaminal	++ (DSI)	-
Lumbar MBB	++	+
Lumbar FJI	++	++
Lumbar transforaminal	++ (DSI)	-
SI Joint/caudal epidural	++	++
SYMPATHETIC BLOCKS		
Stellate	?	++
Coeliac	++	+
Lumbar	++	+
Hypogastric	++	+
MUSCULOSKELETAL		
Peripheral nerves	-	++
Trigger point/intramuscular	-/+	++
Bursae/ligaments	-	++
Tendon	-	++
Joint injections	++	++
Functional assessment	-	++

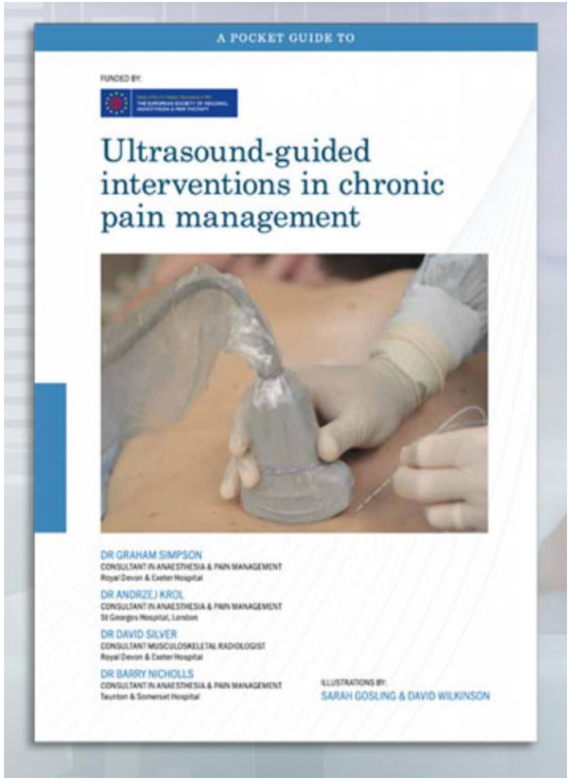
++ = Strongly indicated
+ = Indicated
- = Not indicated/used
? = Historical use. May be superseded by ultrasound

Simpson, Krol, et al.



Butterfly IQ





manfred.greher@kh-herzjesu.at

17.5.2025, Herz-Jesu KH Wien

16. Symposium für US-gez. Nervenblockaden
Schmerztherapie von Kopf bis Fuß