Acute pain in older hospitalized patients: when are infiltrations added value ?

BIUCGM geriatric course program

Turgay TUNA

23/05/2025

H.U.B
HÔPITAL UNIVERSITAIRE DE BRUXELLES
ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT
Hôpital Erasme
ULB
Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola

Douleur

Composante sensori-discriminative

Composante affectivo-émotionnelle

- « Une expérience sensorielle et émotionnelle désagréable associée ou non à des lésions réelles ou potentielles, ou décrite en termes évoquant de telles lésions »

Composante cognitive

From Part III: Pain Terms, A Current List with Definitions and Notes on Usage" (pp 209-214) Classification of Chronic Pain, Second Edition, IASP Task Force on Taxonomy, edited by H. Merskey and N. Bogduk, IASP Press, Seattle, ©1994

- La douleur est toujours une expérience personnelle qui est influencée à des degrés divers par des facteurs biologiques, psychologiques et sociaux.

- La douleur et la nociception sont des phénomènes différents. La douleur ne peut être déduite uniquement de l'activité des neurones sensoriels.

- À travers leurs expériences de vie, les individus apprennent le concept de la douleur.

- Le rapport d'une personne sur une expérience de douleur doit être respecté.

- Bien que la douleur joue généralement un rôle d'adaptation, elle peut avoir des effets négatifs sur le fonctionnement et le bien-être social et psychologique.

- La description verbale n'est qu'un des nombreux comportements permettant d'exprimer la douleur ; l'incapacité à communiquer n'exclut pas la possibilité qu'un être humain ou un animal non humain éprouve de la douleur.

- <u>Douleur aiguë</u>

Signal d'alarme,
mécanisme protecteur.

Douleur subaiguë

- <u>Douleur chronique</u>

Douleur qui perdure > 3 mois;

Facteurs de risque:

- Socio-démographiques;
- Cliniques;
- Psychologiques;
- Génétiques.

Meints SM, Edwards RR. Evaluating psychosocial contributions to chronic pain outcomes. Pro Neuropsy Bio Psy 2018;87:168-182.

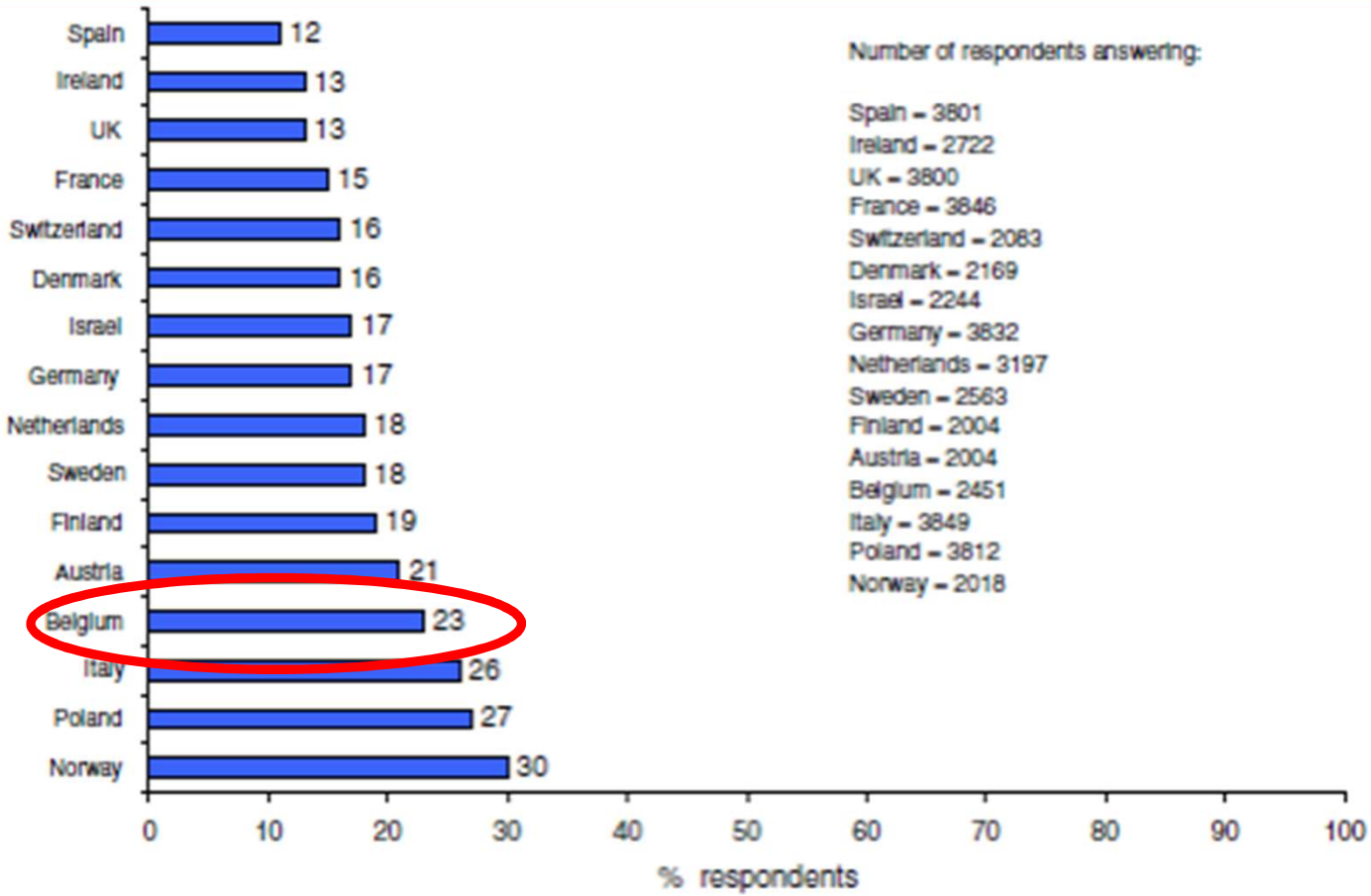
Van Hecke O, Torrance N, Smith BH. Chronic pain epidemiology and its clinical relevance. Br J Anaesth. 2013;111:13-18.

Smith B, Macfarlane G, Torrance E. Epidemiology of chronic pain, from the laboratory to the bus stop: time to add understanding of biological mechanisms to the study of risk factors in population-based research. Pain, 127 (2007), pp. 5-10.

La douleur

- Premier motif de consultation;
- 67% : un épisode douloureux dans l'année;
- 72% de femmes
- 49 à 55% des cas: vécues comme inquiétantes.

Mäntyselkä P, Kumpusalo E, Ahonen R, et al. Pain as a reason to visit the doctor: a study in Finnish primary health care. Pain 2001; 89:175–80.
Koleva D. Pain in primary care: an Italian survey. Eur J Public Health2005; 15:475–79.
Caraceni A, Portenoy RK. An international survey of cancer pain characteristics and syndromes. IASP Task Force on Cancer Pain. International Association for the Study of Pain. Pain 1999; 82:263–74.



H.U.B
HÔPITAL UNIVERSITAIRE DE BRUXELLES
ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT
Hôpital Erasme
ULB
Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola

Macrae WA. Chronic post-surgical pain: 10 years on. Br J Anaesth2008;101:77–86

Koleva D. Pain in primary care: an Italian survey. Eur J Public Health2005;15:475–79

Ospina MB, Taenzer P, Rashiq S, et al. A systematic review of the effectiveness of knowledge translation for chronic noncancer pain management. Pain Res Manag. 2013;18(6):e129-141

10 à 50%

CPSP: prévalence

2 à 10%
=
sévère

- Amputation du membre inférieur: 70% de douleur fantôme et 62% de douleur du moignon ;
- Arthroplastie de la hanche: 27% ;
- Arthroplastie du genou : 44 à 58%, composante neuropathique: 11% des cas; douleur modérée à sévère dans 22% des cas;
- Cure de hernie inguinale: 9 à 43% ;
- Cure de hernie discale lombaire: 44% ;
- Mastectomie avec curage axillaire: 30 à 60%, douleurs modérées à sévères: 14%;
- Thoracotomie par voie postéro-latérale: 39 à 57% ;
- Thoracoscopie: 31%
- Hystérectomie: 26%, des douleurs modérées à sévères: 9 à 10.2% des cas.

Hôpital Erasme | ULB

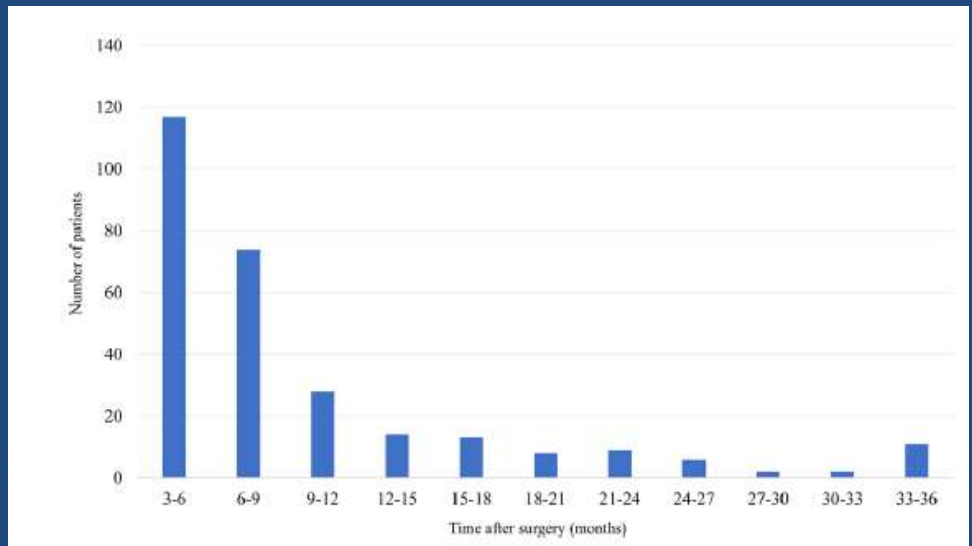


Figure 2 Summed duration of chronic postsurgical pain (CPSP) in patients with CPSP followed up for 36 months after surgery (total, n=1457; CPSP, n=284).

EJA

Eur J Anaesthesiol 2015; **32**:725–734

ORIGINAL ARTICLE

Chronic postsurgical pain in Europe

An observational study

Dominique Fletcher*, Ulrike M. Stamer*, Esther Pogatzki-Zahn, Ruth Zaslansky, Narcis Valentin Tanase, Christophe Perruchoud, Peter Kranke, Marcus Komann, Thomas Lehman , euCPSP group for the Clinical Trial Network group of the European Society of Anaesthesiology and Winfried Meissner

ANESTHESIOLOGY

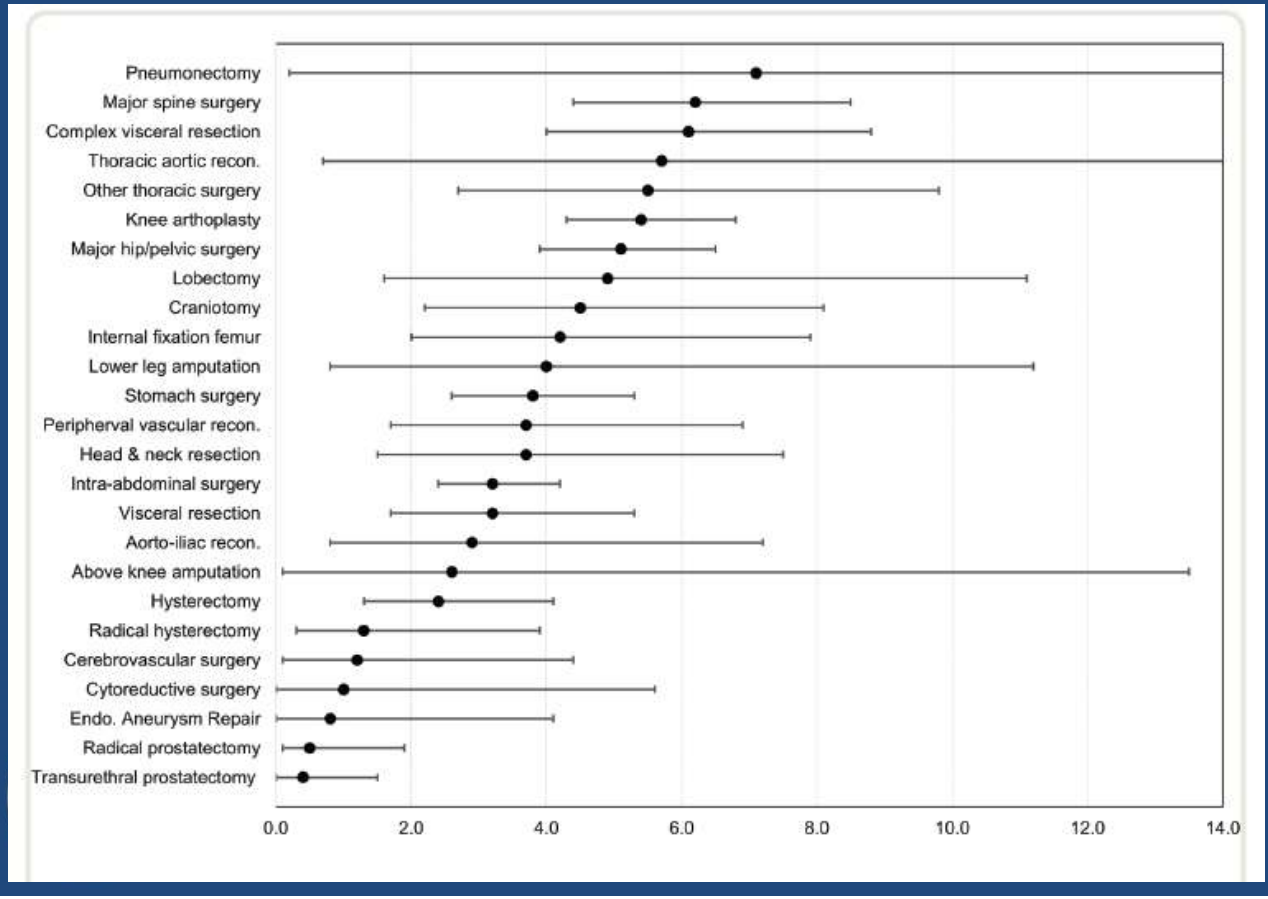
Persistent Incisional Pain after Noncardiac Surgery: An International Prospective Cohort Study

James S. Khan, M.D., M.Sc., Daniel I. Sessler, M.D., Matthew T. V. Chan, M.B., B.S., Ph.D., C. Y. Wang, M.B.Ch.B., F.R.C.A., Ignacio Garutti, M.D., Ph.D., Wojciech Szczeklik, M.D., Ph.D., Alparslan Turan, M.D., Jason W. Busse, D.C., Ph.D., D. Norman Buckley, M.D., James Paul, M.D., M.Sc., Michael McGillion, R.N., Ph.D., Carmen Fernández-Riveira, M.D., Ph.D., Sadeesh K. Srinathan, M.D., Harsha Shanthanna, M.D., Ph.D., Ian Gilron, M.D., M.Sc., Michael Jacka, M.D., M.B.A., Paul Jackson, B.Sc., M.Sc., M.S., M.D., James Hankinson, M.D., Pilar Paniagua, M.D., Ph.D., Shirley Pettit, R.N., P. J. Devereaux, M.D., Ph.D.

Anesthesiology 2021; 135:711–23

Hôpital Erasme

ULB



Facteurs de risque

Surgical characteristics			
Operation year, n			<0.01
2007/2008/2009/2010/2011/2012/2013/2014/2015/2016	45/33/24/38/71/66/66/78/75/62	122/119/141/147/268/331/319/364/394/437	
Operative technique			<0.001
Thoracotomy	193 (34.6)	611 (23.1)	
VATS	365 (65.4)	2031 (76.9)	
Operation type			0.03
Pneumonectomy	16 (2.9)	54 (2.0)	
Lobectomy	471 (84.4)	2117 (80.1)	
Segmentectomy	28 (5.0)	213 (8.1)	
Wedge resection	39 (7.0)	244 (9.2)	
Biopsy	3 (0.5)	13 (0.5)	
Explorative surgery	1 (0.2)	1 (0)	
Operation time, min	160 (130–215)	147 (120–190)	<0.001
Type of anesthesia			0.02
Inhalation agent	187 (33.5)	748 (28.3)	
TIVA	371 (66.5)	1894 (71.7)	
Type of PCA			0.15
Intravenous PCA	426 (76.3)	2065 (78.2)	
Epidural PCA	129 (23.1)	551 (20.9)	
Paravertebral PCA	3 (0.5)	9 (0.3)	
None	0 (0.0)	17 (0.6)	
Other analgesic techniques			0.04
Intercostal nerve blockade	81 (14.5)	493 (18.7)	
Percutaneous wound injection	62 (11.1)	241 (9.1)	
Maximal NRS score during POD 2, 0–10	7 (5–8)	7 (5–8)	0.02
NRS score at first outpatient visit after surgery, 0–10	3 (3–5)	2 (0–3)	<0.001

Hôpital Erasme

ULB

Original research

Long-term incidence of chronic postsurgical pain after thoracic surgery for lung cancer: a 10-year single-center retrospective study

Susie Yoon,[1,2] Won-Pyo Hong,[1] Hyundeok Joo,[3] Hansol Kim,[1] Samina Park,[4,5] Jae-Hyon Bahk,[1,2] Ho-Jin Lee [1,2]

	CPSP group	Non-CPSP group	P value*†
Sample size, n	558	2642	
Demographic characteristics			
Age, years	64 (58–70)	64 (56–71)	0.82
Sex			0.09
Male	295 (52.9)	1503 (56.9)	
Female	263 (47.1)	1139 (43.1)	
Body mass index, kg/m²	23.7 (21.9–25.8)	23.6 (21.6–25.6)	0.32
Current smoker	151 (27.1)	761 (28.8)	0.44
Background medical status			
ASA class I/II/III	160 (28.7)/364 (65.2)/34 (6.1)	752 (28.5)/1749 (66.2)/141 (5.3)	0.76
Diabetes mellitus	82 (14.7)	375 (14.2)	0.81
History of tuberculosis	45 (8.1)	202 (7.6)	0.80
Preoperative analgesic use	24 (4.3)	110 (4.2)	0.98
Preoperative strong opioid use‡	0 (0)	6 (0.2)	0.56
Preoperative antipsychotics use	8 (1.4)	49 (1.9)	0.61
Preoperative chemotherapy	19 (3.4)	84 (3.2)	0.89
Postoperative chemotherapy	196 (35.1)	667 (25.2)	<0.001
Preoperative radiation therapy	12 (2.2)	60 (2.3)	0.99
Postoperative radiation therapy	85 (15.2)	276 (10.4)	<0.01
Previous other surgeries	358 (64.2)	1678 (63.5)	0.81

Hôpital Erasme

ULB

Original research

Long-term incidence of chronic postsurgical pain after thoracic surgery for lung cancer: a 10-year single-center retrospective study

Susie Yoon,[1,2] Won-Pyo Hong,[1] Hyundeok Joo,[3] Hansol Kim,[1] Samina Park,[4,5] Jae-Hyon Bahk,[1,2] Ho-Jin Lee [1,2]

- Doule
- 24 pre
  opéra
- Opioï
- Catast
- Genre

- Sexe
- Age
- Douleur préopératoire en rapport avec le site chirurgical
- Usage préopératoire régulier d'opioïdes
- Usage préopératoire régulier d'anxiolytiques/antidépresseurs
- Chirurgie par tomie,
- Type de chirurgie : thoracique, abdominale, orthopédique
- Chirurgie de longue durée (>120 minutes)
- Obésité (BMI>30)
- Niveau élevé d'anxiété lors de la consultation préopératoire

Score de Kalkman

F.M. Perkins, H. Kehlet: Chr

Lavand'homme PM, Grosu I, er knee arthroplasty: an observational study. Clin Ort

Alkan A, Guc ZG, Senler FC, drome and posttraumatic stress disorder (ORTHUS study): a study (TOG). Support Care Cancer 2016; 24(9):3747-55.

Theunissen M, Peters ML, Schepers J, et al. Recovery 3 and 12 months after hysterectomy: epidemiology and predictors of chronic pain, physical functioning, and global surgery recovery. Medicine (Baltimore) 2016; 95(26): e3980.

International Journal of General Medicine

Dovepress
open access to scientific and medical research

Open Access Full Text Article

ORIGINAL RESEARCH

Predictors of Chronic Postsurgical Pain in Elderly Patients Undergoing Hip Arthroplasty: A Multi-Center Retrospective Cohort Study

Hôpital Erasme

ULB

Table 2 Factors Associated with the Possibility of CPSP at 6 Months Postoperatively (N=612. Five Independent Variables Including Type of Surgery, Preoperative NRS in the Surgical Area, Acute Postoperative NRS, Preoperative Depression State, and Analgesic Type Were Involved in Final Regression Model)

Factors	Univariate Analysis			Multiple Logistic Regression		
	OR	95% CI	P	OR	95% CI	P
Gender (Male vs Female)	1.055	0.737–1.512	0.769			
Age	0.979	0.958–1.001	0.066			
BMI (kg/m^2)	1.021	0.950–1.098	0.571			
Education(1vs.2/3)						
High school	1.108	0.772–1.589	0.579			
Above college	0.291	0.066–1.277	0.102			
ASA grade (Ivs.II/III)						
II	1.327	0.886–1.988	0.170			
III	1.049	0.629–1.749	0.854			
Smoking (No vs Yes)	1.034	0.685–1.559	0.875			
Alcohol abuse (No vs Yes)	1.406	0.871–2.270	0.163			
Use of DEX during surgery (No vs Yes)	0.831	0.578–1.194	0.317			
Blood loss volume (mL)	1.001	1.000–1.002	0.094			
Blood transfusion volume (mL)	1.174	0.937–1.471	0.163			
Duration of surgery (h)	1.090	0.904–1.316	0.367			
Preoperative NRS (surgical area)	1.706	1.448–2.009	<0.001	2.456	1.814–3.327	<0.001
Preoperative NRS (non-surgical area)	1.025	0.627–1.675	0.922			
Preoperative PASS-20	0.996	0.981–1.011	0.602			
Preoperative CES-D	1.115	1.065–1.168	<0.001	1.256	1.146–1.378	<0.001
Type of surgery (Hemi-hip vs Total hip)	3.873	2.609–5.749	<0.001	7.138	3.548–14.364	<0.001
Analgesic method (OA vs PCEA/PCIA)						
PCEA	0.062	0.036–0.107	<0.001	0.129	0.055–0.299	<0.001
PCIA	0.024	0.011–0.051	<0.001	0.033	0.011–0.097	<0.001
Acute NRS postoperatively	6.517	4.789–8.869	<0.001	5.537	3.607–8.499	<0.001

Abbreviations: CPSP, chronic postsurgical pain; PCEA, patient-controlled epidural analgesia; PCIA, patient-controlled intravenous analgesia; OA, oral analgesia; NRS, numerical rating scale; ASA, American Society of Anesthesiologists; DEX, dexmedetomidine.

Algologie interventionnelle

H.U.B
HÔPITAL UNIVERSITAIRE DE BRUXELLES
ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT
Hôpital Erasme
ULB
Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola

Quels agents ?

1. Corticoïdes

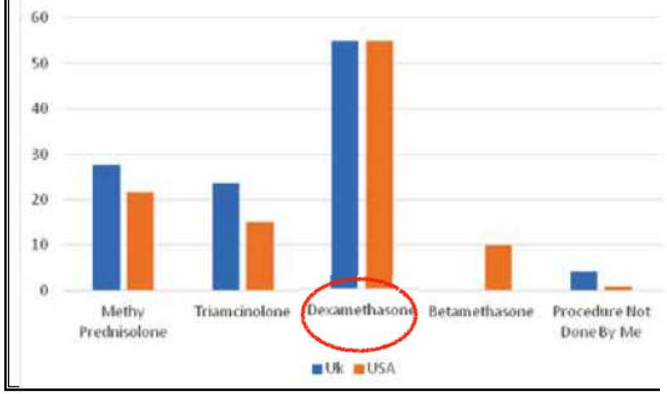
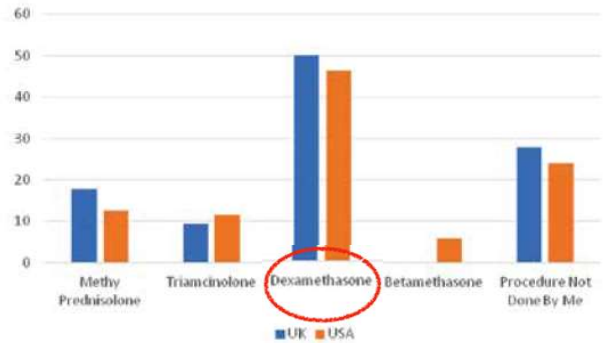


Fig. 3. *Percentage of pain physicians using particulate or nonparticulate steroids for the first/initial lumbar transforaminal epidural injection.*

Hôpital Erasme

ULB

Fig. 5. *Percentage of pain physicians using particulate or nonparticulate steroids for the first/initial thoracic transforaminal epidural injection.*



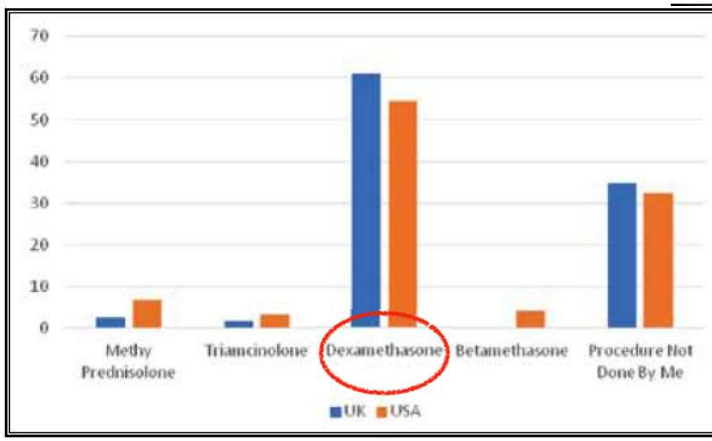


Fig. 4. *Percentage of pain physicians using particulate or nonparticulate steroids for the first/initial cervical transforaminal epidural injection.*

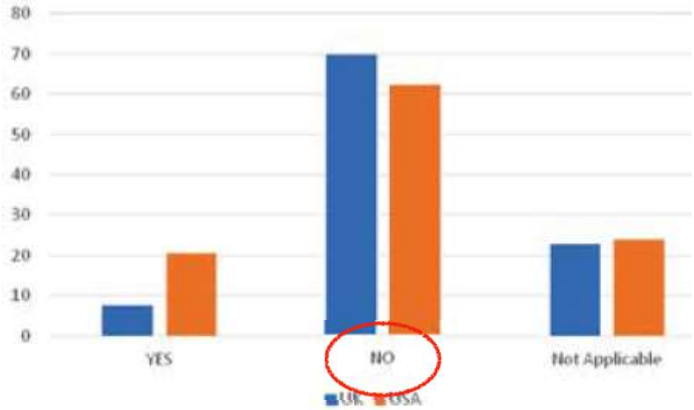


Fig. 6. *Percentage of pain physicians switching to a particulate steroid if the first transforaminal epidural injection with dexamethasone does not provide satisfactory pain relief.*

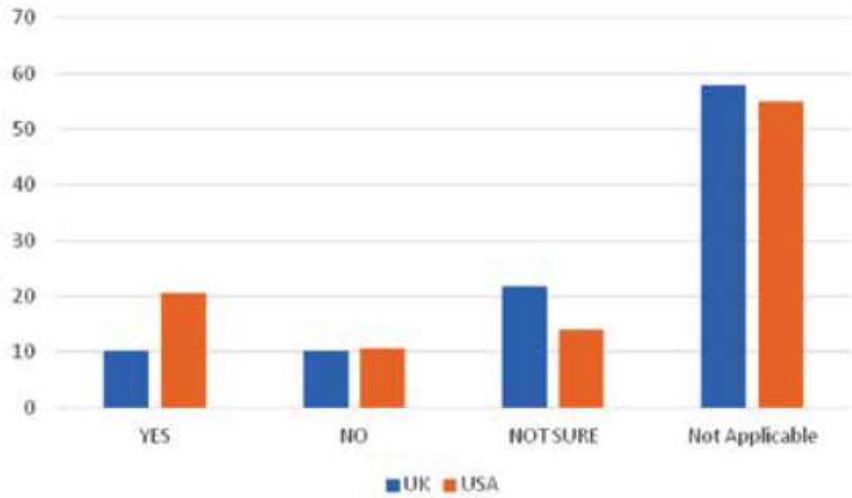


Fig. 7. *Percentage of pain physicians who agree that changing from dexamethasone to a particulate steroid for the second transforaminal epidural injection provides better pain relief.*

2. Anesthésique local

Pain Physician 2019; 22:E435-E440 • ISSN 2150-1149

Cross-Sectional Study

Variations of Technique in Transforaminal Epidural Steroid Injections and Periprocedural Practices by Interventional Pain Medicine Physicians in the United States

Lisa V. Doan, MD, Francisco Narvaez, MD, Michael Fakhry, MD, Kristoffer Padjen, MD, and Christopher G. Gharibo, MD

Hôpital Erasme ULB

Table 1. *Percentage of respondents who prefer each steroid in injectate*

	Cervical TFESI (n = 83)	Lumbar TFESI (n = 242)
Betamethasone	12.1	14.4
Dexamethsone	72.3	36
Methylprednisolone	8.4	31.8
Triamcinolone	2.4	17.4
No steroid	4.8	0.4

Abbreviations: TFESI, transforaminal epidural steroid injection.

Table 2. *Percentage of respondents who prefer each local anesthetic in injectate.*

	Cervical TFESI (n = 85)	Lumbar TFESI (n = 242)
Bupivacaine	29.4	43.8
Lidocaine	50.6	40.9
Ropivacaine	0	2.9
Other	3.5	0.8
None	16.5	11.6

Abbreviations: TFESI, transforaminal epidural steroid injection.

Hôpital Erasme

ULB

Anticoagulation ?
To stop or not to stop

Pain Physician 2020; 23:127-134 • ISSN 1533-3159

Survey

Interventional Pain Medicine Practice in the UK and the USA: A Survey of 242 Pain Physicians

Sanjeeva Gupta, MD[1] and Manohar Sharma, MD[2]

Table 2. *Table showing the percentage of pain physicians either stopping or continuing anticoagulants for medial branch block or sacroiliac joint block in the United Kingdom and the United States.*

Abbreviations: MBB, medial branch block; SIJ, sacroiliac joint

Do you stop anticoagulants/ antiplatelet agents before	YES		No		I don't do this Procedure	
	UK	USA	UK	USA	UK	USA
Lumbar MBB	36%	28%	60%	72%	4%	0%
Cervical MBB	55%	45%	26%	54%	19%	1%
Thoracic MBB	30%	31%	37%	60%	33%	9%
SIJ Block	30%	15%	62%	79%	8%	6%

Do you stop anticoagulants/ antiplatelet agents before	YES		No		I don't do this procedure	
	UK	USA	UK	USA	UK	USA
Lumbar MBB RFD	58%	49%	35%	51%	7%	0%
Cervical MBB RFD	59%	58%	17%	40%	24%	2%
Thoracic MBB RFD	32%	44%	20%	44%	48%	12%
SIJ RFD	43%	35%	31%	46%	26%	19%

Abbreviations: MBB, medial branch block; RFD, radiofrequency denervation; SIJ, sacroiliac joint

Table 3. *Table showing the percentage of pain physicians either stopping or continuing anticoagulants for medial branch radiofrequency denervation or sacroiliac joint radiofrequency denervation in the United Kingdom and the United States.*

Hôpital Erasme

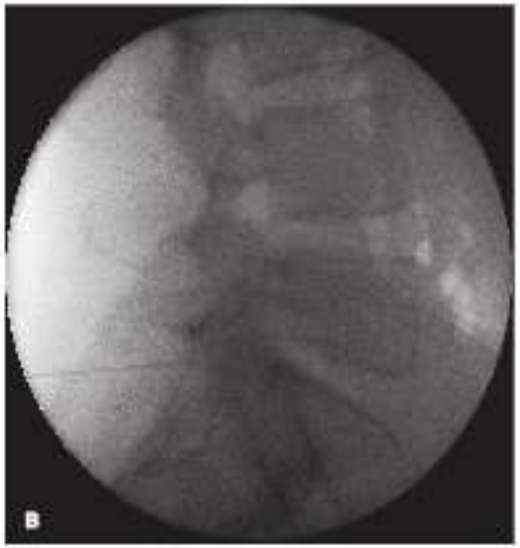
ULB

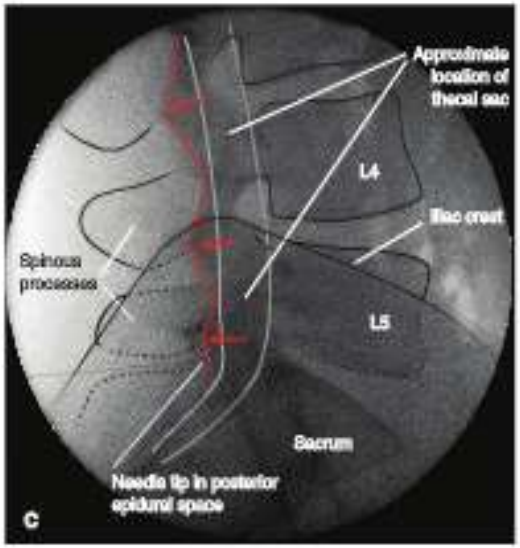
Radiculalgies:
Epidurale vs infiltration foraminale

Epidurale

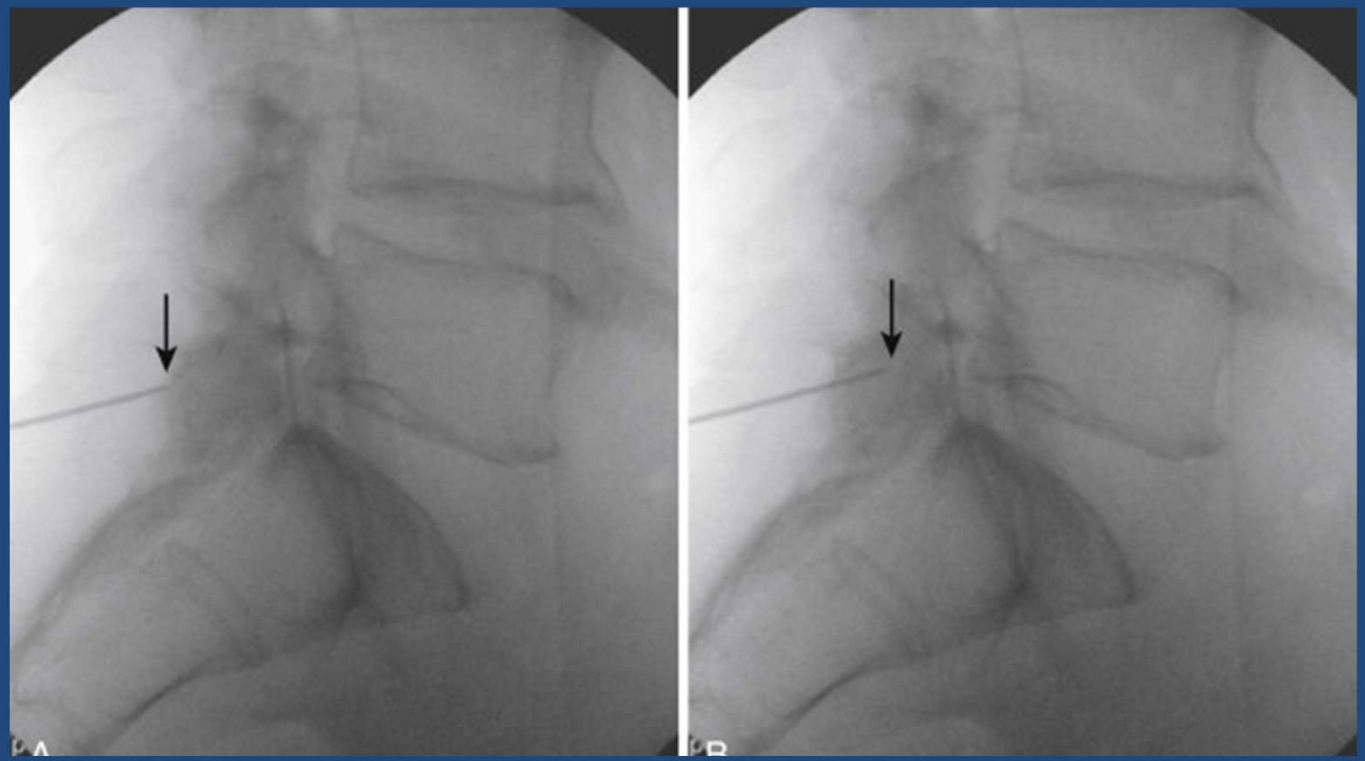
Hôpital Erasme

ULB





Lidocaïne + Depo-medrol



3 ml AL + Cortico

TABLE 98.5

THE RESULTS OF A CONTROLLED TRIAL AT 3 MONTHS AFTER TREATMENT WITH LUMBAR EPIDURAL INJECTIONS OF STEROIDS OR SALINE[116]

Outcome measure	Treatment	
	Steroid	Normal saline
Oswestry disability (0–100)	32	35
Pain (Visual Analog Score; 0–100)	39	40
Sickness Impact Profile (0–100)		
Overall	12	13
Physical	10	9
Restricted activity (days)	6	9

Data from Carette S, LeClaire R, Marcoux S, et al. Epidural corticosteroid injections for sciatica due to herniated nucleus pulposus. *N Eng J Med* 1997;336:1634–1640.

TABLE 98.3

THE OUTCOMES AT 3 MONTHS AFTER TREATMENT WITH EITHER A LUMBAR INTERLAMINAR INJECTION OF STEROIDS OR AN INJECTION OF SALINE INTO AN INTERSPINOUS LIGAMENT[83]

Pain	Treatment		*p* Value
	Steroids	Saline	
None	16	8	
Not severe	24	20	
Severe	1	6	0.05
Surgery	7	10	0.06
Unknown	3	4	0.10

On chi squared analysis, the *p* value is 0.05 if patients who had surgery or whose outcomes were unknown are disregarded. If patients who had surgery are classified as failures, the *p* value increases to 0.06. If unknown

TABLE 98.2

THE RESULTS OF BUSH AND HILLIER[114] IN A CONTROLLED TRIAL OF CAUDAL INJECTIONS OF EPIDURAL STEROIDS

	Response				*p* Value
	No pain	Better	No change	Worse	
At 4 weeks					
Treated	2	5	4	1	0.66
Control	2	3	3	3	
At 1 year					
Treated	6	4	2	2	0.57
Control	6	1	1	3	

The treated group received saline, procaine, and triamcinolone. The control group received saline only. Chi squared analysis yields nonsignificant *p* values.

Data from Bush K, Hillier S. A controlled study of caudal epidural injections of triamcinolone plus procaine for the management of intractable sciatica. *Spine* 1991;16:572–575.

Hôpital Erasme

ULB

TABLE 98.8

A SYNOPSIS OF THE EVIDENCE ON EPIDURAL INJECTIONS OF STEROIDS BY VARIOUS ROUTES

Route		Efficacy
Blind	Caudal	Short-term (<4 weeks) Epidural Steroids = Epidural Normal Saline Long-term (>4 weeks) Epidural Steroids = Epidural Normal Saline
	Lumbar	Short-term (<4 weeks) Epidural Steroids = Interspinous Normal Saline Epidural Steroids = Epidural Normal Saline Epidural Steroids > Epidural Normal Saline Long-term (>4 weeks) Epidural Steroids = Epidural Normal Saline Epidural Steroids = Interspinous Normal Saline
Fluroscopically-Guided	Caudal Lumbar	No evidence available
Transforaminal		Transforaminal Steroids>IM Normal Saline Transforaminal Steroids>IM Steroids Transforaminal Steroids > Interlaminar Steroids Transforaminal Steroids = Transforaminal LA Surgery Sparing

IM, intramuscular; LA, local anaesthetic.

TABLE 98.6

THE RESULTS OF A CONTROLLED TRIAL OF LUMBAR INTERLAMINAR EPIDURAL INJECTIONS OF STEROIDS OR NORMAL SALINE[117]

	Proportion relieved		
	Normal saline (N = 42)	Steroids (N = 43)	NNT
Day 20	0.36	0.51	6.5
Day 35	0.48	0.49	100

NNT, number needed to treat.
Data from Valat JP, Girausdeau B, Rozenberg S, et al. Epidural corticosteroid injections for sciatica: a randomised, double-blind, controlled clinical trial. *Ann Rheum Dis* 2003;62:639–643.

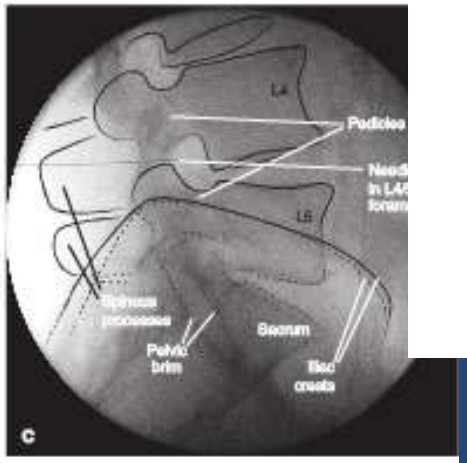
ERASMVS

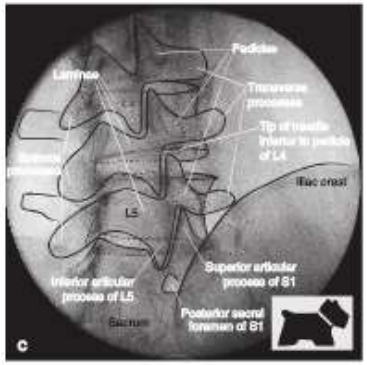
SCIENTIA VINCERE TENEBRAS ULB

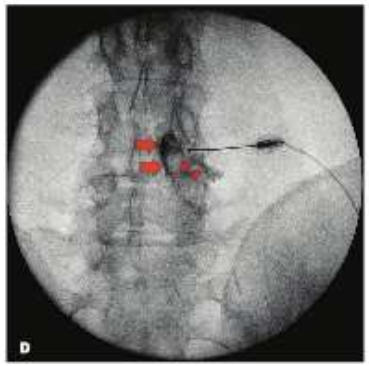
Infiltration foraminale

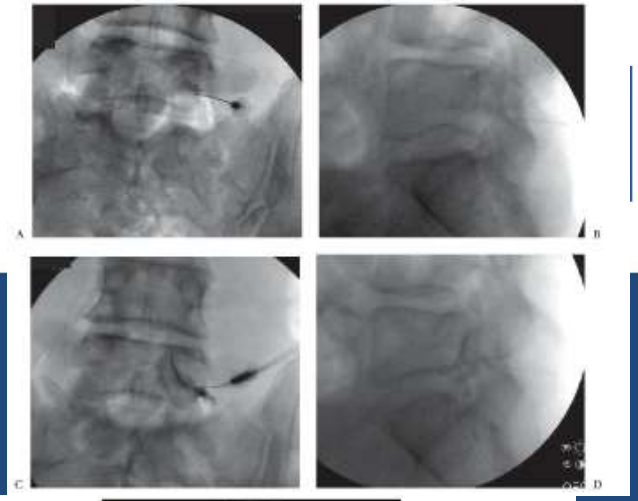
Hôpital Erasme

ULB









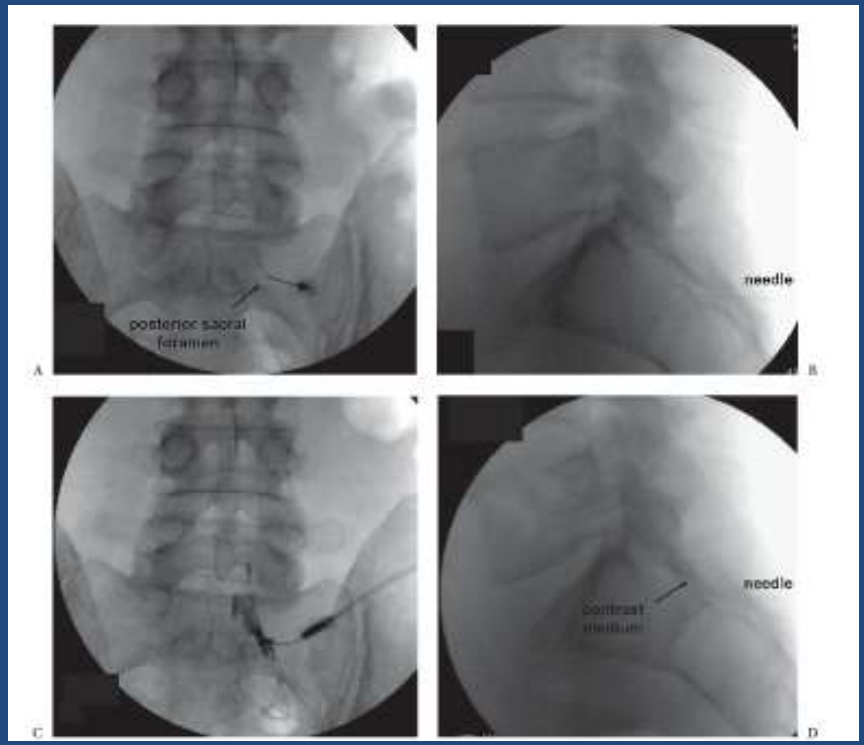
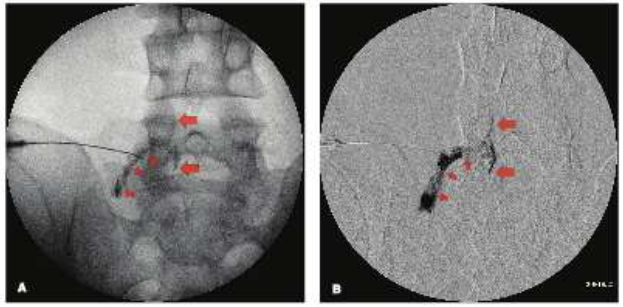


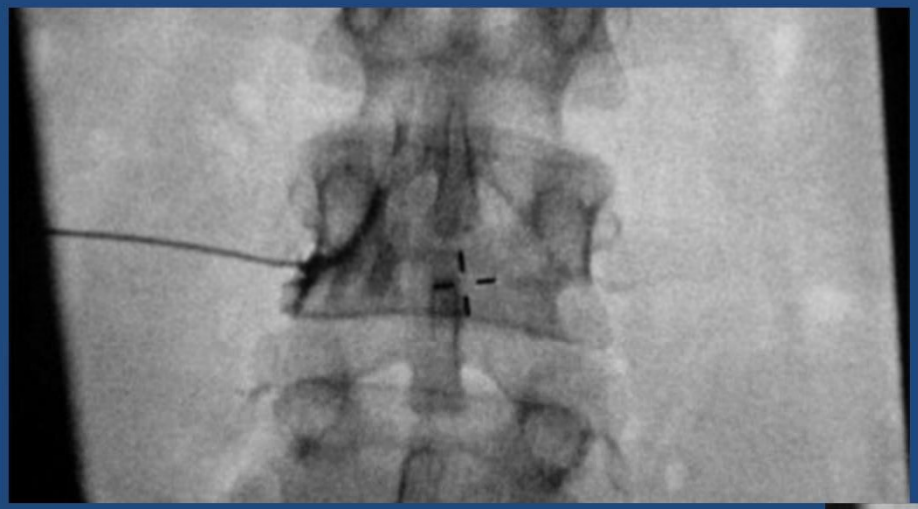
Figure 6-11. *(Continued)*

D: Lateral radiograph with the needle in final position for right L4/L5 transforaminal injection after injection of 1 mL of radiographic contrast medium (iopamidol 200 mg per mL). Contrast outlines the spinal nerve (*small arrows*) and extends along the anterior and posterior aspects of the epidural space (*large arrows*).

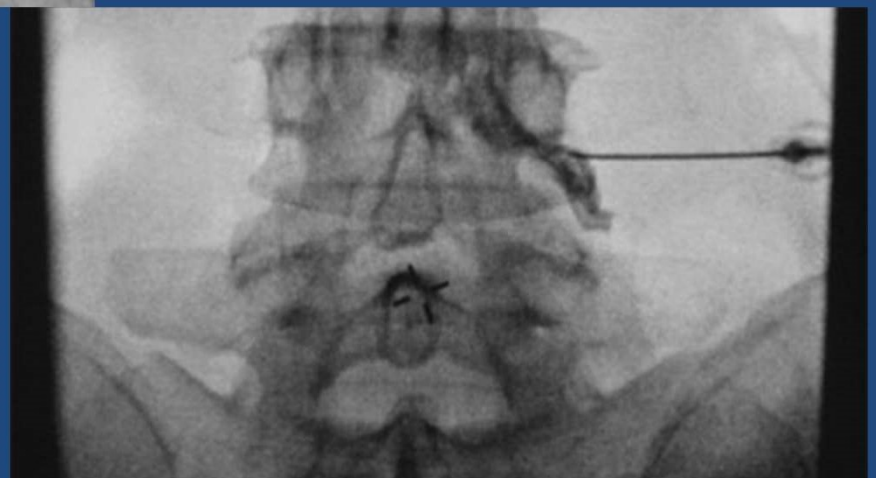


Hôpital Erasme

ULB



1 ml AL + Cortico



Hôpital Erasme

ULB

TABLE 98.7

THE RESULTS OF A CONTROLLED TRIAL THAT COMPARED THE OUTCOMES OF TREATMENT WITH TRANSFORAMINAL INJECTIONS OF STEROIDS AND PARASPINAL INJECTIONS OF NORMAL SALINE[69]

Outcome	Treatment: Transforaminal injection of steroids (N = 25)	Treatment: Paraspinal normal saline (N = 23)
Pain (0–100) (mean ± sd)		
Baseline	88 ± 14	94 ± 14
12 months	16 ± 8	36 ± 11
Roland Morris		
Baseline	8.8	9.6
12 months	22.1	18.3
>50% relief of pain	[illegible]	11
	84%	48%

Data from Vad VB, Bhat AL, Lutz GE, et al. Transforaminal epidural steroid injections in lumbosacral radiculopathy. *Spine* 2002;27:11–16.

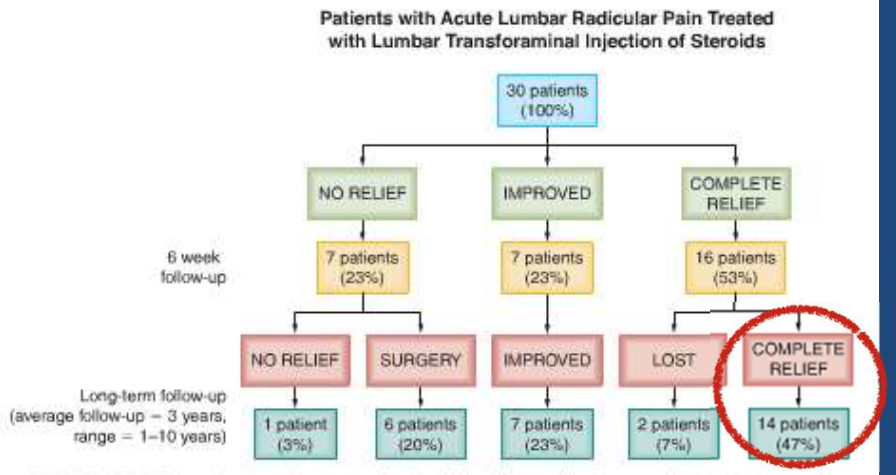


FIGURE 98.8 The results of an observational study of the efficacy of lumbar transforaminal injection of steroids. (Data from Weiner BK, Fraser RD. Foraminal injection for lateral lumbar disc herniation. *J Bone Joint Surg* 1997;79B:804–807.)

Hindawi
Pain Research and Management
Volume 2020, Article ID 9103421, 10 pages
https://doi.org/10.1155/2020/9103421

Research Article

Ultrasound-Guided Selective Nerve Root Block versus Fluoroscopy-Guided Interlaminar Epidural Block versus Fluoroscopy-Guided Transforaminal Epidural Block for the Treatment of Radicular Pain in the Lower Cervical Spine: A Retrospective Comparative Study

Jin Hyuk Jang,[1] Woo Yong Lee,[2] Jong woo Kim,[3] Kyoung Rai Cho,[4] Sang Hyun Nam,[5] and YongBum Park[1]

[1]*Department of Rehabilitation Medicine, Sanggye Paik Hospital, Inje University College of Medicine, Seoul, Republic of Korea*
[2]*Department of Anesthesiology, Sanggye Paik Hospital, Inje University College of Medicine, Seoul, Republic of Korea*
[3]*Department of Family Medicine, Sanggye Paik Hospital, Inje University College of Medicine, Seoul, Republic of Korea*
[4]*Department of Otorhinolaryngology Head and Neck Surgery, Sanggye Paik Hospital, Inje University College of Medicine, Seoul, Republic of Korea*
[5]*Department of Plastic and Reconstructive Surgery, Sanggye Paik Hospital, Inje University College of Medicine, Seoul, Republic of Korea*

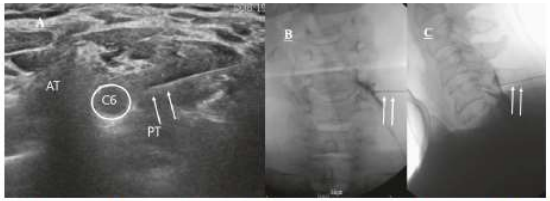


Figure 1: (A) Ultrasonography-guided selective nerve root block (target nerve root: C6). The needle (arrow) is placed on the dorsal surface of the C6 nerve root. AT, anterior tubercle; PT, posterior tubercle. (B) C6 transforaminal epidural injection. The A-P view of the contrast media which spread into the intraforaminal lesion. (C) C5-6 interlaminar epidural injection. Lateral view of the contrast media which spreads into the epidural space. The arrow indicates a needle.

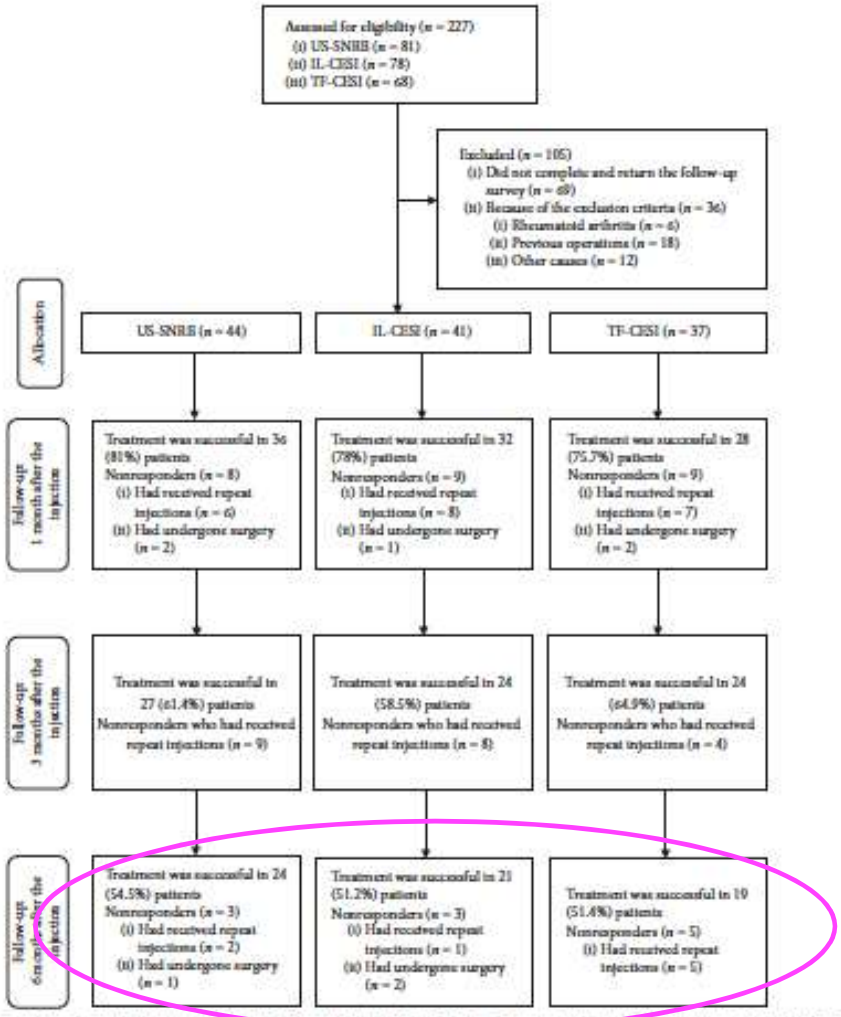
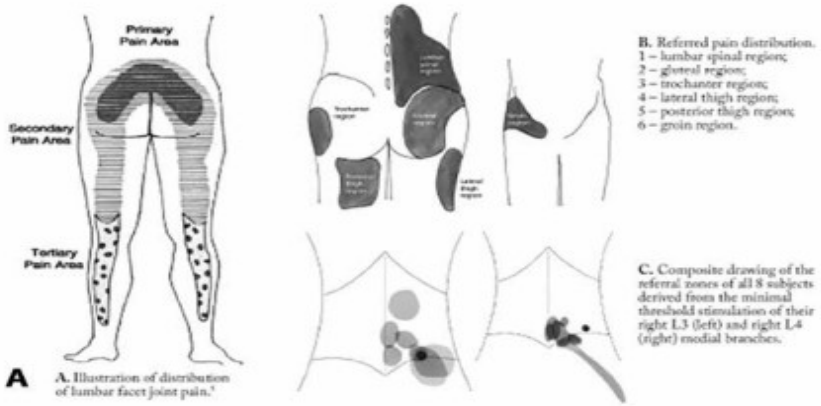


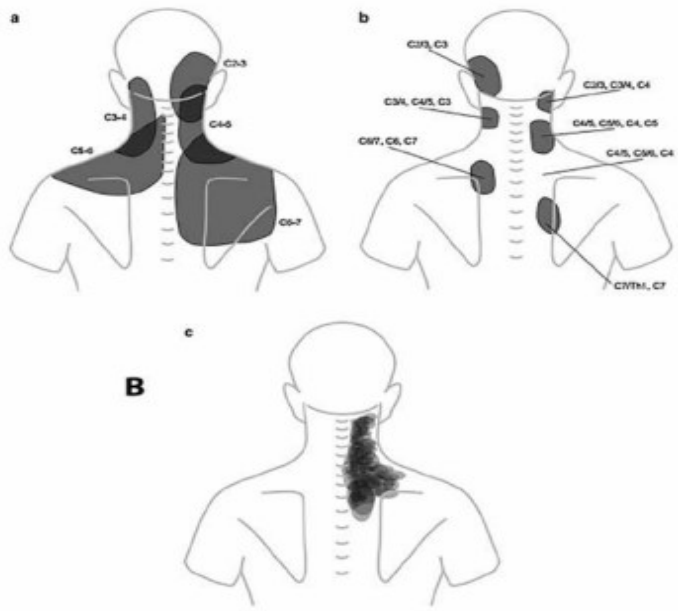
Figure 2: Flow diagram indicating progress of patients through the study. US-SNRB: ultrasonography-guided selective nerve root block, IL-CESI: fluoroscopy-guided interlaminar cervical epidural steroid injection, TF-CESI: fluoroscopy-guided transforaminal cervical epidural steroid injection.

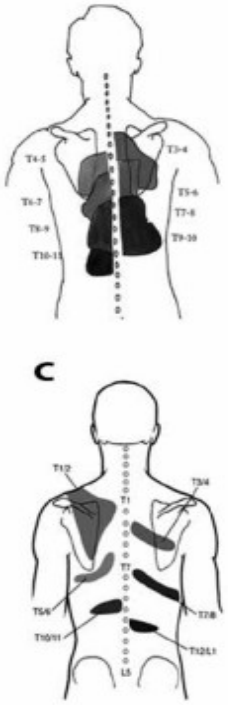
Hôpital Erasme

ULB

Rachialgies: les syndromes facettaires







Pain Physician 2020; 23:S1-S127• ISSN 2150-1149

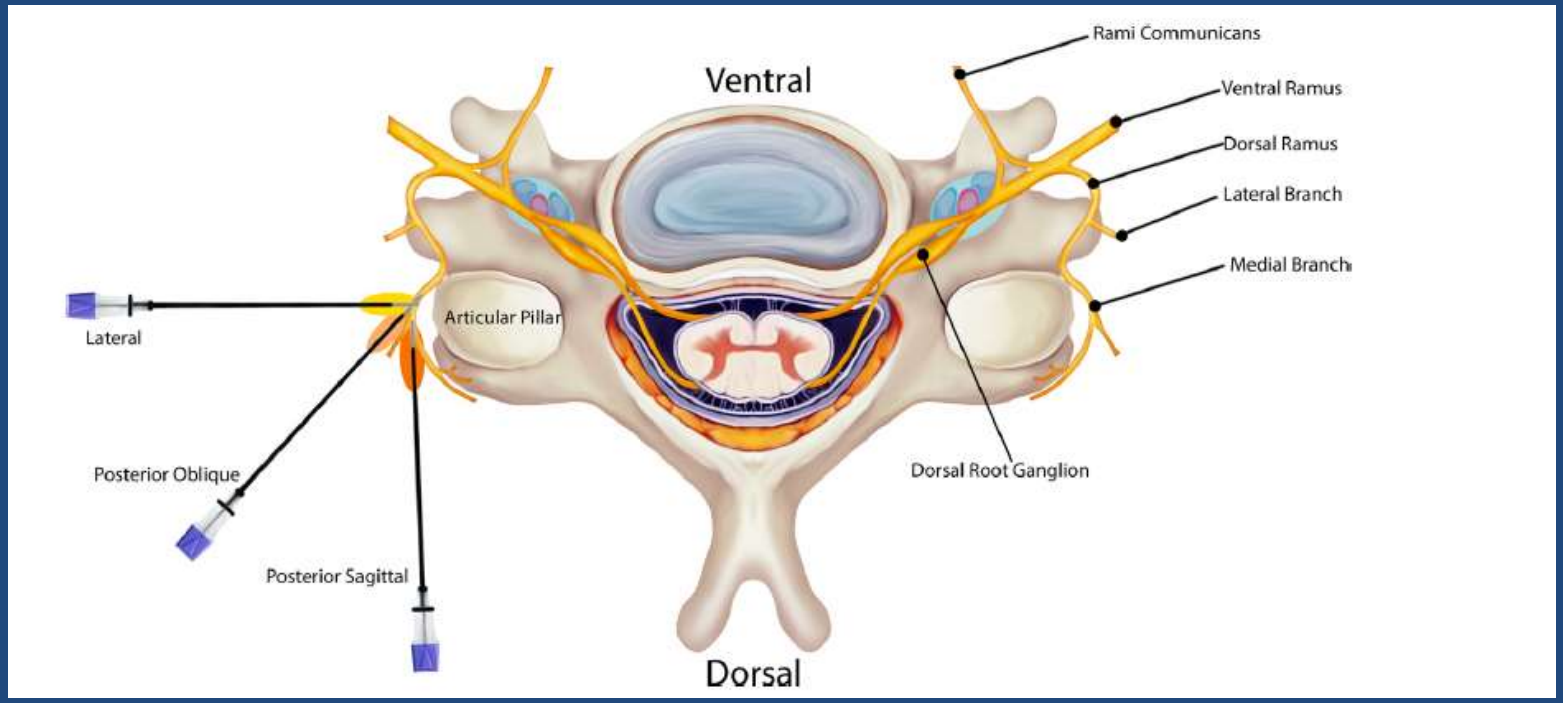
Facet Joint Interventions Guidelines

Comprehensive Evidence-Based Guidelines for Facet Joint Interventions in the Management of Chronic Spinal Pain: American Society of Interventional Pain Physicians (ASIPP) Guidelines

Laxmaiah Manchikanti, MD, Alan D. Kaye, MD, PhD, Amol Soin, MD, Sheri L. Albers, DO, Douglas Beall, MD, Richard E. Latchaw, MD, Mahendra R. Sanapati, MD, Shalini Shah, MD, Sairam Atluri, MD, Alaa Abd-Elsayed, MD, MPH, Salahadin Abdi, MD, PhD, Steve Aydin, DO, Sanjay Bakshi, MD, Mark Boswell, MD, PhD, Ricardo Buenaventura, MD, Joseph Cabaret, MD, Aaron K. Calodney, MD, Kenneth D. Candido, MD, Paul J. Christo, MD, Lynn Cintron, MD, Sudhir Diwan, MD, Christopher Gharibo, MD, Jay Grider, DO, PhD, Myank Gupta, MD, Bill Haney, MD, Michael E. Harned, MD, Standiford Helm II, MD, Jessica Jameson MD, Sunny Jha, MD, Adam M. Kaye, Pharm D, FASCP, FCPhA, Nebojsa Nick Knezevic, MD, PhD, Radomir Kosanovic, MD, Maanasa V. Manchikanti, Annu Navani, MD, Gabor Racz, MD, Vidyasagar Pampati, MSc, Ramarao Pasupuleti, MD, Cyril Philip, MD, Kartic Rajput, MD, Nalini Sehgal, MD, Gururau Sudarshan, MD, Rachana Vanaparthy, MBBS, Bradley W. Wargo, DO, and Joshua A. Hirsch, MD

Hôpital Erasme

ULB



Hôpital Erasme

ULB

CONTINGENCY TABLES SHOWING THE EFFECT ON DIAGNOSTIC CONFIDENCE OF DIFFERENT SPECIFICITIES AND SENSITIVITIES OF A DIAGNOSTIC TEST IN DETECTING A CONDITION WITH A PREVALENCE OF 60%

Specificity	Sensitivity	Prevalence	Blocks	Condition		Diagnostic Confidence
				Present	Absent	
0.88	0.54	60%	Positive	324	48	88%
			Negative	276	352	
				600	400	
0.65	1.00	60%	Positive	600	140	81%
			Negative		260	
				600	400	

Diagnostic confidence is the measure of how confident the practitioner can be that the condition really is present when a test is positive. It amounts to the positive predictive value that applies for a particular prevalence, and is derived from the specificity and sensitivity of the test by the equations[41]:

$$[\text{posttest odds}] = [\text{pretest odds}] \times [\text{positive likelihood ratio}]$$

$$[\text{positive likelihood ratio}] = [\text{sensitivity}] / [1 - \text{specificity}]$$

$$[\text{pretest odds}] = [\text{prevalence}] / [1 - \text{prevalence}]$$

0,5 ml AL

Occipito-cervicalgies

H.U.B
HÔPITAL UNIVERSITAIRE DE BRUXELLES
ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT
Hôpital Erasme
ULB
Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola

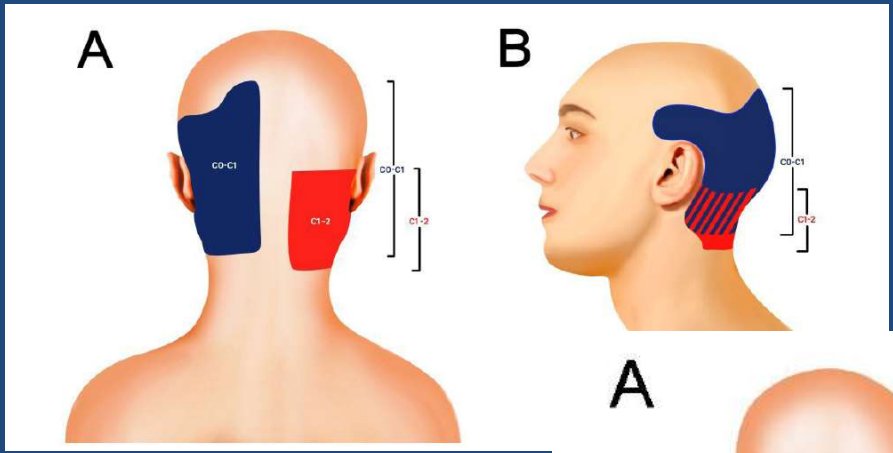
Consensus practice guidelines on interventions for cervical spine (facet) joint pain from a multispecialty international working group

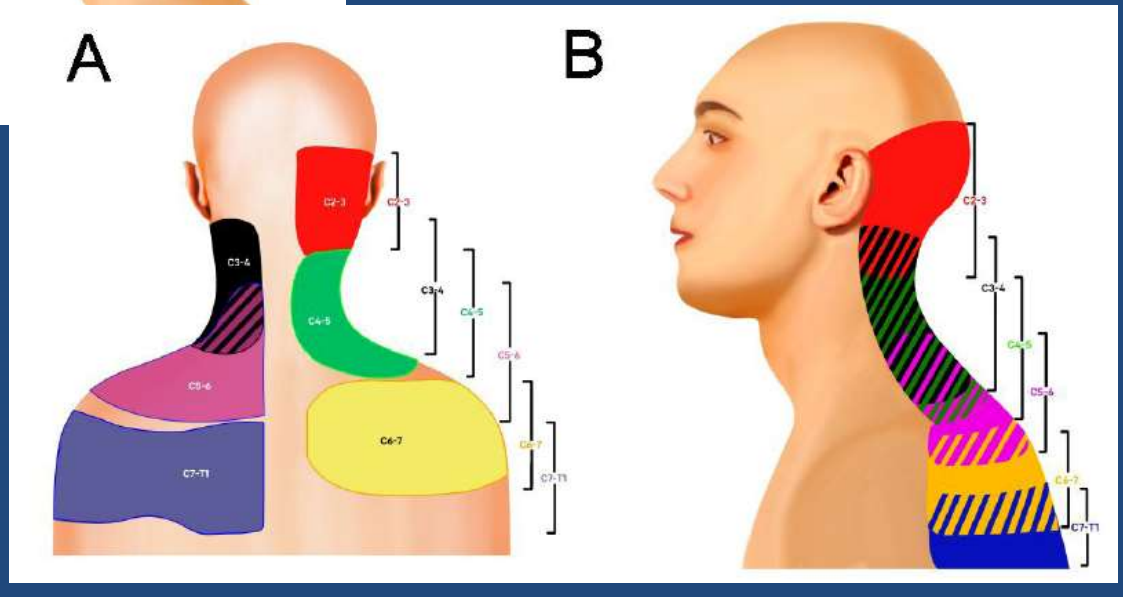
Robert W Hurley,[1] Meredith C B Adams,[2] Meredith Barad,[3] Arun Bhaskar,[4] Anuj Bhatia,[5] Andrea Chadwick,[6] Timothy R Deer,[7] Jennifer Hah,[8] W Michael Hooten,[9] Narayan R Kissoon,[10] David Wonhee Lee,[11] Zachary Mccormick,[12] Jee Youn Moon,[13,14] Samer Narouze,[15] David A Provenzano,[16,17] Byron J Schneider,[18] Maarten van Eerd,[19] Jan Van Zundert,[19] Mark S Wallace,[20] Sara M Wilson,[21] Zirong Zhao,[22] Steven P Cohen[23]

Hurley RW, *et al*. *Reg Anesth Pain Med* 2022;**47**:3–59. doi:10.1136/rapm-2021-103031

Hôpital Erasme

ULB





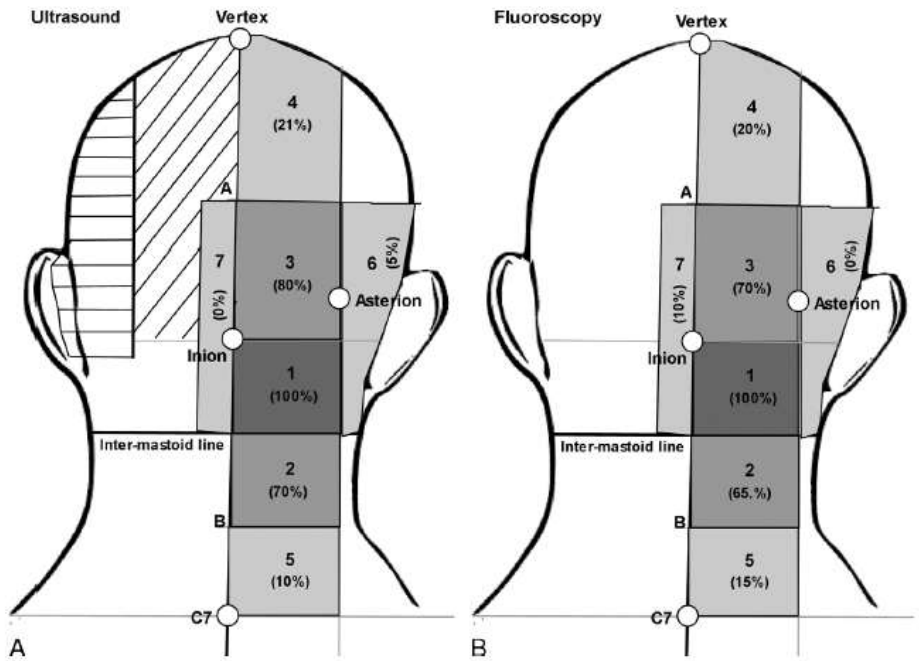


FIGURE 4. Sensory distribution of the TONBs: (panel A) US group n = 19, (panel B) fluoroscopy group n = 20. No statistical difference was found between the 2 groups. Zones are numbered 1 to 7; percentage in brackets represents the proportion of patients with hypoesthesia in at least half that zone; A is the midpoint between the inion and the vertex; B is the midpoint between the intermastoid line and the dorsal process of C7. The left side of panel A also contains an approximation of the sensory distribution of the GON (oblique pattern) and lesser occipital nerve (horizontal pattern).

Hôpital Erasme

ULB

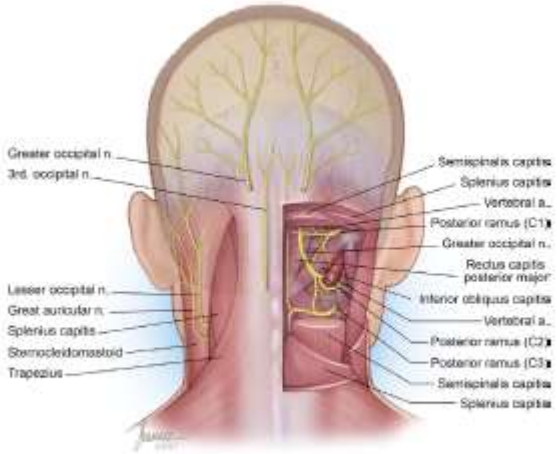


Figure 4 Origins of the greater occipital nerve and its course in the Occiput. a, artery; n, nerve. Reproduced with permission from Samer Narouze, MD, PhD. All rights reserved.

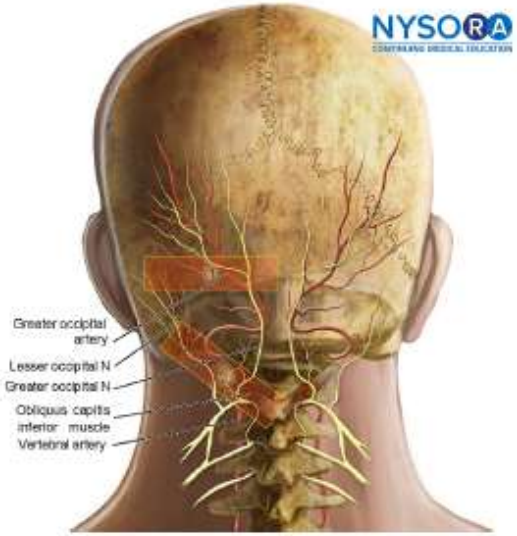


Figure 6 Probe position for two ultrasound-guided techniques to selectively block the greater occipital nerve (N).

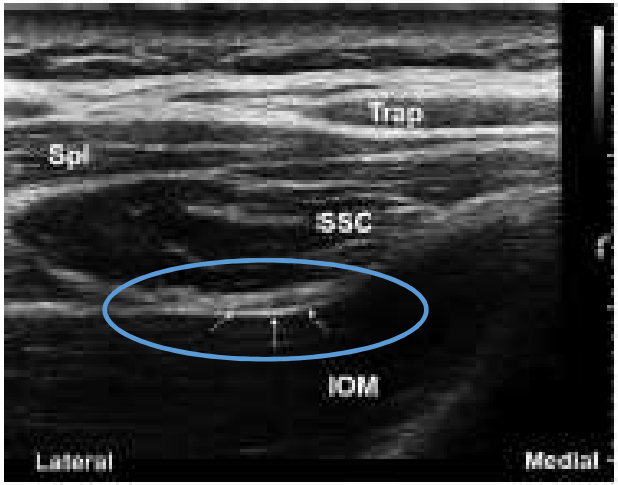
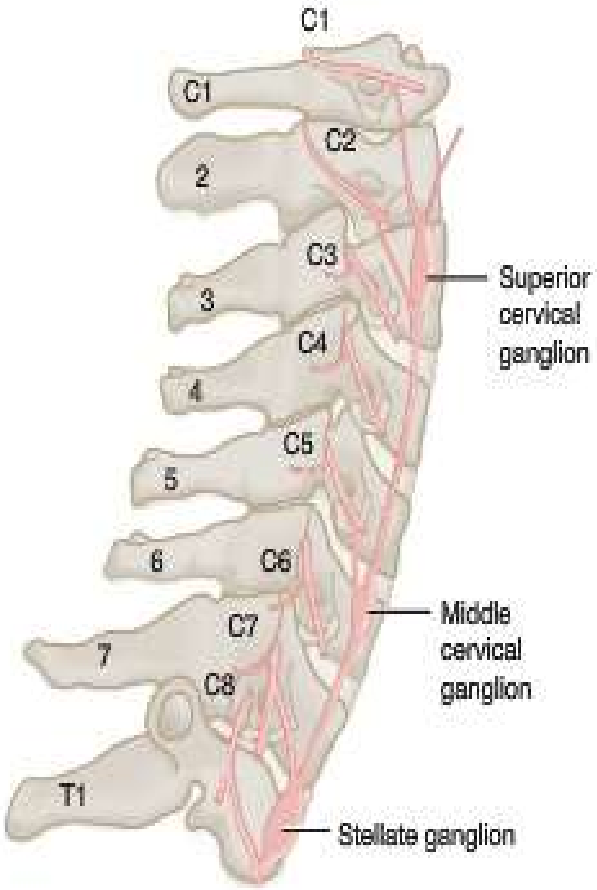
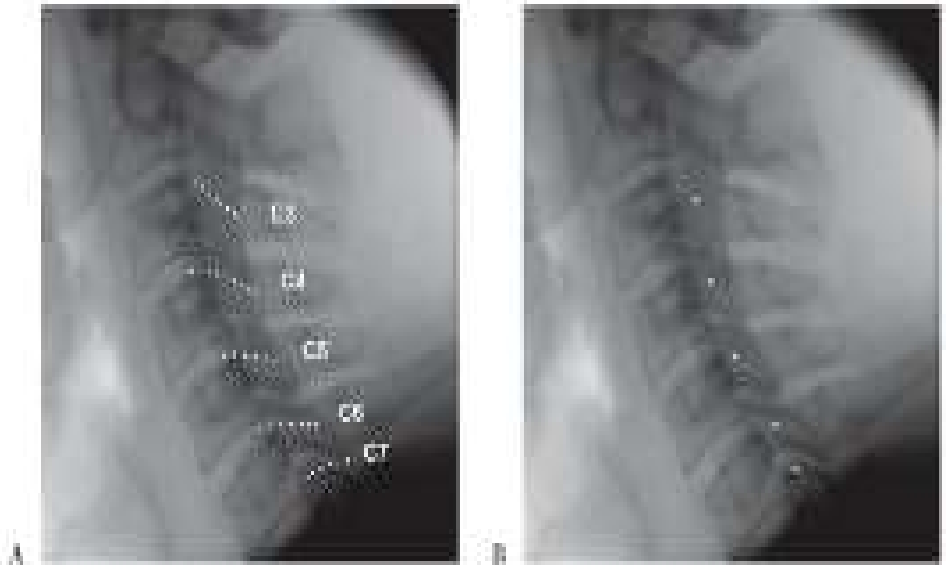
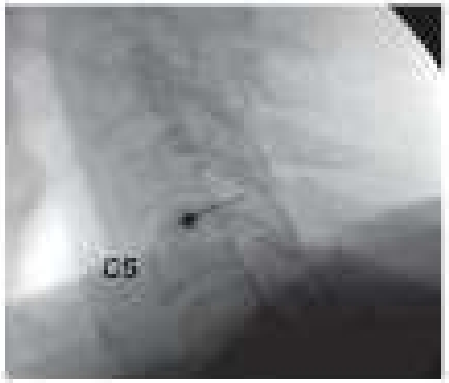


Figure 7 Ultrasound image for blockade of the greater occipital nerve in the fascial plane between the oblique capitis inferior muscle and the semispinalis capitis muscle. This image corresponds to probe position 2 in figure 6. IOM, inferior obliquus capitis muscle; Spl, splenius capitis muscle; SSC, semispinalis capitis muscle; trap, trapezius muscle.


C1
C1
C2
2
C3
3
C4
4
C5
5
6
C6
C7
7
C8
T1
Superior cervical ganglion
Middle cervical ganglion
Stellate ganglion


A
B


C5

ORIGINAL ARTICLE

A Randomized Comparison Between Ultrasound- and Fluoroscopy-Guided Third Occipital Nerve Block

Roderick J. Finlayson, MD, FRCPC, John-Paul B. Etheridge, MD, CCFP,* Lucy Vieira, MD, FRCPC,† Gaurav Gupta, MD, FRCPC,* and De Q.H. Tran, MD, FRCPC**

Regional Anesthesia and Pain Medicine • Volume 38, Number 3, May-June 2013

Hôpital Erasme

ULB

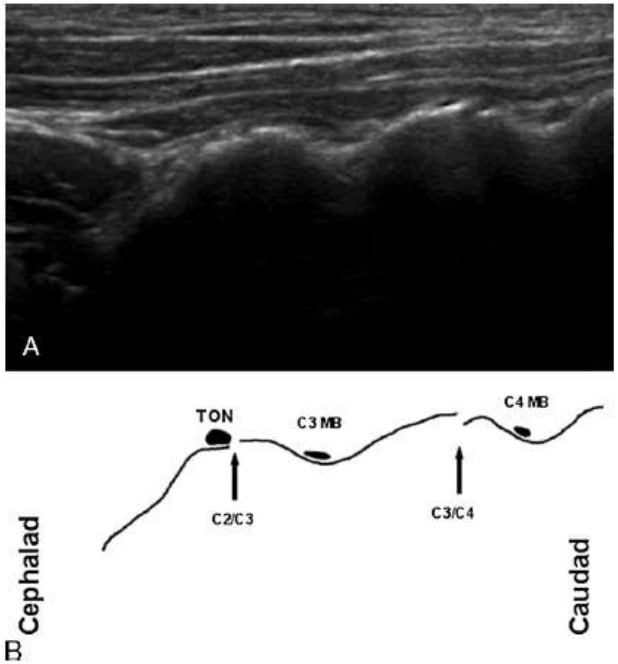


FIGURE 1. A, Coronal US scan of the upper cervical spine. B, Explanatory line drawing: the inferior articular process articular process of C2 (cephalad), AP of C3 (middle), and AP of C4 are outlined; TON, C3 medial branch (C3 MB), C4 medial branch (C4 MB). Arrows point to the respective zygapophyseal joints.

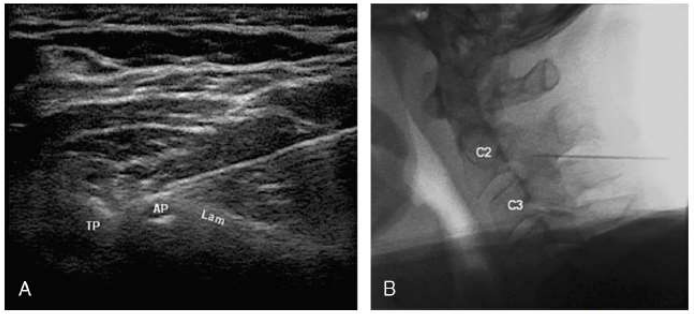


FIGURE 2. A, Transverse US scan of the inferior articular process of C2 demonstrating an in-plane needle targeting the TON; transverse process (TP), articular process (AP), lamina (Lam). B, Lateral radiograph of the cervical spine taken after needle was positioned under US guidance as in A, showing the needle resting on the inferior articular process of C2; vertebral body of C2 (C2), vertebral body of C3 (C3).

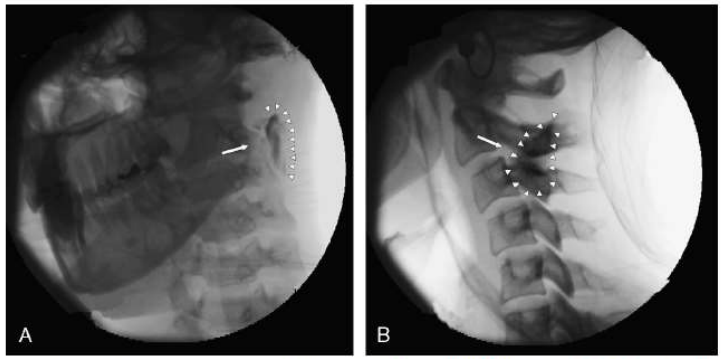
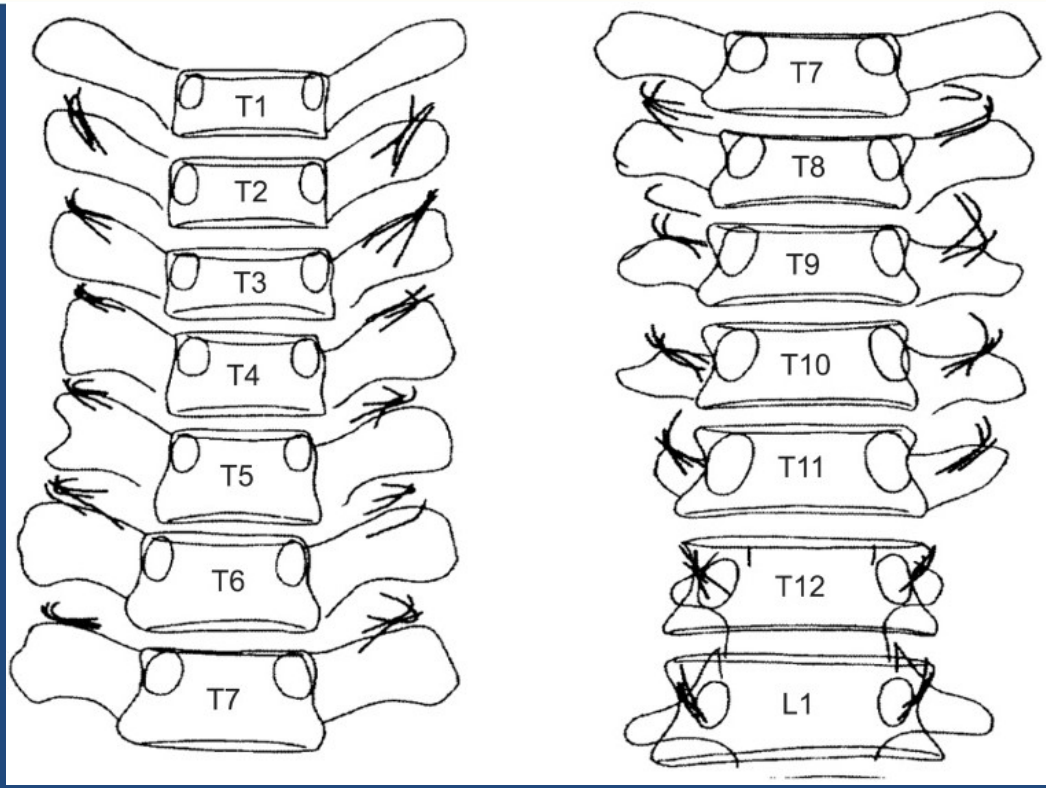


FIGURE 3. Radiographic views demonstrating contrast distribution after a US-guided block of the TON with 0.9 mL of a 1:1 mixture of bupivacaine 0.75% and Omnipaque 240. Large arrows point to C2–C3 zygapophyseal joint; small arrows delineate the contrast. A, Anteroposterior view with head rotated away from the blocked side. B, Lateral view.

Au niveau thoracique

Hôpital Erasme

ULB



Au niveau lombaire

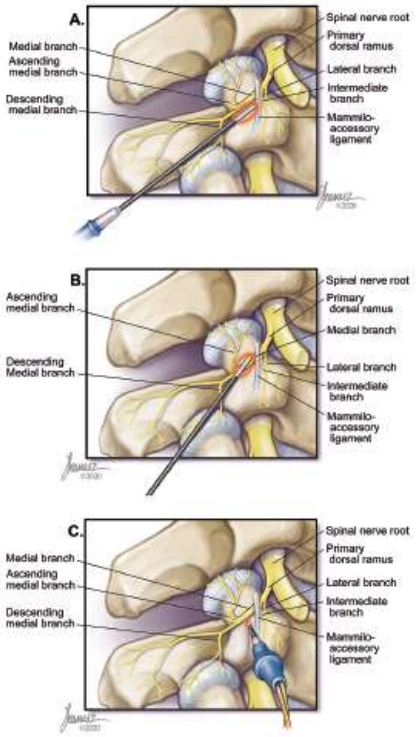
Consensus practice guidelines on interventions for lumbar facet joint pain from a multispecialty, international working group

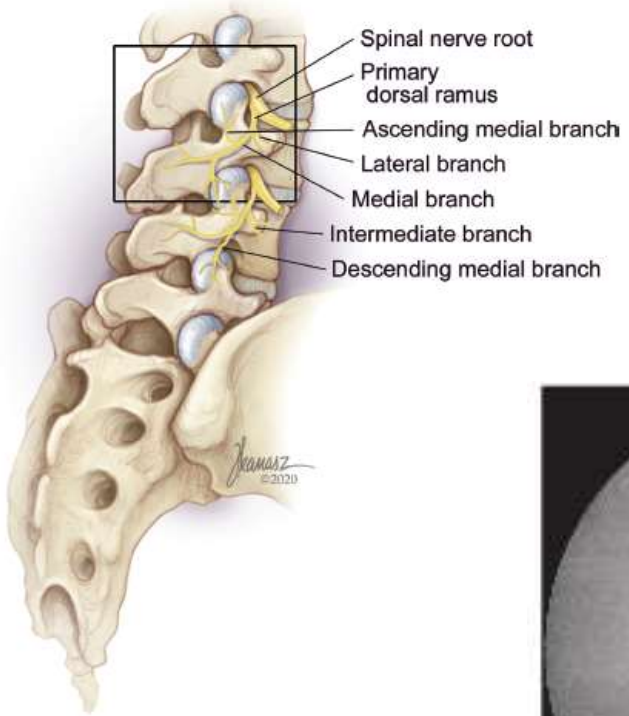
Steven P Cohen ,[1] Arun Bhaskar,[2] Anuj Bhatia,[3] Asokumar Buvanendran,[4] Tim Deer,[5] Shuchita Garg,[6] W Michael Hooten ,[7] Robert W Hurley,[8] David J Kennedy,[9] Brian C McLean,[10] Jee Youn Moon,[11] Samer Narouze,[12] Sanjog Pangarkar,[13] David Anthony Provenzano,[14] Richard Rauck,[15] B Todd Sitzman,[16] Matthew Smuck,[17] Jan van Zundert ,[18,19] Kevin Vorenkamp,[20] Mark S Wallace,[21] Zirong Zhao[22]

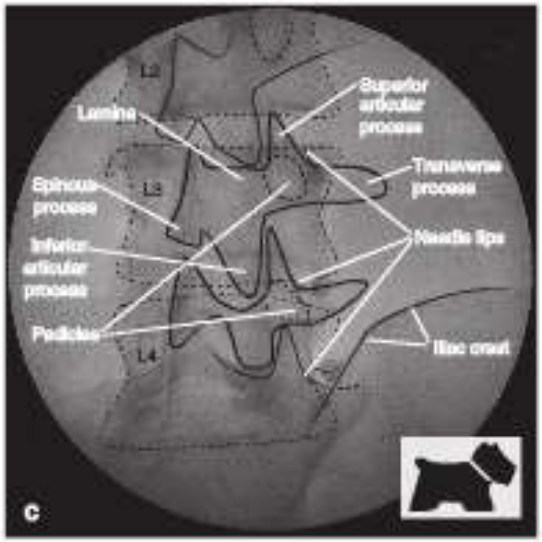
Hôpital Erasme

ULB

Cohen SP, *et al*. *Reg Anesth Pain Med* 2020;**45**:424–467. doi:10.1136/rapm-2019-101243

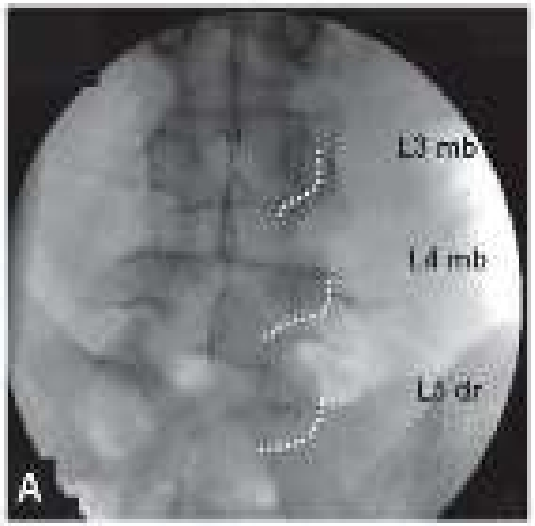


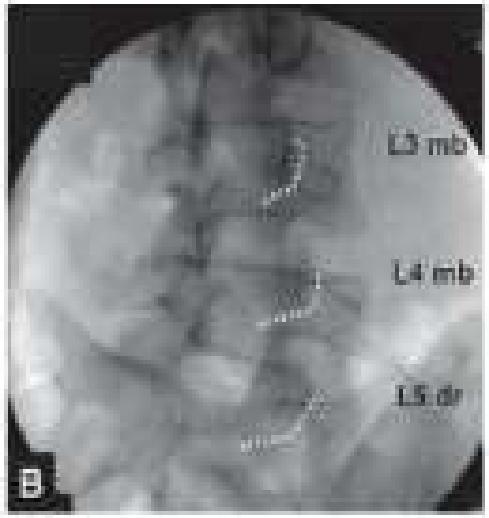


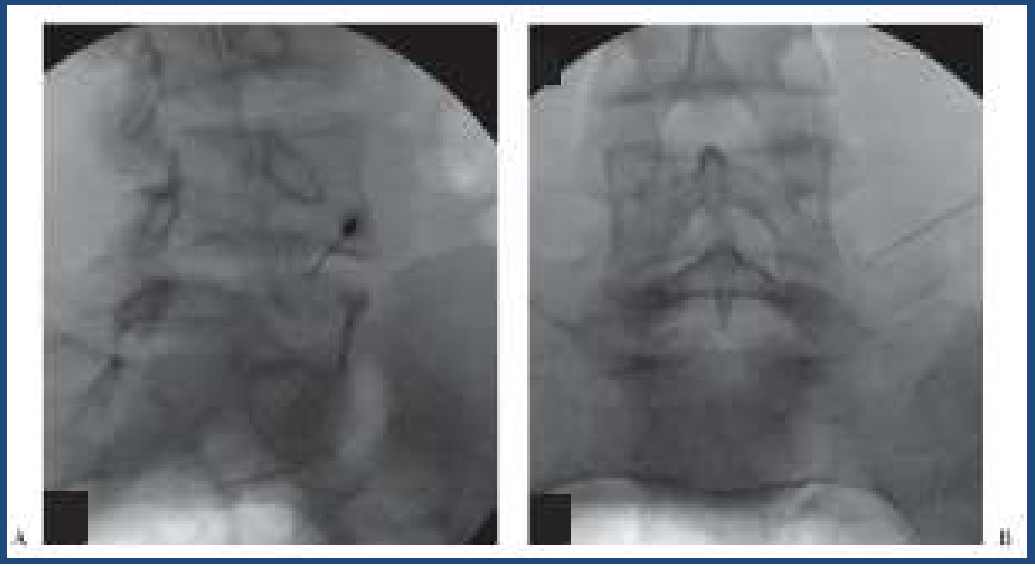


Hôpital Erasme

ULB







Hôpital Erasme

ULB

Radiofréquence

Prérequis =
Bloc diagnostique +

Pain Physician 2020; 23:S1-S127• ISSN 2150-1149

Facet Joint Interventions Guidelines

Comprehensive Evidence-Based Guidelines for Facet Joint Interventions in the Management of Chronic Spinal Pain: American Society of Interventional Pain Physicians (ASIPP) Guidelines

Laxmaiah Manchikanti, MD, Alan D. Kaye, MD, PhD, Amol Soin, MD, Sheri L. Albers, DO, Douglas Beall, MD, Richard E. Latchaw, MD, Mahendra R. Sanapati, MD, Shalini Shah, MD, Sairam Atluri, MD, Alaa Abd-Elsayed, MD, MPH, Salahadin Abdi, MD, PhD, Steve Aydin, DO, Sanjay Bakshi, MD, Mark Boswell, MD, PhD, Ricardo Buenaventura, MD, Joseph Cabaret, MD, Aaron K. Calodney, MD, Kenneth D. Candido, MD, Paul J. Christo, MD, Lynn Cintron, MD, Sudhir Diwan, MD, Christopher Gharibo, MD, Jay Grider, DO, PhD, Myank Gupta, MD, Bill Haney, MD, Michael E. Harned, MD, Standiford Helm II, MD, Jessica Jameson MD, Sunny Jha, MD, Adam M. Kaye, Pharm D, FASCP, FCPhA, Nebojsa Nick Knezevic, MD, PhD, Radomir Kosanovic, MD, Maanasa V. Manchikanti, Annu Navani, MD, Gabor Racz, MD, Vidyasagar Pampati, MSc, Ramarao Pasupuleti, MD, Cyril Philip, MD, Kartic Rajput, MD, Nalini Sehgal, MD, Gururau Sudarshan, MD, Rachana Vanaparthy, MBBS, Bradley W. Wargo, DO, and Joshua A. Hirsch, MD

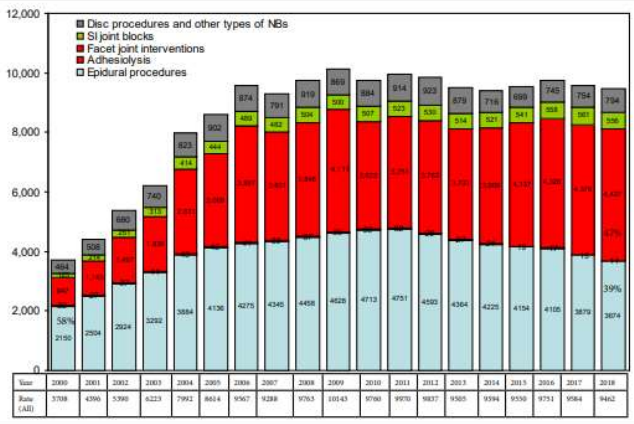


Fig. 6. *Distribution of procedural characteristics (rates) by type of procedures from 2000 to 2018.*

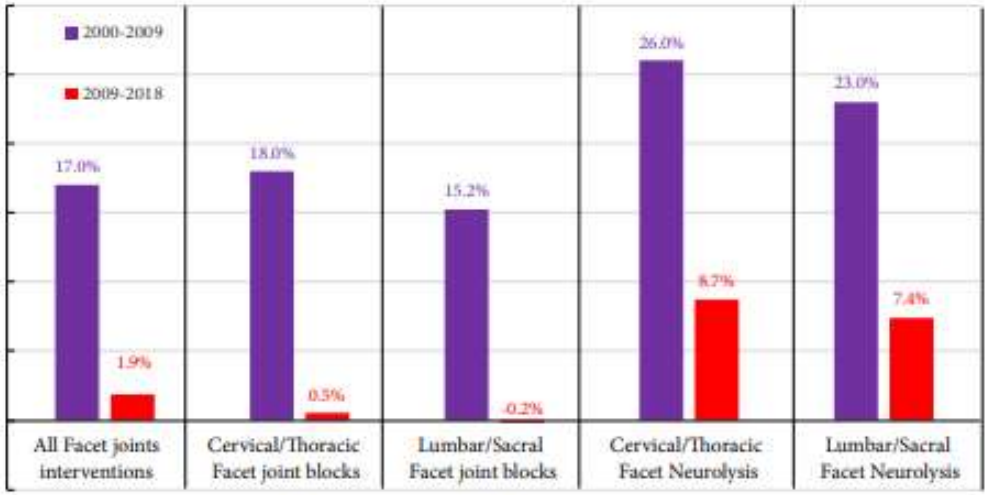


Fig. 5. *Comparative utilization patterns based on an annual rate from 2000-2009 and 2009-2018.*

- RADIOFREQUENCE CONVENTIONNELLE
- RADIOFRÉQUENCE PULSÉE
- COOLED RADIOFREQUENCY

H.U.B

Current Pain and Headache Reports (2022) 26:855–862
https://doi.org/10.1007/s11916-022-01088-w

CHRONIC PAIN MEDICINE (O VISWANATH, SECTION EDITOR)

Review of Opioid Sparing Interventional Pain Management Options and Techniques for Radiofrequency Ablations for Sacroiliac Joint Pain

Mila Pastrak[1] · Nikola Vladicic[2] · Jordan Sam[3] · Bruce Vrooman[4] · Frederick Ma[5] · Ammar Mahmoud[6] · James S. Khan[7] · Alaa Abd-Elsayed[8] · Farhan Khandwalla[5] · Scott McGilvray[9] · Ognjen Visnjevac[1,5,10]

Table 1 Characteristics of different RFA techniques

RFA technique	Probe	Temperature	Duration	Lesion size and shape	Probe placement
Conventional RFA	18–22-gauge cannula 4–10 mm tip length	70–90 °C	60–90 s	Oval shape 2–4 mm diameter	L4 medial branches, L5 dorsal rami, S1–S3 foramina; multiple lesions are required to block impulses
Cooled RFA	17–18-gauge cannula 4 mm tip length	60–80 °C	90–150 s	Spherical shape 8–10 mm diameter	L4 medial branches, L5 dorsal rami, S1–S3 foramina; electrodes are placed at a greater distance from the foramina
Pulsed RFA	21–22-gauge cannula 2–10 mm tip length	Up to 42 °C	Short bursts lasting 20 ms Quiet phase lasting 480 ms	No lesion is created	L4 medial branches, L5 dorsal rami, S1–S3 foramina; multiple lesions are required to block impulses
Pulsed IA RFA	22-gauge curved-tip cannula	Up to 42 °C	500–600 s	No lesion is created	IA placement of electrodes
Bipolar RFA	Convectional, cooled or pulsed	45 °C to 55 °C	15 min	Irregular spherical shape 8–10 mm diameter	Needles are positioned 6 mm apart
Simplicity III probe (combination of monopolar and bipolar lesions)	Curved probe with 3 independent active electrodes	80 °C	Total duration 5 min	Large strip lesion	Continuous strip lesion from L5 to S4 dorsal rami. single entry point for 3 electrodes

Radiofréquence conventionnelle

Consensus practice guidelines on interventions for lumbar facet joint pain from a multispecialty, international working group

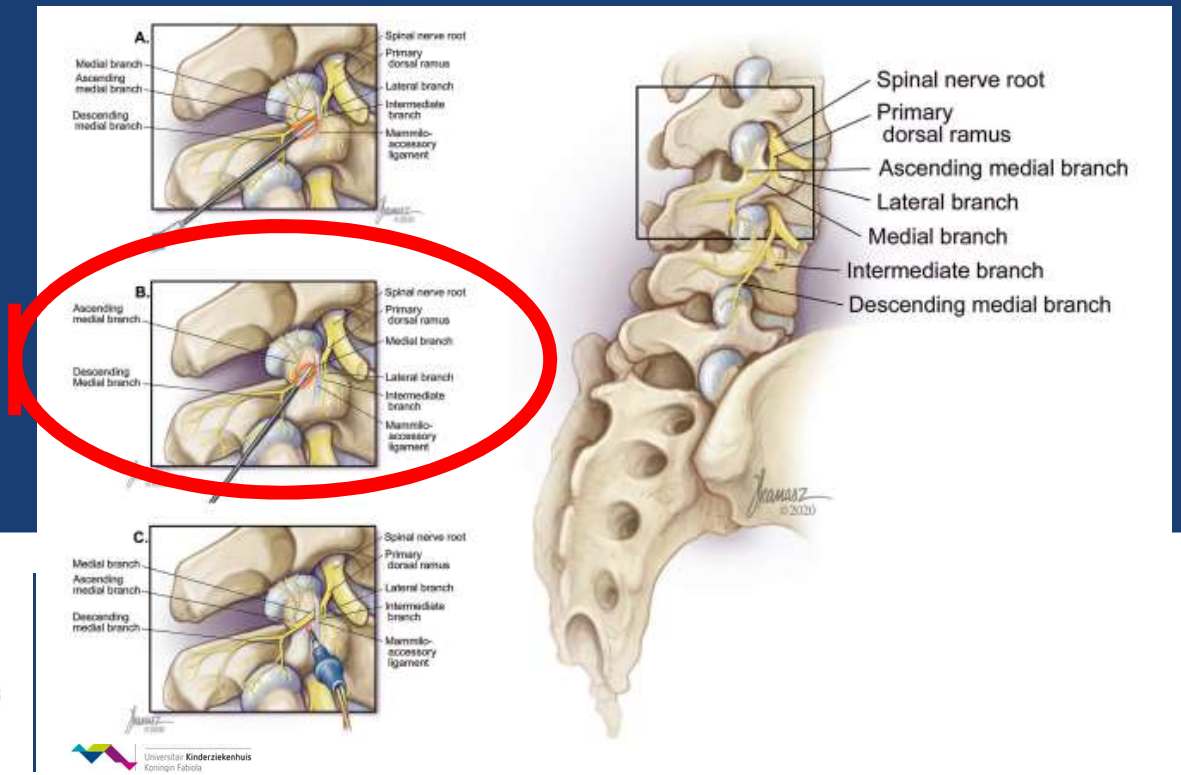
Steven P Cohen,[1] Arun Bhaskar,[2] Anuj Bhatia,[3] Asokumar Buvanendran,[4] Tim Deer,[5] Shuchita Garg,[6] W Michael Hooten,[7] Robert W Hurley,[8] David J Kennedy,[9] Brian C McLean,[10] Jee Youn Moon,[11] Samer Narouze,[12] Sanjog Pangarkar,[13] David Anthony Provenzano,[14] Richard Rauck,[15] B Todd Sitzman,[16] Matthew Smuck,[17] Jan van Zundert,[18,19] Kevin Vorenkamp,[20] Mark S Wallace,[21] Zirong Zhao[22]

Reg Anesth Pain Med 2020;**45**:424–467. doi:10.1136/rapm-2019-101243

Table 10 Factors affecting radiofrequency lesion generation

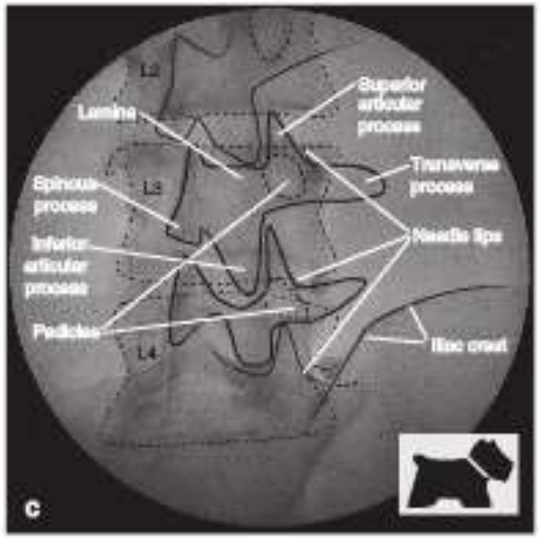
Radiofrequency element	Electrophysiological principle
Distance from active tip	Heat generation=1/(radius from active tip)[220] ► Tissue heating decreases rapidly with increasing distance from the active tip.
RFA current intensity*	Heat generation=(current density)[14] ► Heat generated from RFA is directly proportional to current density. ► Current intensity has a strong influence on tissue heating.
Duration of RF application	The duration of heating influences lesion size.

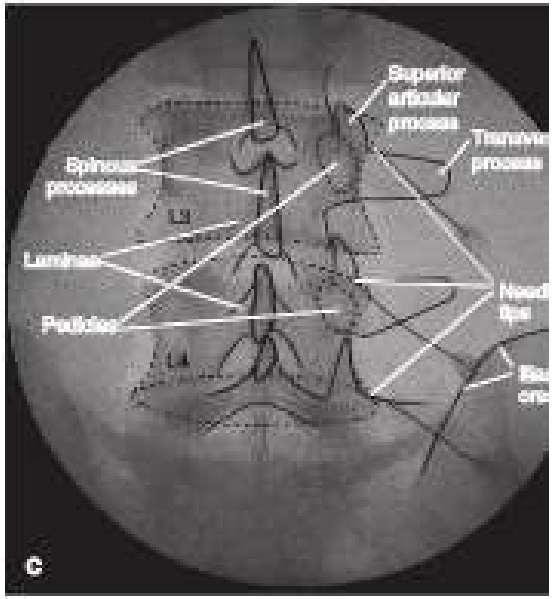
*Tip size as determined by the gauge of the needle and the length of the active tip influences RF current intensity.
RF, radiofrequency; RFA, radiofrequency ablation



H.U.B
HÔPITAL UNIVERSITAIRE DE BRUXELLES
ACADEMISCH ZIEKENHUIS BRUSSEL

B


L2
Lamina
Superior articular process
Transverse process
Spinous process
L3
Inferior articular process
Needle tips
Pedicles
L4
Iliac crest
C

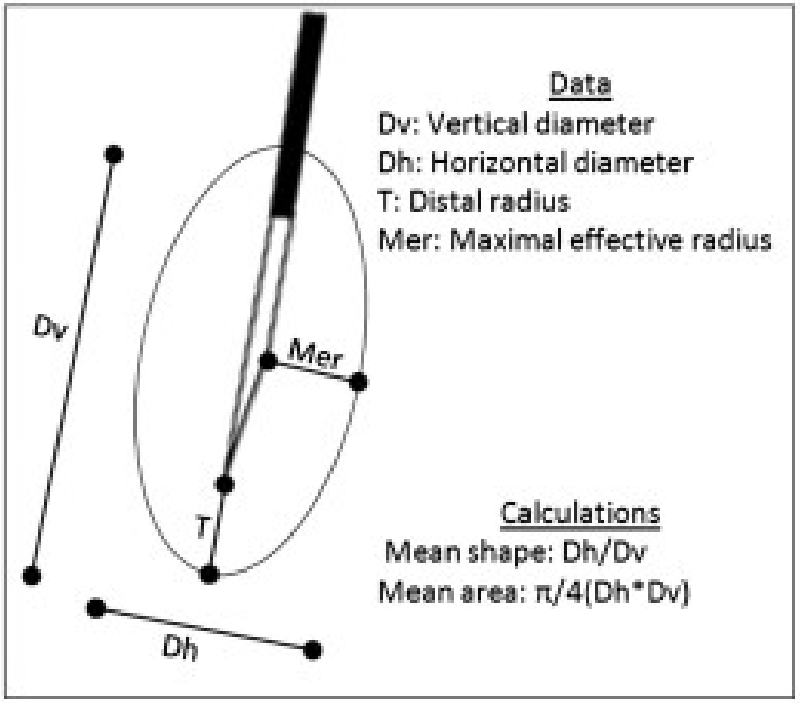

Superior articular process
Spinous processes
L3
Laminae
Pedicles
L4
C

Injection of Steroids Before Radiofrequency Ablation Has a Negative Impact on Lesion Size

Worakamol Tiyaprasertkul, MD, and Jordi Perez, MD, PhD

(*Reg Anesth Pain Med* 2014;39: 189–191)

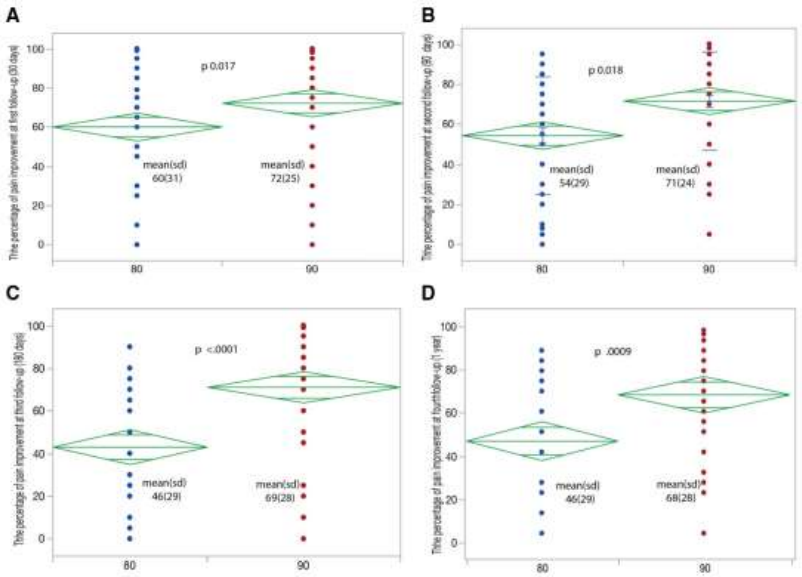
coadministration of other substances like steroids remains con-

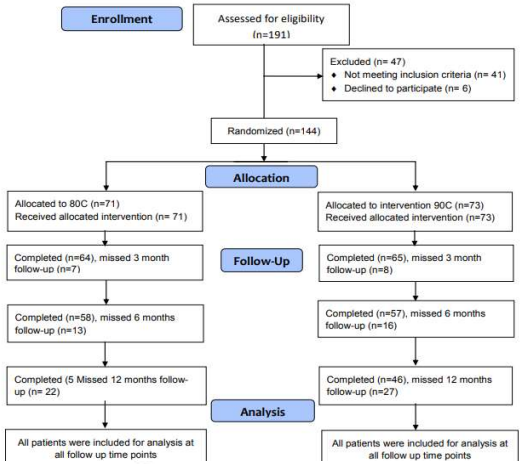


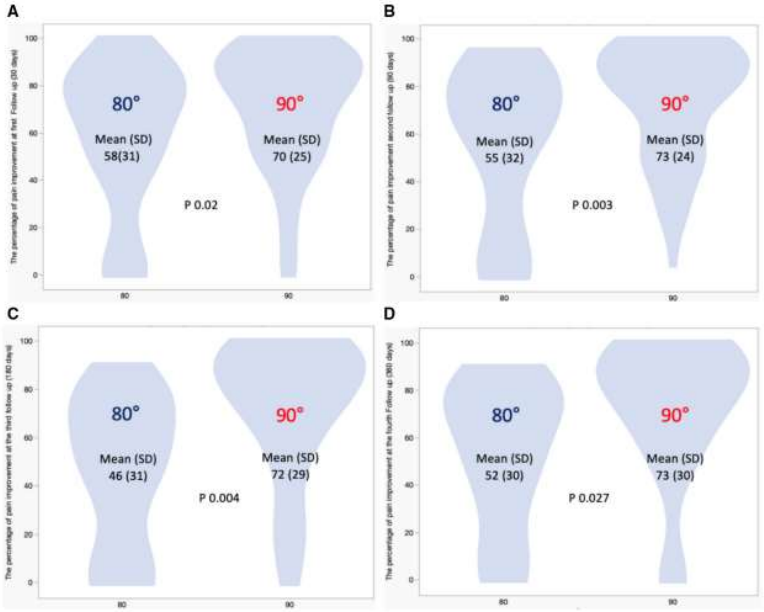
Impact of temperature on the magnitude and duration of relief after lumbar facets medial branch nerves radiofrequency ablation: a randomized double-blinded study

Nagy Mekhail ,[1] Shrif Costandi ,[2] Sherif Armanyous,[1] Erin Templeton,[1] Lou-Anne G Acevedo-Moreno ,[1] Nicholas Prayson[2]

Mekhail N, *et al*. *Reg Anesth Pain Med* 2024;**0**:1–8.







CONCLUSIONS

Lumbar facetogenic back pain is a prevalent condition that can remarkably affect an individual patient's quality of life and functional status, as well as impact the productivity of society at large. Thermal RFA has been demonstrated to be an effective therapeutic modality for facetogenic chronic back pain with a notable surge lately in the number of procedures being performed. Yet, several factors involved in determining a favorable outcome after this procedure require further research and optimization. In a previous retrospective study, patients who had RFA of the medial branches at 90°C acquired significant analgesic relief when compared with those who had RFA at 80°C. This prospective double-blinded randomized study confirmed that RFA at both temperatures was equally effective. However, RFA at 90°C was associated with better odds of achieving the desired pain relief and showed more durable pain relief without increased risk of complications when compared with RFA at 80°C.

H.U.B

HÔPITAL UNIVERSITAIRE DE BRUXELLES

ACADEMISCH ZIEKENHUIS BRUSSEL

Indication: Rachialgies / Syndromes facettaires

H.U.B
HÔPITAL UNIVERSITAIRE DE BRUXELLES
ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT
Hôpital Erasme
ULB
Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola

Pain Physician 2020; 23:51-5127• ISSN 2150-1149

Facet Joint Interventions Guidelines

Comprehensive Evidence-Based Guidelines for Facet Joint Interventions in the Management of Chronic Spinal Pain: American Society of Interventional Pain Physicians (ASIPP) Guidelines

Laxmaiah Manchikanti, MD, Alan D. Kaye, MD, PhD, Amol Soin, MD, Sheri L. Albers, DO, Douglas Beall, MD, Richard E. Latchaw, MD, Mahendra R. Sanapati, MD, Shalini Shah, MD, Sairam Atluri, MD, Alaa Abd-Elsayed, MD, MPH, Salahadin Abdi, MD, PhD, Steve Aydin, DO, Sanjay Bakshi, MD, Mark Boswell, MD, PhD, Ricardo Buenaventura, MD, Joseph Cabaret, MD, Aaron K. Calodney, MD, Kenneth D. Candido, MD, Paul J. Christo, MD, Lynn Cintron, MD, Sudhir Diwan, MD, Christopher Gharibo, MD, Jay Grider, DO, PhD, Myank Gupta, MD, Bill Haney, MD, Michael E. Harned, MD, Standiford Helm II, MD, Jessica Jameson MD, Sunny Jha, MD, Adam M. Kaye, Pharm D, FASCP, FCPhA, Nebojsa Nick Knezevic, MD, PhD, Radomir Kosanovic, MD, Maanasa V. Manchikanti, Annu Navani, MD, Gabor Racz, MD, Vidyasagar Pampati, MSc, Ramarao Pasupuleti, MD, Cyril Philip, MD, Kartic Rajput, MD, Nalini Sehgal, MD, Gururau Sudarshan, MD, Rachana Vanaparthy, MBBS, Bradley W. Wargo, DO, and Joshua A. Hirsch, MD

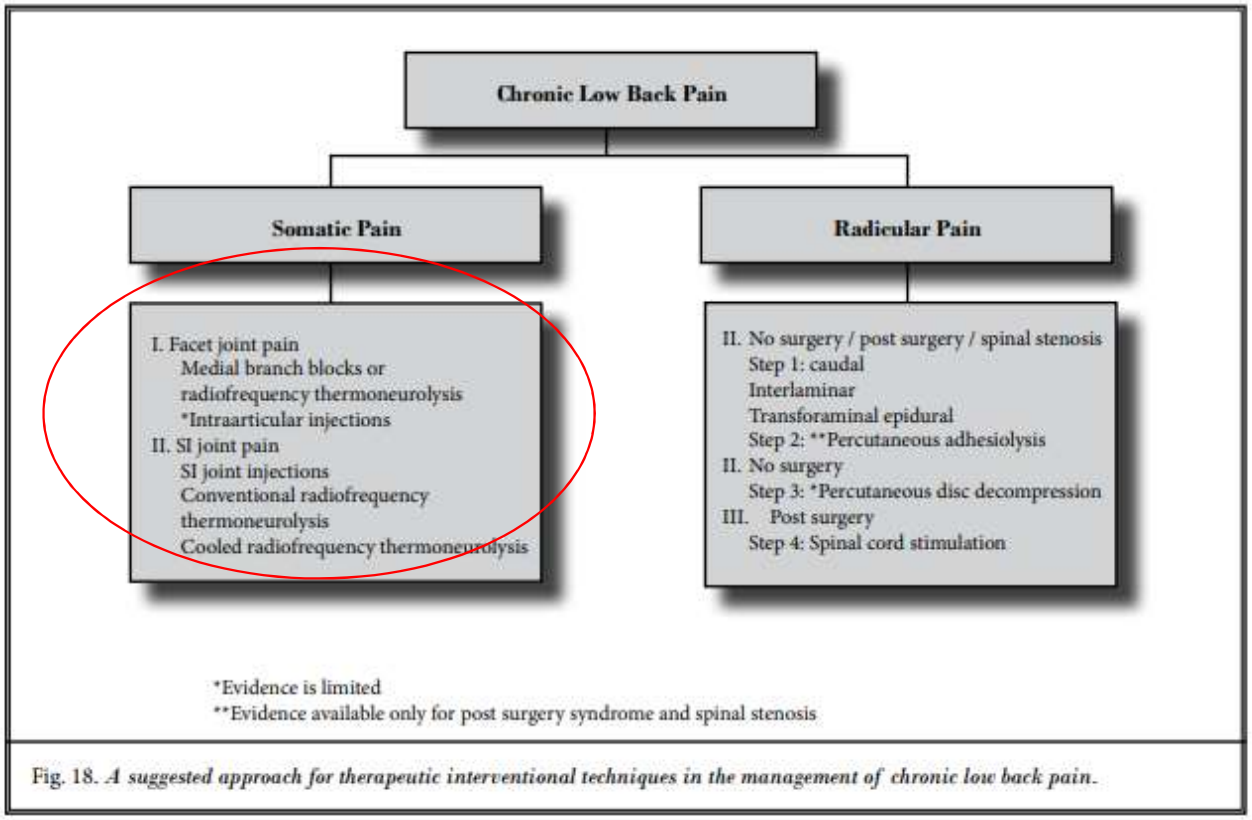


Fig. 18. *A suggested approach for therapeutic interventional techniques in the management of chronic low back pain.*

H.U.B HÔPITAL UNIVERSITAIRE DE BRUXELLES ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT

Hôpital Erasme ULB

Hôpital Universitaire des Enfants Reine Fabiola Universitair Kinderziekenhuis Koningin Fabiola

Pain Physician 2020; 23:S1-S127• ISSN 2150-1149

Facet Joint Interventions Guidelines

Comprehensive Evidence-Based Guidelines for Facet Joint Interventions in the Management of Chronic Spinal Pain: American Society of Interventional Pain Physicians (ASIPP) Guidelines

Laxmaiah Manchikanti, MD, Alan D. Kaye, MD, PhD, Amol Soin, MD, Sheri L. Albers, DO, Douglas Beall, MD, Richard E. Latchaw, MD, Mahendra R. Sanapati, MD, Shalini Shah, MD, Sairam Atluri, MD, Alaa Abd-Elsayed, MD, MPH, Salahadin Abdi, MD, PhD, Steve Aydin, DO, Sanjay Bakshi, MD, Mark Boswell, MD, PhD, Ricardo Buenaventura, MD, Joseph Cabaret, MD, Aaron K. Calodney, MD, Kenneth D. Candido, MD, Paul J. Christo, MD, Lynn Cintron, MD, Sudhir Diwan, MD, Christopher Gharibo, MD, Jay Grider, DO, PhD, Myank Gupta, MD, Bill Haney, MD, Michael E. Harned, MD, Standiford Helm II, MD, Jessica Jameson MD, Sunny Jha, MD, Adam M. Kaye, Pharm D, FASCP, FCPhA, Nebojsa Nick Knezevic, MD, PhD, Radomir Kosanovic, MD, Maanasa V. Manchikanti, Annu Navani, MD, Gabor Racz, MD, Vidyasagar Pampati, MSc, Ramarao Pasupuleti, MD, Cyril Philip, MD, Kartic Rajput, MD, Nalini Sehgal, MD, Gururau Sudarshan, MD, Rachana Vanaparthy, MBBS, Bradley W. Wargo, DO, and Joshua A. Hirsch, MD

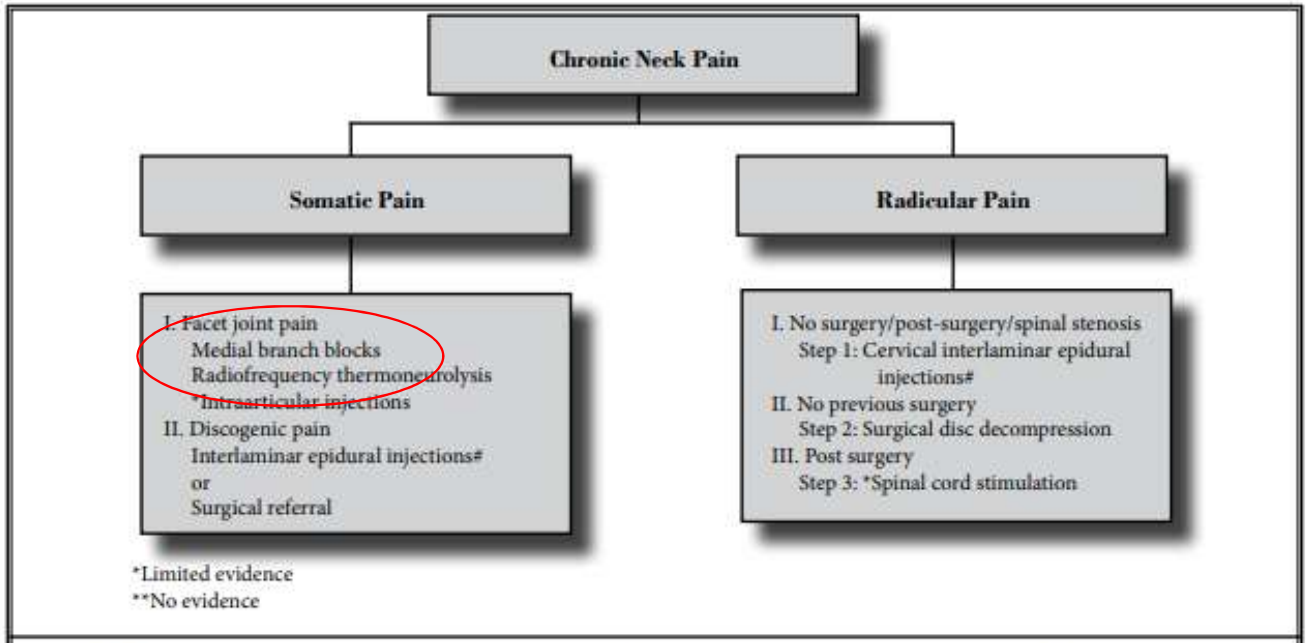


Fig. 19. *A suggested approach for therapeutic interventional techniques in the management of chronic neck pain.*

H.U.B HÔPITAL UNIVERSITAIRE DE BRUXELLES ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT

Hôpital Erasme ULB

Hôpital Universitaire des Enfants Reine Fabiola Universitair Kinderziekenhuis Koningin Fabiola

Pain Physician 2020; 23:S1-S127• ISSN 2150-1149

Facet Joint Interventions Guidelines

Comprehensive Evidence-Based Guidelines for Facet Joint Interventions in the Management of Chronic Spinal Pain: American Society of Interventional Pain Physicians (ASIPP) Guidelines

Laxmaiah Manchikanti, MD, Alan D. Kaye, MD, PhD, Amol Soin, MD, Sheri L. Albers, DO, Douglas Beall, MD, Richard E. Latchaw, MD, Mahendra R. Sanapati, MD, Shalini Shah, MD, Sairam Atluri, MD, Alaa Abd-Elsayed, MD, MPH, Salahadin Abdi, MD, PhD, Steve Aydin, DO, Sanjay Bakshi, MD, Mark Boswell, MD, PhD, Ricardo Buenaventura, MD, Joseph Cabaret, MD, Aaron K. Calodney, MD, Kenneth D. Candido, MD, Paul J. Christo, MD, Lynn Cintron, MD, Sudhir Diwan, MD, Christopher Gharibo, MD, Jay Grider, DO, PhD, Myank Gupta, MD, Bill Haney, MD, Michael E. Harned, MD, Standiford Helm II, MD, Jessica Jameson MD, Sunny Jha, MD, Adam M. Kaye, Pharm D, FASCP, FCPhA, Nebojsa Nick Knezevic, MD, PhD, Radomir Kosanovic, MD, Maanasa V. Manchikanti, Annu Navani, MD, Gabor Racz, MD, Vidyasagar Pampati, MSc, Ramarao Pasupuleti, MD, Cyril Philip, MD, Kartic Rajput, MD, Nalini Sehgal, MD, Gururau Sudarshan, MD, Rachana Vanaparthy, MBBS, Bradley W. Wargo, DO, and Joshua A. Hirsch, MD

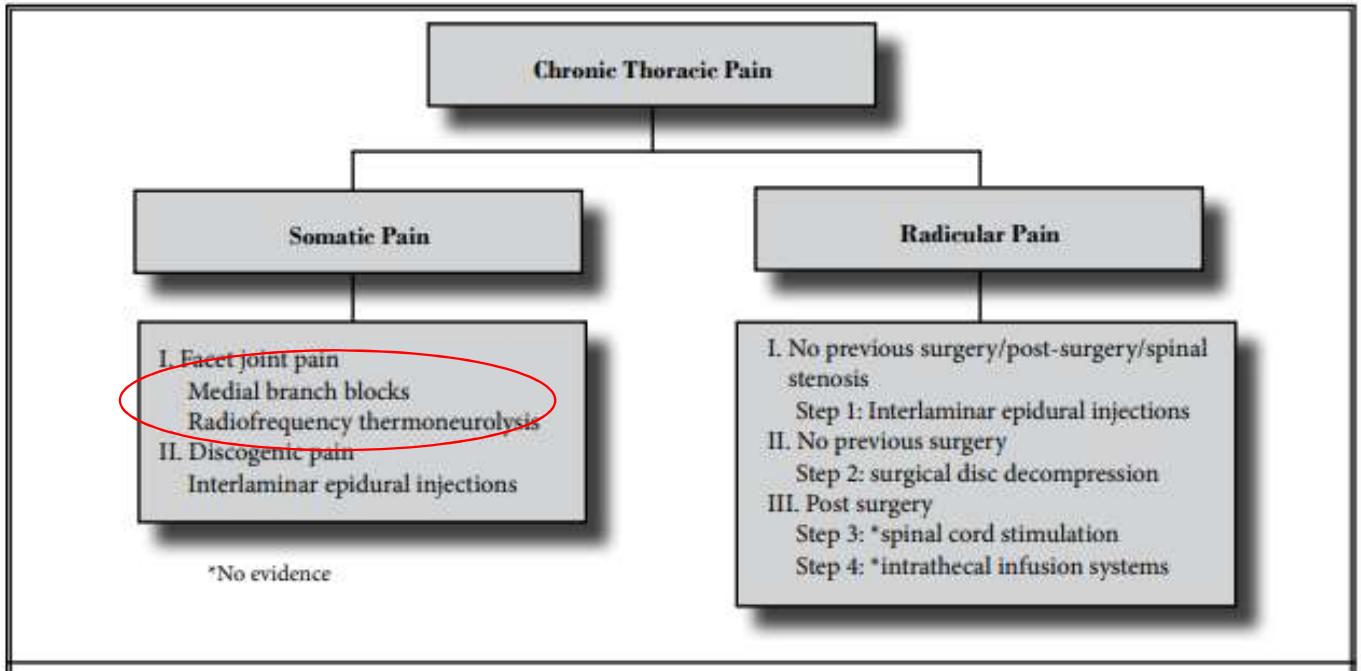


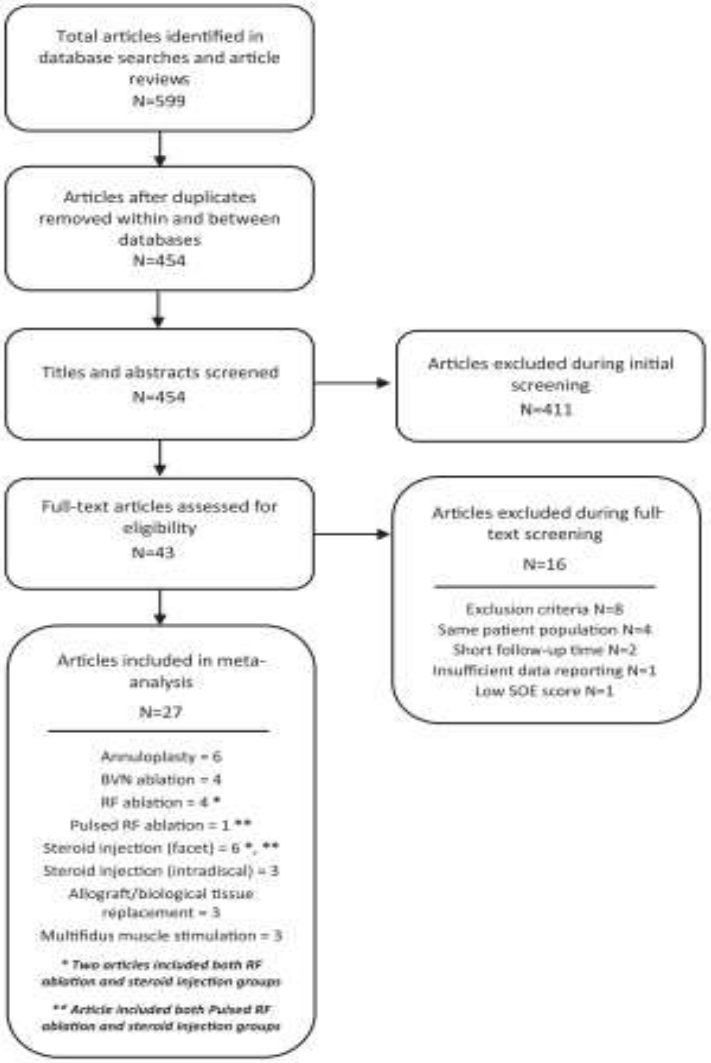
Fig. 20. *A suggested approach for therapeutic interventional techniques in the management of chronic thoracic pain.*

H.U.B HÔPITAL UNIVERSITAIRE DE BRUXELLES ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT

Hôpital Erasme ULB

Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola



Pain Management Interventions for the Treatment of Chronic Low Back Pain

A Systematic Review and Meta-Analysis

Nagy Mekhail, MD, PhD, Sam Eldabe, MD,† Erin Templeton, MD,* Shrif Costandi, MD,* and Richard Rosenquist, MD,‡*

Clin J Pain • Volume 39, Number 7, July 2023

TABLE 2. Article/Study Counts

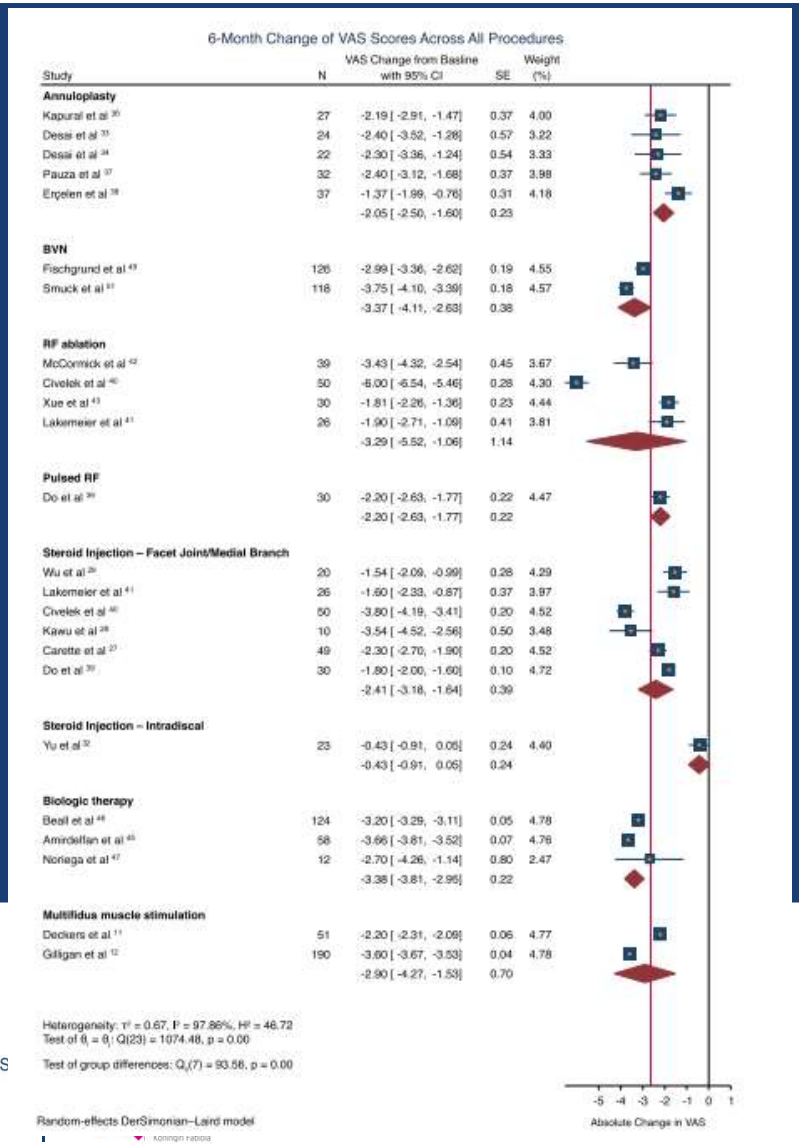
Intervention	Number of articles	Number of individual studies	Number of data sets for meta-analysis*
Steroid injection—intradiscal	3	3	3
Annuloplasty	6	5	7
Pulsed RF ablation & steroid injection	1	1	2
RF ablation	2	2	3
RF ablation & steroid injection	2	2	6
Steroid injection—facet joints or medial branches	3	3	3
Multifidus muscle stimulation	3	2	7
Biological therapy	3	3	7
BVN ablation	4	2	7
Total	27	23	45

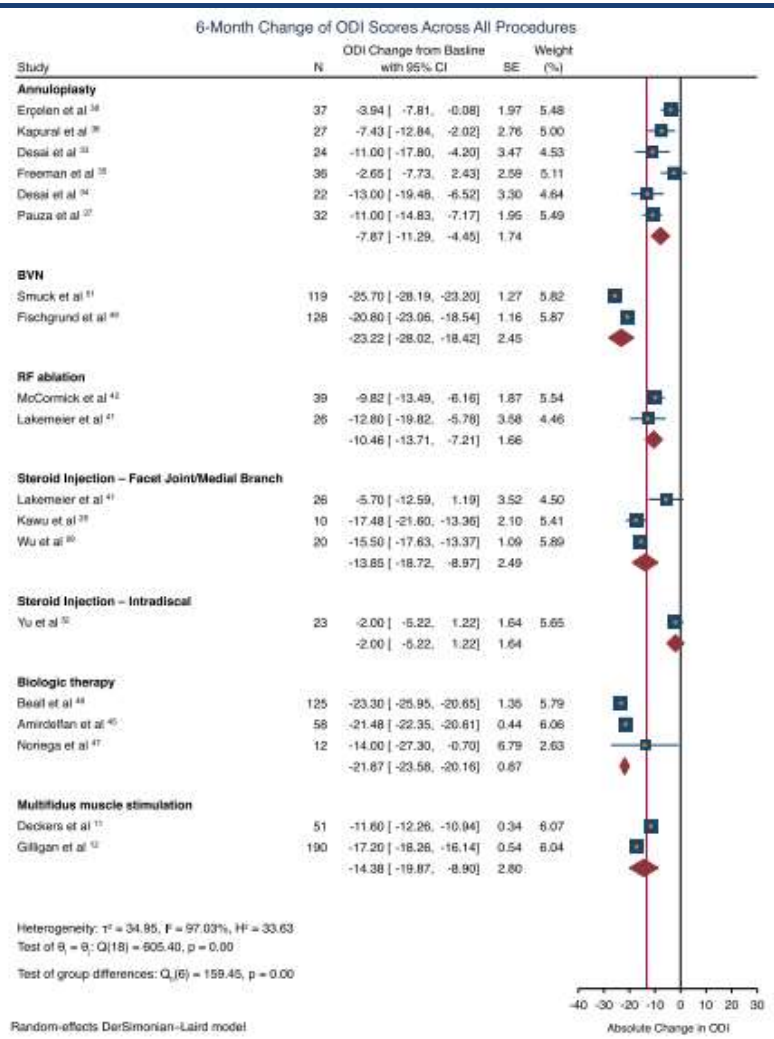
*Includes data from all relevant intervention study arms, all follow-up intervals, and any crossover groups.

Pain Management Interventions for the Treatment of Chronic Low Back Pain

A Systematic Review and Meta-Analysis

Nagy Mekhail, MD, PhD, Sam Eldabe, MD,† Erin Templeton, MD,* Shrif Costandi, MD,* and Richard Rosenquist, MD,‡*





H.U.B

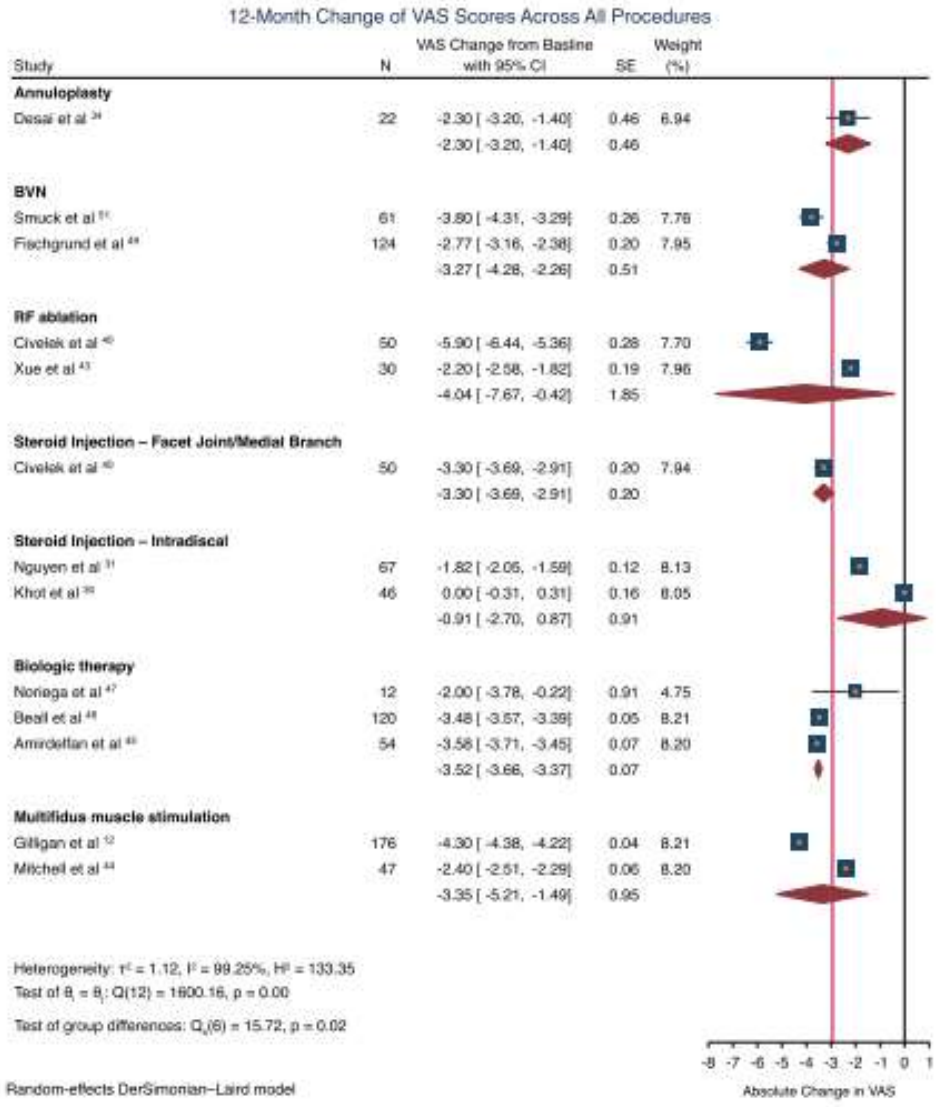
HÔPITAL UNIVERSITAIRE DE BRUXELLES

ACADEMISCH ZIEKENHUIS BRUSSEL

Pain Management Interventions for the Treatment of Chronic Low Back Pain

A Systematic Review and Meta-Analysis

Nagy Mekhail, MD, PhD, Sam Eldabe, MD,† Erin Templeton, MD,* Shrif Costandi, MD,* and Richard Rosenquist, MD‡*



HÔPITAL UNIVERSITAIRE DE BRUXELLES

ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT

Hôpital Erasme

ULB

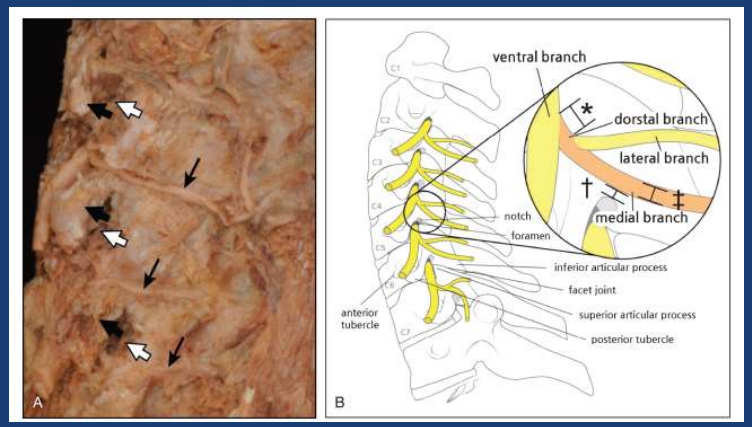
Hôpital Universitaire des Enfants Reine Fabiola

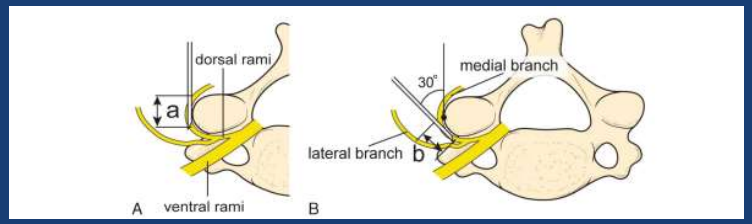
Universitair Kinderziekenhuis Koningin Fabiola

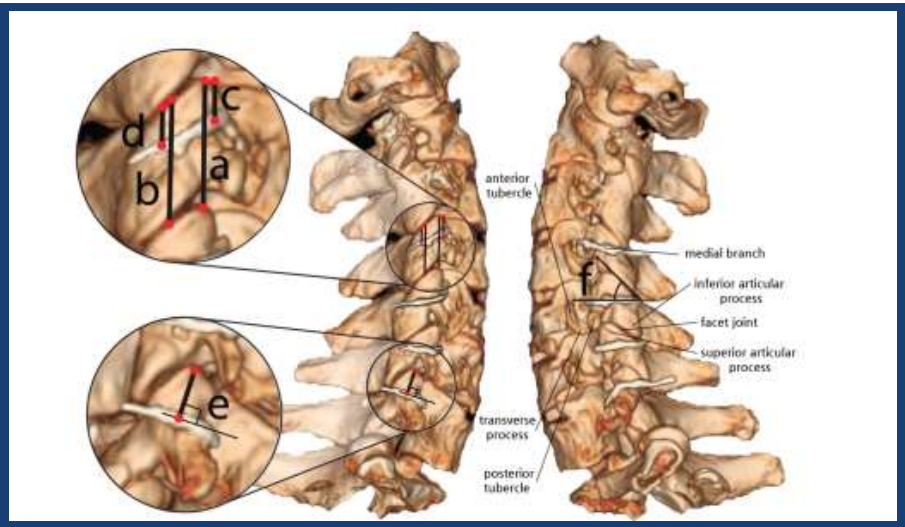
Anatomical Analysis of Medial Branches of Dorsal Rami of Cervical Nerves for Radiofrequency Thermocoagulation

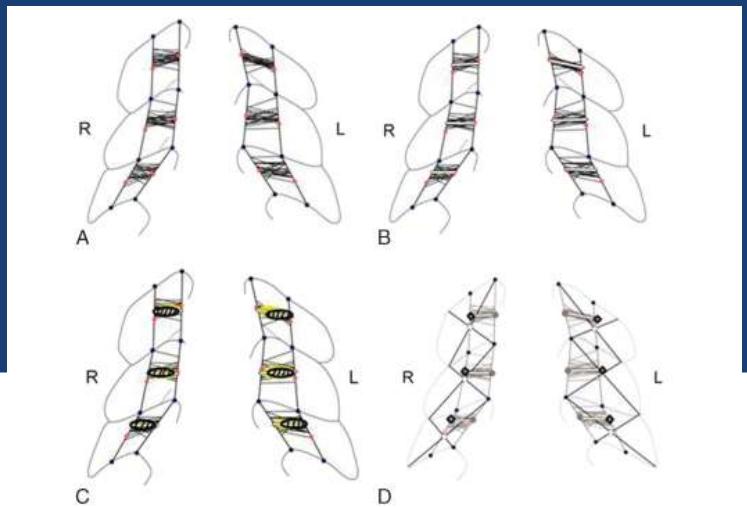
Tae Dong Kweon, MD, PhD,† Ji Young Kim, MD, PhD,*† Hye Yeon Lee, MD, PhD,‡ Myung Hwa Kim, MD,* and Youn-Woo Lee, MD, PhD*†*

(*Reg Anesth Pain Med* 2014;39: 465–471)









H.U.B

HÔPITAL UNIVERSITAIRE DE BRUXELLES

ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT

Hôpital Erasme

ULB

Hôpital Universitaire des Enfants Reine Fabiola

Universitair Kinderziekenhuis Koningin Fabiola

Radiofréquence pulsée

H.U.B
HÔPITAL UNIVERSITAIRE DE BRUXELLES
ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT
Hôpital Erasme
ULB
Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola

Pain Physician 2021; 24:525-532 • ISSN 1533-3159

Narrative Review

Pulsed Radiofrequency in Interventional Pain Management: Cellular and Molecular Mechanisms of Action – An Update and Review

various sets of PRF parameters. Lastly, the majority of studies were performed in rodents which, while useful in the identification and evaluation of cellular and molecular mechanisms, may or may not be translatable to human neuropathic pain pathophysiology and the human response to PRF therapy. Further investigation is warranted to fully elucidate the direct mechanisms of action of PRF for treatment of neuropathic pain in humans.

Pain Physician 2021; 24:525-532 • ISSN 1533-3159

Narrative Review

Pulsed Radiofrequency in Interventional Pain Management: Cellular and Molecular Mechanisms of Action – An Update and Review

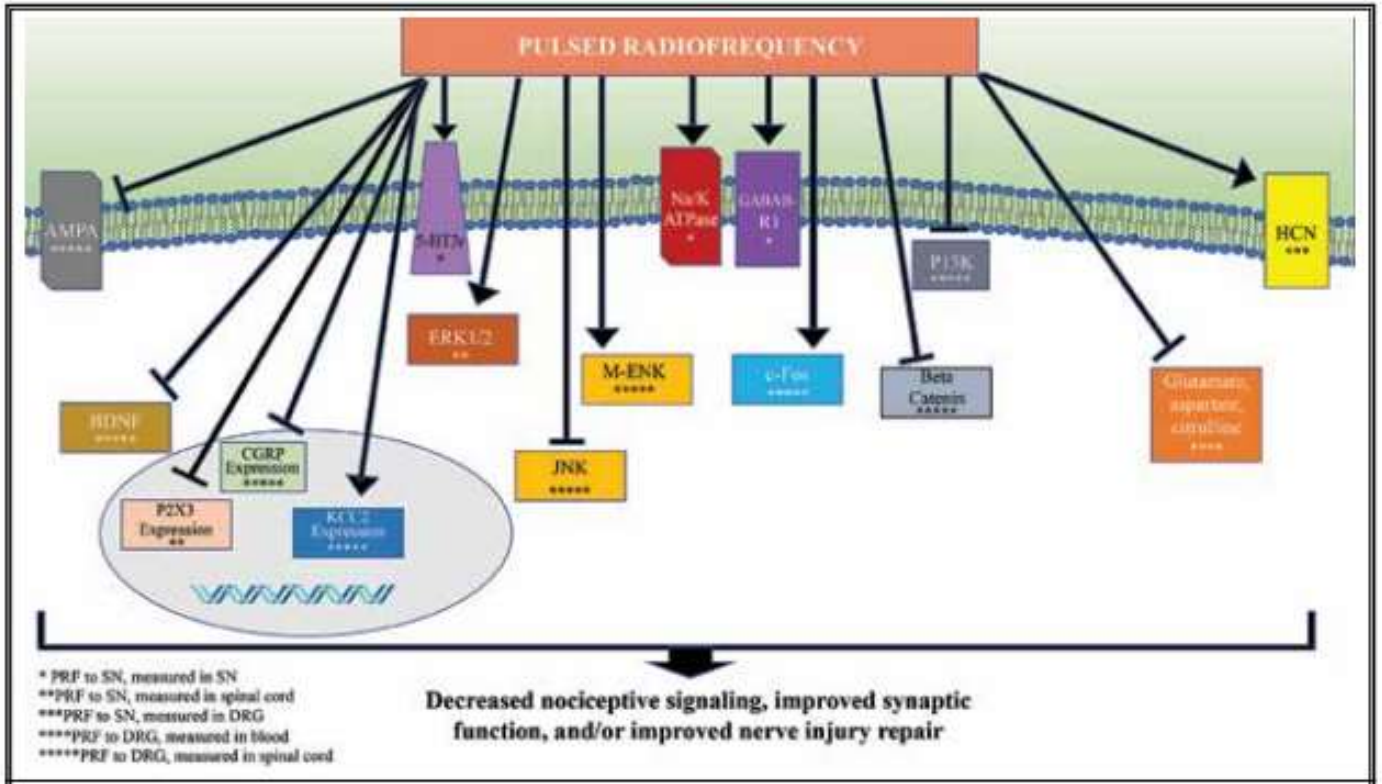


Fig. 1. *Pulsed radiofrequency mechanism of action in neurons.*

H.U.B
HÔPITAL UNIVERSITAIRE DE BRUXELLES
ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT
Hôpital Erasme
ULB
Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola

Pain Physician 2021; 24:525-532 • ISSN 1533-3159

Narrative Review

Pulsed Radiofrequency in Interventional Pain Management: Cellular and Molecular Mechanisms of Action – An Update and Review

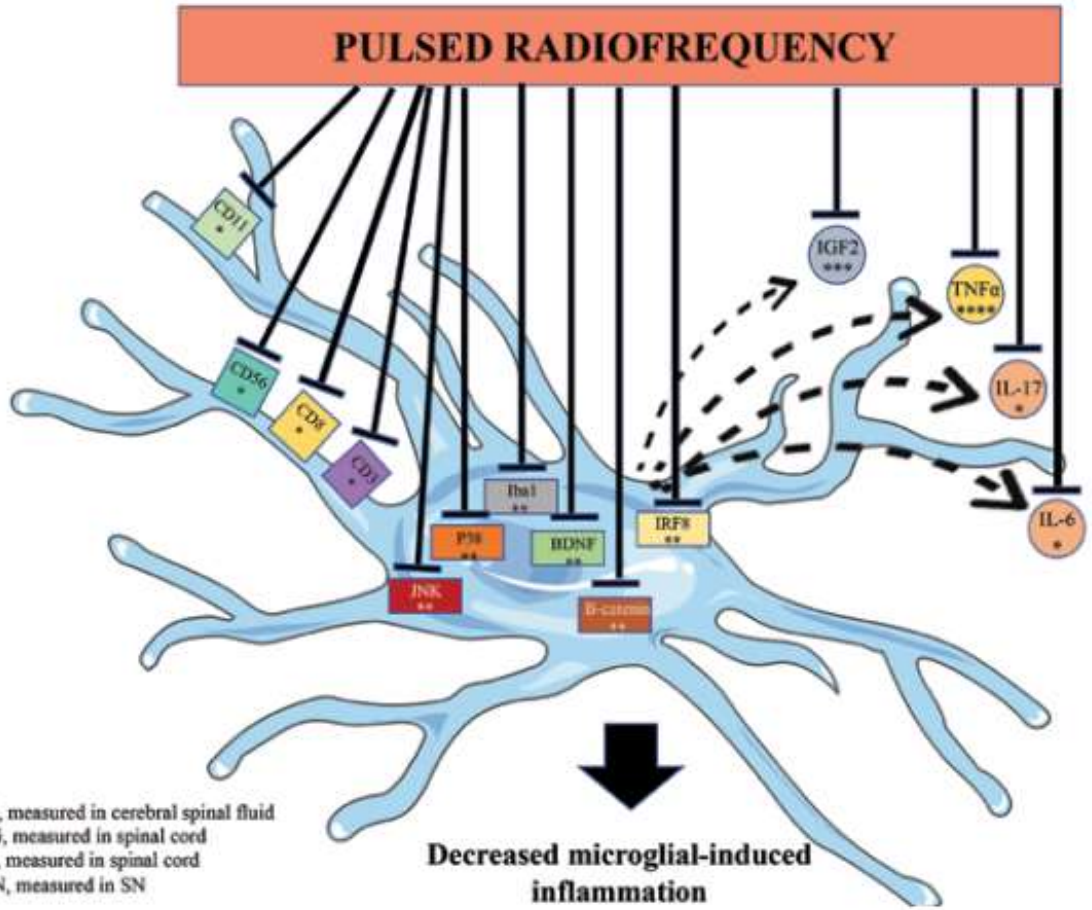


Fig. 2. *Pulsed radiofrequency mechanism of action in glial cells.*

H.U.B HÔPITAL UNIVERSITAIRE DE BRUXELLES ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT

Hôpital Erasme ULB

Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola

Indication: douleur neuropathique

Pain Physician 2019; 22:209-228 • ISSN 1533-3159

Systematic Review

Interventional Treatments for Postherpetic Neuralgia: A Systematic Review

Chia-Shiang Lin, MD, Ying-Chun Lin, MD, Hsuan-Chih Lao, MD, and Chien-Chuan Chen, MD

Pulsed Radiofrequency

Radiofrequency is a minimally invasive, target-selective technique that can be used to reduce chronic postherpetic neuralgia-related pain (59). The underlying mechanism is attributed to the effects of a rapidly changing electrical field on neuronal membranes (60), which results in electrolyte conduction and subsequent depolarization (61). The first case series of the dorsal root ganglion as an interventional site was conducted in 2008; in a cohort of 49 patients, the authors reported a significant reduction in pain ratings during a 12-week follow-up (62). Subsequent case studies involving the anterior ethmoidal nerve (63), infraorbital nerve (64), mental nerve (65), and caudal epidural (66) also reported satisfactory pain relief that persisted for 6 months.

Four RCTs have specifically addressed the use of pulsed radiofrequency for postherpetic neuralgia (Table 8) (18-21). Two RCTs targeted areas near the dorsal root ganglion via the angulus costae (18) and paravertebral puncture (19), whereas the other 2 trials targeted the intercostal nerves but provided no further descriptions (20,21). All study outcomes, including VAS, average rescue medication dosage, most SF-36 index scores (e.g., general health perceptions, social function, emotional role, mental health index, bodily pain index, physical function, and physical role), and the Pittsburgh Sleep Quality Index scale, favored pulsed radiofrequency. The observed effects began on Day 2 or 3 after treatment and persisted for 2-6 months (i.e., study endpoint). No side effects such as pneumothorax, infection, nerve injury, postoperative paresthesia, pain exacerbation, or any other serious adverse effects were observed in all studies. A recent meta-analysis similarly demonstrated the effectiveness of pulsed radiofrequency, including significant pain improvement after 1 day, 1 week, and 1 and 3 months, with only minor adverse events (e.g., local symptoms and transient bradycardia) (67).

Pain. 2013 November ; 154(11): 2249–2261. doi:10.1016/j.pain.2013.06.004.

Interventional management of neuropathic pain: NeuPSIG recommendations

Robert H. Dworkin[a,*], Alec B. O'Connor[b], Joel Kent[b], Sean C. Mackey[c], Srinivasa N. Raja[d], Brett R. Stacey[e], Robert M. Levy[f], Miroslav Backonja[g], Ralf Baron[h], Henning Harke[i], John D. Loeser[j], Rolf-Detlef Treede[k], Dennis C. Turk[l], and Christopher D. Wells[l]

Postherpetic neuralgia (PHN)

A recent double-blind RCT compared pulsed radiofrequency (PRF) treatment with sham therapy in 96 patients with PHN affecting the thoracic dermatomes [59]. PRF treatment of the intercostal nerve at the level of the zoster lesion, and the segments above and below, was done once a week for three weeks. Post-procedure pain scores and tramadol use were decreased, and several health-related quality of life domains were significantly improved through 6 months after treatment in the PRF group compared to the sham group. These results are similar to the reports from open-label studies of a reduction in pain during a 12-week follow up period after PRF treatment of the affected cervical, thoracic, or lumbar DRG in patients with PHN [67]. No complications were encountered in these studies. Although these preliminary studies are encouraging, the results need to be replicated and the recommendation for the role of PRF for PHN was considered "inconclusive."

Pain. 2013 November ; 154(11): 2249–2261. doi:10.1016/j.pain.2013.06.004.

Interventional management of neuropathic pain: NeuPSIG recommendations

Robert H. Dworkin[a,*], Alec B. O'Connor[b], Joel Kent[b], Sean C. Mackey[c], Srinivasa N. Raja[d], Brett R. Stacey[e], Robert M. Levy[f], Miroslav Backonja[g], Ralf Baron[h], Henning Harke[i], John D. Loeser[j], Rolf-Detlef Treede[k], Dennis C. Turk[l], and Christopher D. Wells[l]

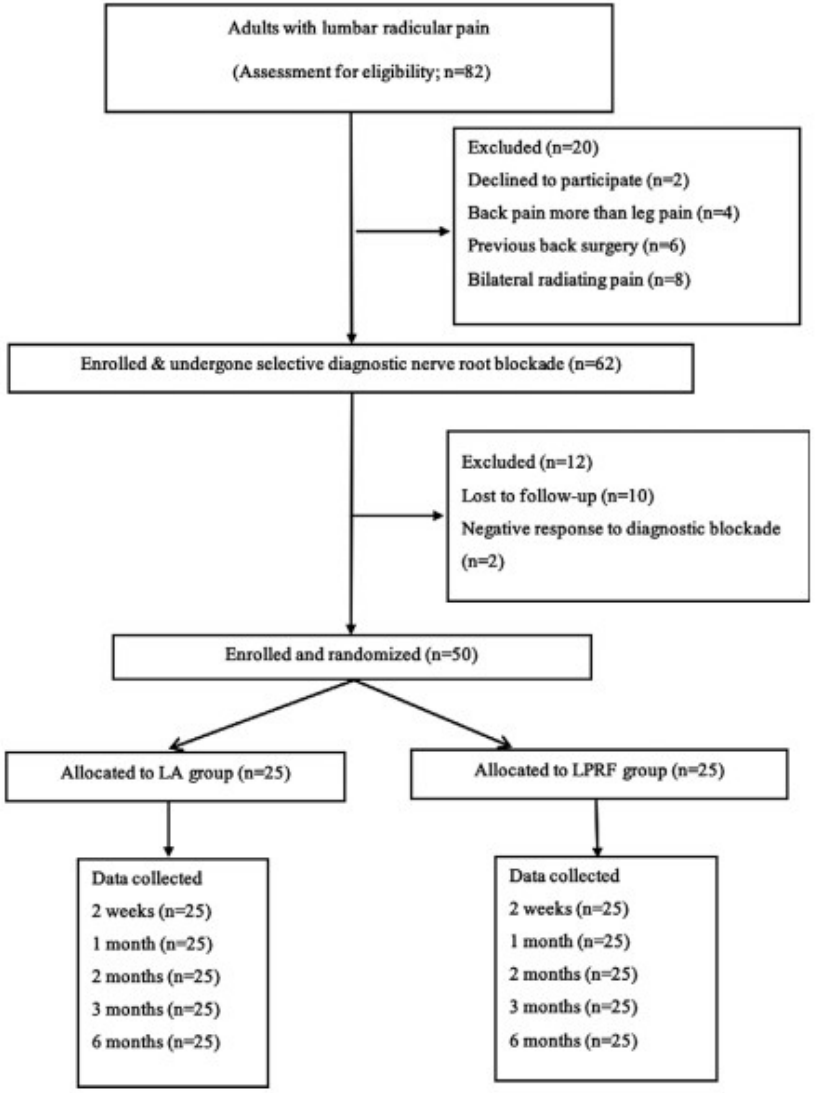
Lumbosacral and cervical radiculopathy

In summary, there is limited evidence of a potential short-term benefit of RF lesioning and PRF therapy in the treatment of chronic cervical radicular pain ("inconclusive" recommendation). These recommendations are similar to that of van Boxem et al. [135] who concluded that PRF of the DRG for cervical radicular pain may be indicated for a selected group of patients with chronic cervical brachialgia. For the treatment of lumbar radiculopathy, there is limited evidence for the beneficial effects of PRF of DRG and segmental nerve roots ("inconclusive" recommendation), and no evidence of benefit of RF lesioning (recommendation "against") [23].

Transforaminal Epidural Injection of Local Anesthetic and Dorsal Root Ganglion Pulsed Radiofrequency Treatment in Lumbar Radicular Pain: A Randomized, Triple-Blind, Active-Control Trial

Manish De, MD*; Virender K. Mohan, MD, FIPP*; Debesh Bhoi, MD*; Praveen Talawar, MD†; Ajeet Kumar, MD‡; Bhavuk Garg, MS§; Anjan Trikha, MD*; Maya Dehran, MD*; Lokesh Kashyap, MD*; Dilip R. Shende, MD*

Pain Practice, Volume 20, Issue 2, 2020 154–167



H.U.B HÔPITAL UNIVERSITAIRE DE BRUXELLES ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT

Hôpital Erasme ULB

Hôpital Universitaire des Enfants Reine Fabiola Universitair Kinderziekenhuis Koningin Fabiola

Transforaminal Epidural Injection of Local Anesthetic and Dorsal Root Ganglion Pulsed Radiofrequency Treatment in Lumbar Radicular Pain: A Randomized, Triple-Blind, Active-Control Trial

Manish De, MD*; Virender K. Mohan, MD, FIPP*; Debesh Bhoi, MD*; Praveen Talawar, MD†; Ajeet Kumar, MD‡; Bhavuk Garg, MS§; Anjan Trikha, MD*; Maya Dehran, MD*; Lokesh Kashyap, MD*; Dilip R. Shende, MD*

Figure 1. Squaring of the L4 vertebra and right oblique rotation of the C-arm so that the tip of the superior articular process of L5 was under the 6 o'clock position of the pedicle of the L4 vertebra.

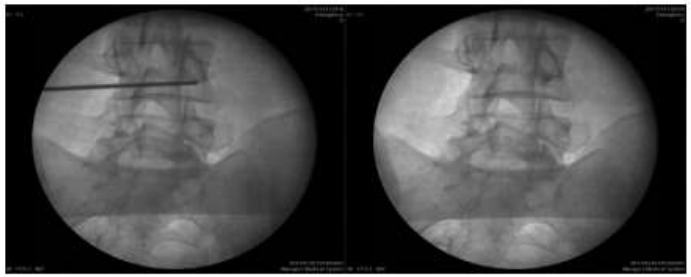
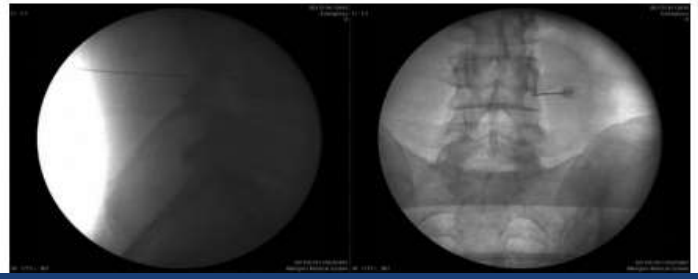


Figure 2. Marking and entry of the needle parallel to the x-ray beam in the oblique position of the C-arm.



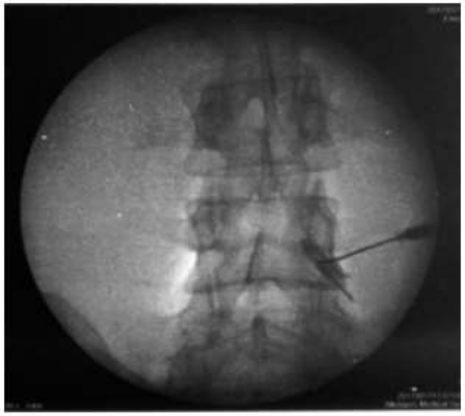


Figure 4. Spread of radio contrast material delineating the exiting nerve root.

H.U.B
HÔPITAL UNIVERSITAIRE DE BRUXELLES
ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT
Hôpital Erasme
ULB
Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola

Transforaminal Epidural Injection of Local Anesthetic and Dorsal Root Ganglion Pulsed Radiofrequency Treatment in Lumbar Radicular Pain: A Randomized, Triple-Blind, Active-Control Trial

Manish De, MD*; Virender K. Mohan, MD, FIPP*; Debesh Bhoi, MD*; Praveen Talawar, MD†; Ajeet Kumar, MD‡; Bhavuk Garg, MS§; Anjan Trikha, MD*; Maya Dehran, MD*; Lokesh Kashyap, MD*; Dilip R. Shende, MD*

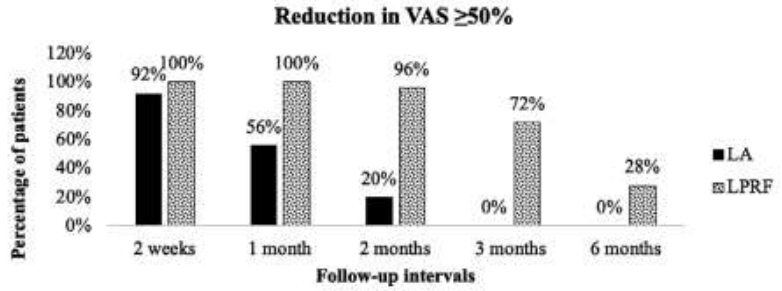
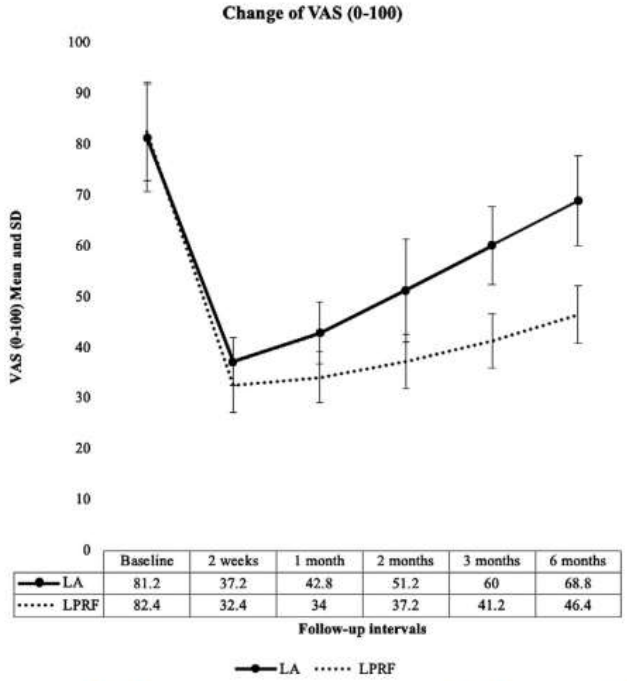


Figure 7. Percentage of patients showing ≥50% reduction in VAS scores at different time intervals in the local anesthetic (LA) and lumbar pulsed radiofrequency (LPRF) groups.



	Baseline	2 weeks	1 month	2 months	3 months	6 months
LA	81.2	37.2	42.8	51.2	60	68.8
LPRF	82.4	32.4	34	37.2	41.2	46.4

Figure 6. Change in VAS scores (0 to 100) at intervals of 2 weeks and 1, 2, 3, and 6 months in the local anesthetic (LA) and lumbar pulsed radiofrequency (LPRF) groups. SD, standard deviation.

H.U.B
HÔPITAL UNIVERSITAIRE DE BRUXELLES
ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT
Hôpital Erasme
ULB
Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola

Transforaminal Epidural Injection of Local Anesthetic and Dorsal Root Ganglion Pulsed Radiofrequency Treatment in Lumbar Radicular Pain: A Randomized, Triple-Blind, Active-Control Trial

Manish De, MD*; Virender K. Mohan, MD, FIPP*; Debesh Bhoi, MD*; Praveen Talawar, MD†; Ajeet Kumar, MD‡; Bhavuk Garg, MS§; Anjan Trikha, MD*; Maya Dehran, MD*; Lokesh Kashyap, MD*; Dilip R. Shende, MD*

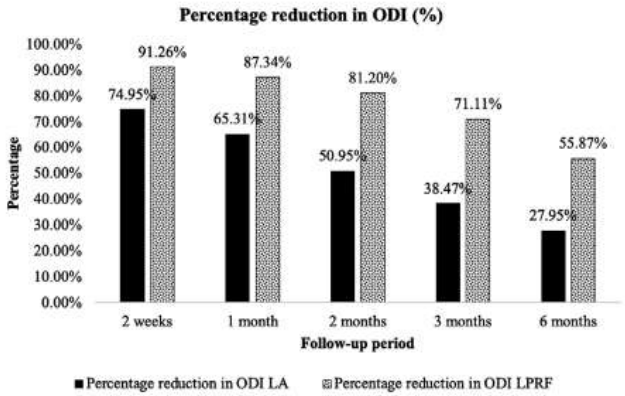
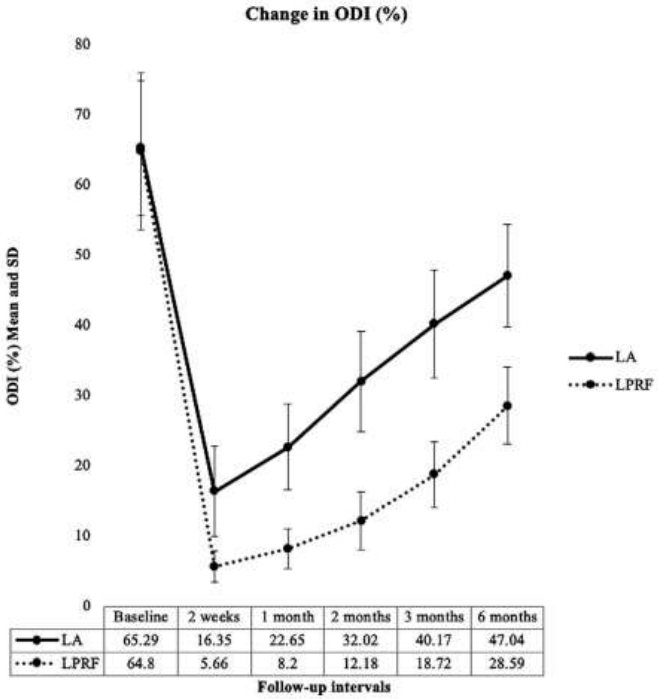


Figure 9. Percentage reductions in Oswestry Disability Index (ODI) scores in the local anesthetic (LA) and lumbar pulsed radiofrequency (LPRF) groups at different time intervals.



	Baseline	2 weeks	1 month	2 months	3 months	6 months
LA	65.29	16.35	22.65	32.02	40.17	47.04
LPRF	64.8	5.66	8.2	12.18	18.72	28.59

Figure 8. Change in Oswestry Disability Index (ODI) scores (%) at intervals of 2 weeks and 1, 2, 3, and 6 months in the local anesthetic (LA) and lumbar pulsed radiofrequency (LPRF) groups.

H.U.B
HÔPITAL UNIVERSITAIRE DE BRUXELLES
ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT
Hôpital Erasme
ULB
Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola

Transforaminal Epidural Injection of Local Anesthetic and Dorsal Root Ganglion Pulsed Radiofrequency Treatment in Lumbar Radicular Pain: A Randomized, Triple-Blind, Active-Control Trial

Manish De, MD*; Virender K. Mohan, MD, FIPP*; Debesh Bhoi, MD*; Praveen Talawar, MD†; Ajeet Kumar, MD‡; Bhavuk Garg, MS§; Anjan Trikha, MD*; Maya Dehran, MD*; Lokesh Kashyap, MD*; Dilip R. Shende, MD*

Table 3. Distribution of patients showing ≥50% reduction in VAS (0 to100) and ≤20% ODI score at different time-intervals in LA and LPRF group

Groups	2 weeksn (%)	1 monthn (%)	2 monthsn (%)	3 monthsn (%)	6 monthsn (%)
Reduction in VAS score of ≥50%					
LA	23 (92%)	14 (56%)	5 (20%)	0 (0%)	0 (0%)
LPRF	25 (100%)	25 (100%)	24 (96%)	18 (72%)	7 (28%)
95% CI of proportions	−0.08 (−0.13 to −0.03)	−0.44 (−0.54 to −0.34)	−0.76 (−0.85 to −0.67)	−0.72 (−0.81 to −0.63)	−0.28 (−0.37 to −0.19)
P value	0.85	0.59	0.28	0.312	0.705
ODI score ≤20%					
LA	17 (68%)	8 (32%)	2 (8%)	0 (0%)	0 (0%)
LPRF	25 (100%)	25 (100%)	25 (100%)	18 (72%)	2 (8%)
95% CI of proportions	−0.32 (−0.41 to −0.23)	−0.68 (−0.77 to −0.59)	−0.92 (−0.97 to −0.87)	−0.72 (−0.81 to −0.63)	−0.08 (−0.13 to −0.03)
P value	0.664	0.34	0.019*	0.312	0.85

CI, confidence interval; LA, local anesthetic; LPRF, lumbar pulsed radiofrequency; ODI, Oswestry Disability Index; SD, standard deviation.
*Significant difference ($P < 0.05$).

H.U.B
HÔPITAL UNIVERSITAIRE DE BRUXELLES
ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT
Hôpital Erasme
ULB
Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola

Pain Medicine, 21(12), 2020, 3320–3343
doi: 10.1093/pm/pnaa141
Advance Access Publication Date: 3 June 2020
Review Article

OXFORD

Efficacy and Safety of Pulsed Radiofrequency as a Method of Dorsal Root Ganglia Stimulation in Patients with Neuropathic Pain: A Systematic Review

Ivana Vuka, MS,* Tihana Marcius, MS,* Svjetlana Došenović, MD, PhD,† Lejla Ferhatović Hamzić, PhD,‡ Katarina Vučić, MD, PhD,§ Damir Sapunar, MD, PhD,*,¶,a and Livia Puljak, MD, PhD¶,a

Conclusions

The effects of PRF treatment applied to the DRG as an intervention for neuropathic pain conditions have been reported in multiple studies. Although conclusions from these studies indicate that PRF treatment of the DRG is safe and effective for the treatment of neuropathic pain, the available evidence was of very low quality. There were few RCTs with at least one of the key domains with an unclear or high RoB. The majority of studies had a nonrandomized design with multiple limitations and were based on relatively few, highly selected participants. Thus, these results should be interpreted with caution, and the generalization of these results to all patients with neuropathic painful conditions is not possible. Findings reported in the currently available studies about PRF treatment of the DRG for neuropathic pain should be considered preliminary evidence, and these findings should be confirmed in high-quality RCTs with a sufficient number of homogeneous participants and uniform comparators.

H.U.B
HÔPITAL UNIVERSITAIRE DE BRUXELLES
ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT
Hôpital Erasme
ULB
Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola

ELSEVIER

The SPINE JOURNAL

The Spine Journal 23 (2023) 651–655

Clinical Study

Ultrasound-guided pulsed radiofrequency of cervical nerve root for cervical radicular pain: a prospective randomized controlled trial

Pornpan Chalermkitpanit, MD[a,b], Patt Pannangpetch, MD[a,b], Yuwarin Kositworakitkun, MD[b], Weerasak Singhatanadgige, MD[c,d], Wicharn Yingsakmongkol, MD[c,d], Porntipa Pasuhirunnikorn, MD[b], Teerachat Tanasansomboon, MD[d,e,f,g]

Table 3
The number of patients with 50% pain reduction

Duration after the intervention	Steroid group (n=21)	PRF group (n=20)	*P*-value
1 mo	15 (71.4%)	19 (95%)	.046*
3 mo	5 (23.8%)	14 (70%)	.002*
6 mo	2 (9.5%)	8 (40%)	.023*
9 mo	1 (4.8%)	6 (30%)	.032*

PRF: Pulsed radiofrequency.
The value is presented as n (%).
* Statistically significant difference.

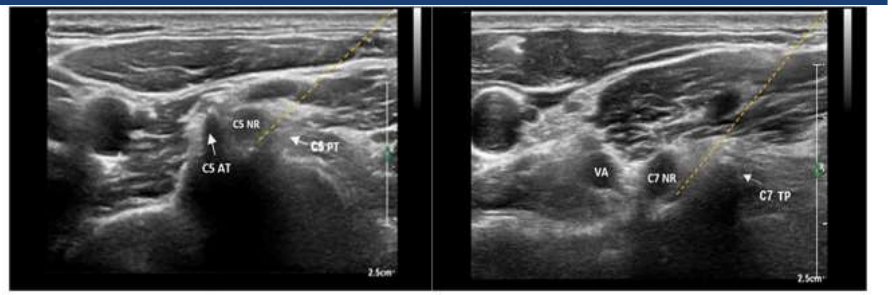


Fig. 2. The ultrasound images demonstrated C5 (left) and C7 (right) cervical nerve roots under a periradicular approach. The dash line exhibited the needle trajectory. (AT, anterior tubercle; NR, cervical nerve root; PT, posterior tubercle; VA, vertebral artery; TP, transverse process).

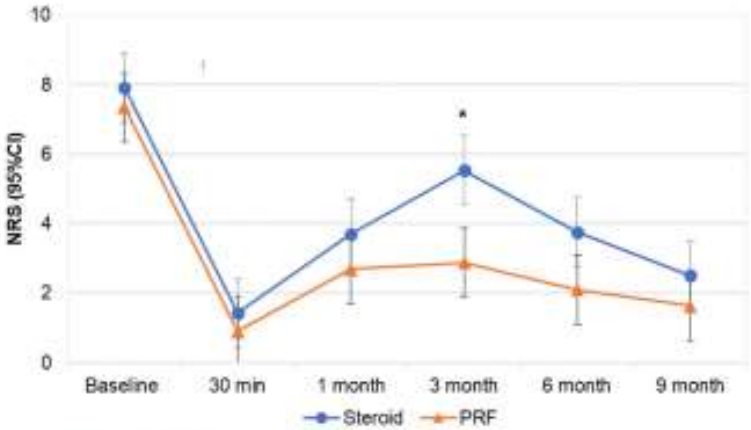


Fig. 3. The graph showed pain severity between the study groups. Statistical analysis using Generalized Estimating Equation (GEE). *The mean difference in pain score after adjusting the baseline pain score was 2.1 (95% confidence interval [CI] 0.5–3.7, p=.01).

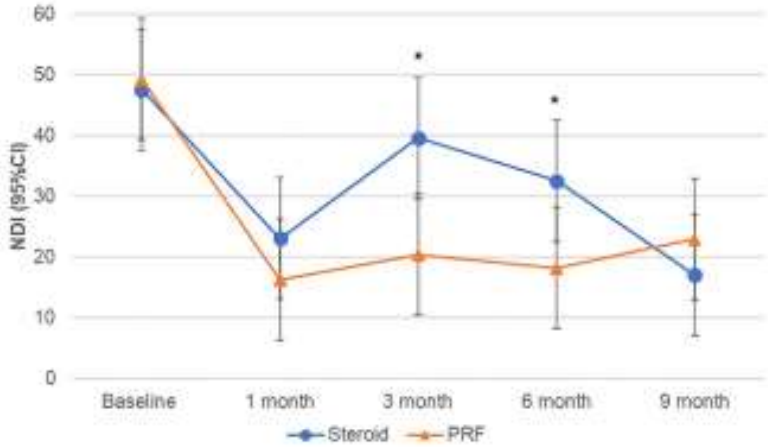


Fig. 4. The graph showed the neck disability index (NDI) between the study groups. Statistical analysis using Generalized Estimating Equation (GEE). *The mean differences at 3- and 6-month were 23.0 (95% CI 9.6–36.4; p<.01), and 23.8 (95% CI 4.2–43.3; p<.01), respectively.

H.U.B
HÔPITAL UNIVERSITAIRE DE BRUXELLES
ACADEMISCH ZIEKENHUIS BRUSSEL

Facialgies / Trigéminalgies

H.U.B
HÔPITAL UNIVERSITAIRE DE BRUXELLES
ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT
Hôpital Erasme
ULB
Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola

medicina MDPI

Article

Update on Interventional Management of Neuropathic Pain: A Delphi Consensus of the Spanish Pain Society Neuropathic Pain Task Force

Ancor Serrano-Afonso [1,*], Rafael Gálvez [2], Elena Paramés [3], Ana Navarro [4], Dolores Ochoa [5] and Concepción Pérez-Hernández [6]

Medicina **2022**, *58*, 627. https://doi.org/10.3390/medicina58050627

(C) Radiofrequency

14. PRF can be considered an efficacious alternative for the treatment of PHN.
15. Repeated, long duration therapies should be considered for PHN.
16. Early application of PRF reduces both herpes pain and the incidence of PHN.
17. Conventional radiofrequency is more effective than PRF for idiopathic trigeminal neuralgia.
18. Thermal radiofrequency has similar results on the trigeminal ganglion than its peripheral branches.
19. Radiofrequency cannot be recommended for CRPS.

3.3. Radiofrequency

Consensus was reached in 4 out of 6 statements (66.7%), and it was in the second round in all but one. The single item for which consensus was already attained in the first round stated that pulsed radiofrequency (PRF) is an effective alternative to treat PHN (Figure 2C, item 15). Already in the second round, panelists agreed that early application of PRF reduces herpes pain and the incidence of PHN, and that the latter condition would require repeated, long-lasting therapies (Figure 2C, items 16 and 17). Also in the second round, consensus was reached that conventional radiofrequency is more effective than PRF therapy for idiopathic trigeminal neuralgia (Figure 2C, item 18).

There was no agreement that radiofrequency is not indicated for CRPS, or that radiofrequency thermoablation of either the trigeminal ganglion or the trigeminal branches has similar effects (Figure 2C, items 19 and 20).

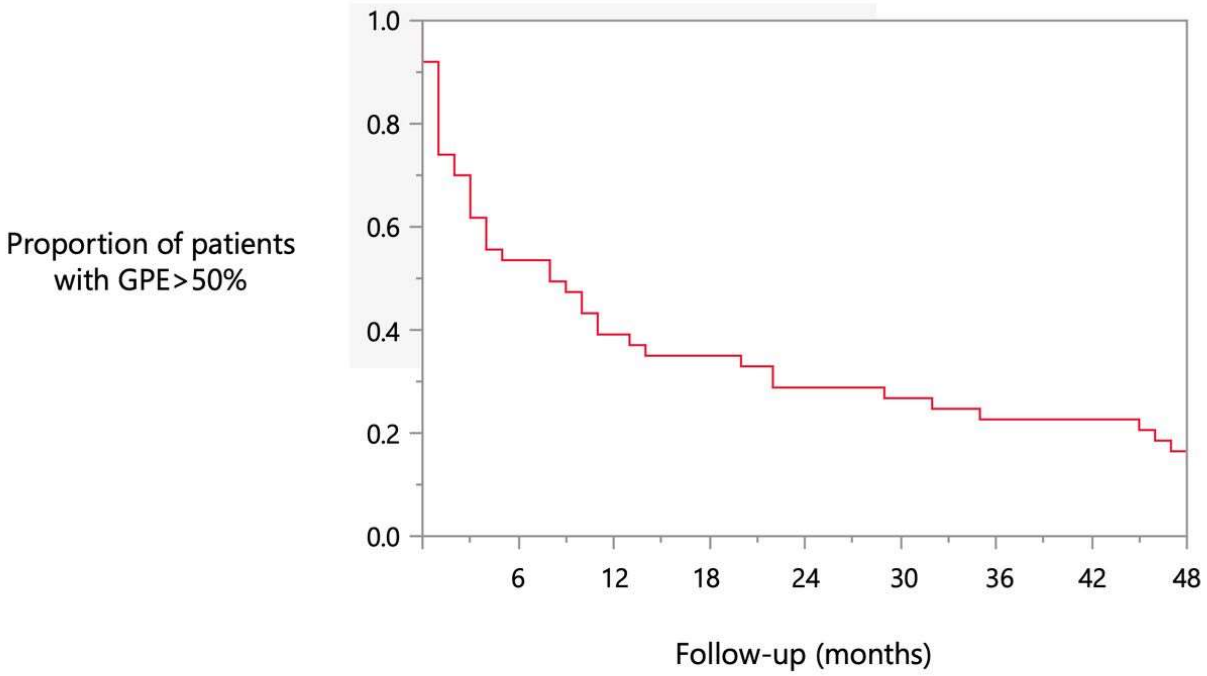
Pulsed radiofrequency treatment of the Gasserian ganglion for trigeminal neuralgia: a retrospective study (PROGRESS)

Jan Van Zundert [1,2] Matthias Vanderdonckt,[3,4] Klaas Buyse,[1] Roel Mestrum,[1,5] Dieter Mesotten,[3] Koen Van Boxem[1,2]

Van Zundert J, *et al*. *Reg Anesth Pain Med* 2023;**0**:1–3.

CONCLUSION

In our retrospective analysis of 81 patients, the PRF treatment of the Gasserian ganglion provided efficacy for the majority of patients. Given the potential for less complications compared with CRF, future comparative research is warranted.



H.U.B
HÔPITAL UNIVERSITAIRE DE BRUXELLES
ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT
Hôpital Erasme
ULB
Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola

Pain Physician 2020; 23:E559-E580 • ISSN 2150-1149

Systematic Review

Use of Radiofrequency Ablation for the Management of Facial Pain: A Systematic Review

Vwaire Orhurhu, MD[1], Faizan Khan, MD[2], Rodrigo C. Quispe, MD[2], Lisa Huang, MD[3], Ivan Urits, MD[3], Mark Jones, MD[3], Omar Viswanath, MD[4], Alan D. Kaye, MD, PhD[5], and Alaa Abd-Elsayed, MD[6]

Conclusions

This systematic review found evidence that RF ablation is efficient in treating patients with facial pain, as well as in improving quality of life and reducing oral medication use. Maximal pain control is achieved using combined CRF and PRF therapy. With studies focused on different methods of RF ablation, treatment can be more directed toward greatest efficiency by means of altering duration, temperature and frequency of therapy. Complications are uncommon and include facial numbness, masseter weakness, cheek hematomas, diminished corneal reflex and dry eyes.

Gonalgies, Sacralgies, Scapulalgies

Radiofréquence conventionnelle

↓

Cooled radiofrequency

Articulation sacro-iliaque

H.U.B
HÔPITAL UNIVERSITAIRE DE BRUXELLES
ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT
Hôpital Erasme
ULB
Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola

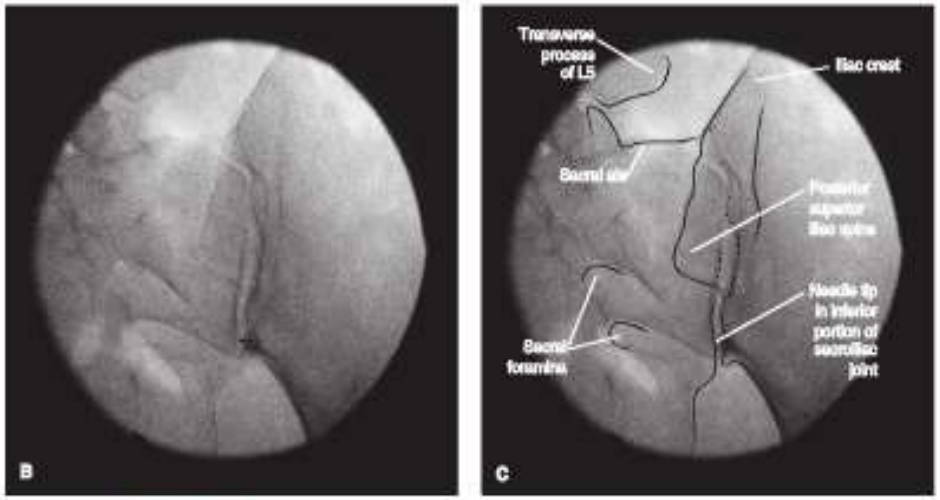
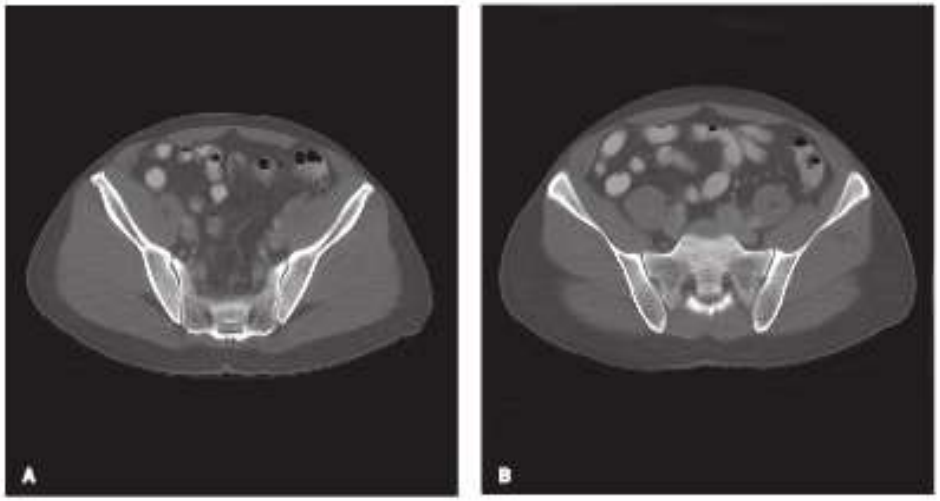


Figure 8-4. *(Continued)*
B: Anterior-posterior radiograph of the SI joint during intra-articular SI joint injection. A 22-gauge spinal needle is in position in the posterior-inferior aspect of the right SI joint. **C:** Labeled image. Note that the superior portion of the SI joint (*dashed lines*) is obscured by the overlying posterior superior iliac spine.



Hôpital Erasme

ULB

AL + Cortico

Hôpital Erasme

ULB

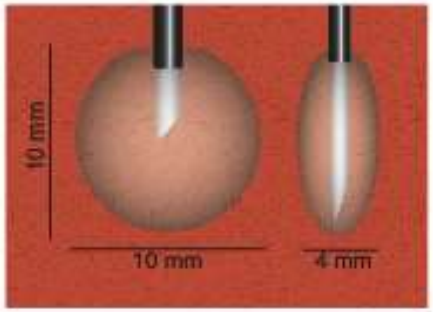
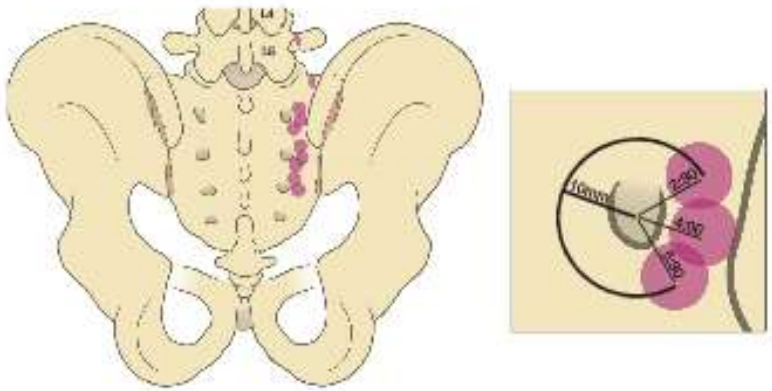
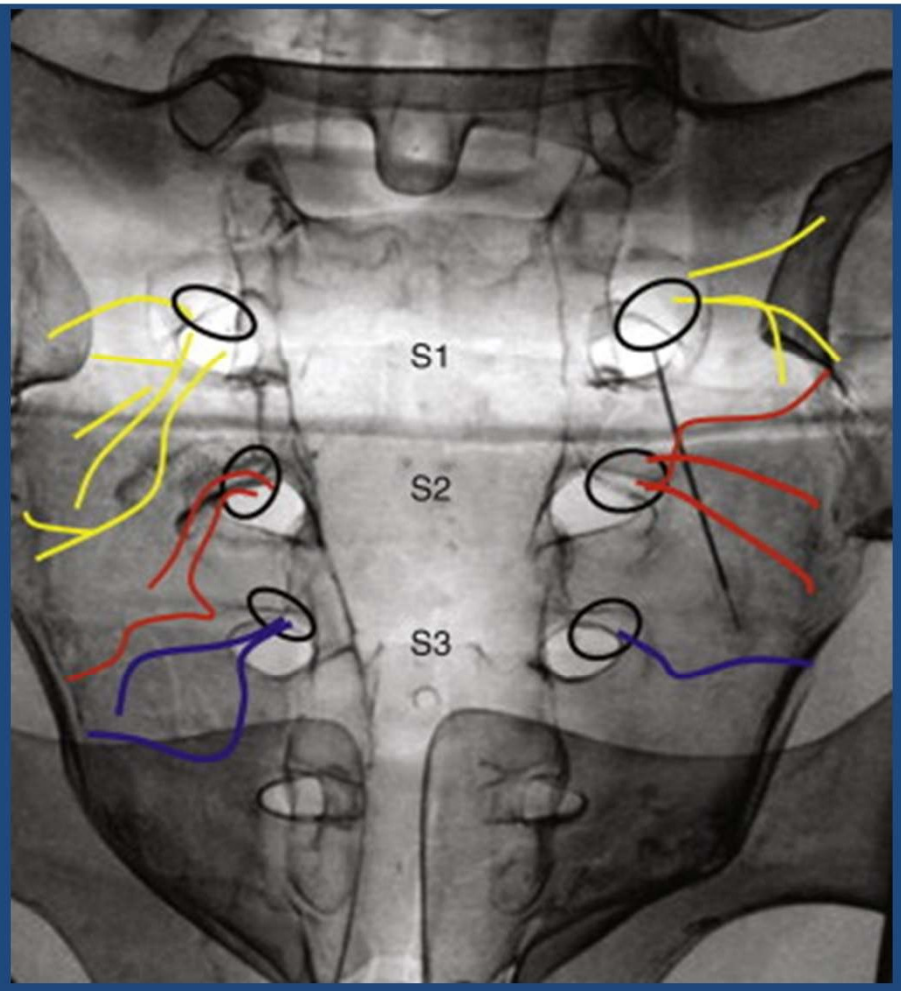


Figure 8-11.
Diagram demonstrating the difference in lesion size and shape between cooled (left) and conventional radiofrequency probes (right).





Current Pain and Headache Reports (2024) 28:335–372
https://doi.org/10.1007/s11916-024-01226-6

NEUROPATHIC PAIN (A ABD-ELSAYED, SECTION EDITOR)

Systematic Review and Meta-Analysis of the Effectiveness of Radiofrequency Ablation of the Sacroiliac Joint

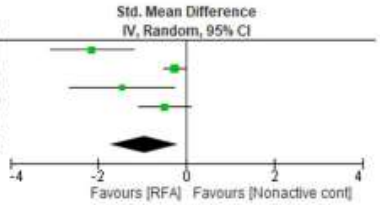
Rajesh Naidu Janapala[1] · Emilija Knezevic[2] · Nebojsa Nick Knezevic[3,4] · Rachana Pasupuleti[5] · Mahendra R. Sanapati[6,7] · Alan D. Kaye[8,9,10,11,12] · Vidyasagar Pampati[6,7] · Sahar Shekoohi[12] · Laxmaiah Manchikanti[6,7,13,14]

Conclusion

A systematic review and meta-analysis evaluated the effectiveness of radiofrequency neurotomy in managing sacroiliac joint pain. The review followed established guidelines and assessed 8 RCTs and 12 observational studies. Evidence quality varied due to methodological differences, but there was Level III evidence with fair recommendation for the effectiveness of RFA in improving pain and functional status at various time points.

Study or Subgroup	RFA Mean	RFA SD	RFA Total	Nonactive Control Mean	Nonactive Control SD	Nonactive Control Total	Weight	Std. Mean Difference IV, Random, 95% CI
Cohen et al. 2008	2.4	2.3	14	6	0.1	14	22.0%	-2.15 [-3.10, -1.19]
Juch et al. 2017	4.77	2.56	116	5.45	2.7	112	31.9%	-0.26 [-0.52, 0.00]
Mehta et al. 2018	3.4	2	9	6.5	2	6	18.4%	-1.46 [-2.66, -0.26]
Patel et al. 2012	3.7	2.7	34	5	2.4	17	27.7%	-0.49 [-1.08, 0.10]
Total (95% CI)			173			149	100.0%	-0.96 [-1.73, -0.19]

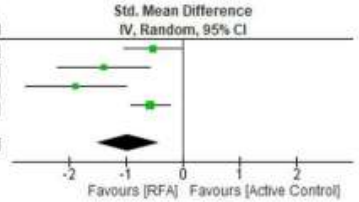
Heterogeneity: Tau² = 0.47; Chi² = 16.89, df = 3 (P = 0.0007); I² = 82%
Test for overall effect: Z = 2.43 (P = 0.02)



A.

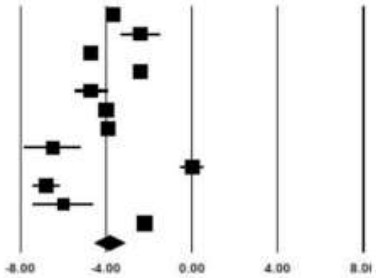
Study or Subgroup	RFA Mean	RFA SD	RFA Total	Active Control Mean	Active Control SD	Active Control Total	Weight	Std. Mean Difference IV, Random, 95% CI
AboElfadl et al. 2022	2	2.22	30	3.5	3.33	30	27.9%	-0.52 [-1.04, -0.01]
Dutta et al. 2018	3.067	0.8837	15	4.4	0.9856	15	20.6%	-1.39 [-2.19, -0.58]
Salman et al. 2016	2.3	2.4	15	6.4	1.8	15	19.0%	-1.88 [-2.76, -1.00]
Zheng et al. 2014	2.5	4.16	76	4.4	1.96	68	32.5%	-0.57 [-0.90, -0.24]
Total (95% CI)			136			128	100.0%	-0.97 [-1.53, -0.42]

Heterogeneity: Tau² = 0.21; Chi² = 10.57, df = 3 (P = 0.01); I² = 72%
Test for overall effect: Z = 3.47 (P = 0.0005)



B.

Study name	Difference in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	Total
Cohen et al. 2008	-3.700	0.134	0.018	-3.963	-3.437	-27.612	0.000	14
Patel et al. 2012	-2.400	0.463	0.214	-3.307	-1.493	-5.184	0.000	34
Zheng et al. 2014	-4.700	0.133	0.018	-4.961	-4.439	-35.338	0.000	76
Juch et al. 2017	-2.400	0.084	0.007	-2.565	-2.235	-28.571	0.000	116
Mehta et al. 2018	-4.700	0.400	0.160	-5.484	-3.916	-11.750	0.000	9
Dutta et al. 2018	-4.000	0.038	0.001	-4.074	-3.926	-105.263	0.000	15
Salman et al. 2016	-3.900	0.180	0.032	-4.253	-3.547	-21.667	0.000	15
AboElfadl et al. 2022	-6.500	0.677	0.458	-7.827	-5.173	-9.601	0.000	30
Bellini et al. 2016	0.000	0.271	0.073	-0.531	0.531	0.000	1.000	60
Kawamoto et al. 2021 Conventional	-6.800	0.316	0.100	-7.419	-6.181	-21.519	0.000	40
Kawamoto et al. 2021 Cooling	-6.000	0.722	0.521	-7.415	-4.585	-8.310	0.000	12
Bayerl et al. 2018	-2.200	0.063	0.004	-2.323	-2.077	-34.921	0.000	64
	-3.848	0.359	0.129	-4.552	-3.145	-10.721	0.000	



Heterogeneity				Tau-squared			
Q-value	df (Q)	P-value	I-squared	Tau Squared	Standard Error	Variance	Tau
1179.282	11	0.000	99.067	1.429	1.169	1.345	1.195

C.

HÔPITAL UNIVERSITAIRE DE BRUXELLES
ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT
Hôpital Erasme
ULB
Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola

Cooled radiofrequency ablation versus standard medical management for chronic sacroiliac joint pain a multicenter, randomized comparative effectiveness study

Steven P Cohen ,[1] Leonardo Kapural,[2] Lynn Kohan ,[3] Sean Li,[4] Robert W Hurley ,[5] Richard Vallejo,[6] Yashar Eshraghi,[7] Pradeep Dinakar,[8] Shravani Durbhakula ,[1] Douglas P Beall,[9] Mehul J Desai,[10] David Reece,[11] Sandy Christiansen ,[12] Min Ho Chang,[13] Adam J Carinci,[14] Michael DePalma[15]

Cohen SP, *et al*. *Reg Anesth Pain Med* 2024;**49**:184–191. doi:10.1136/rapm-2023-104568

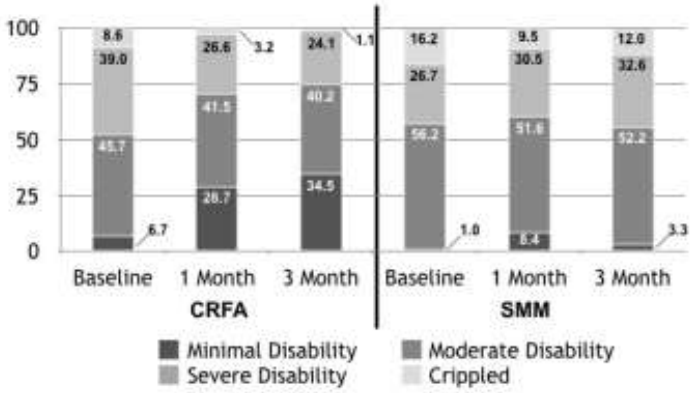


Figure 3 Percentage of subjects in Oswestry Disability Index categories. CRFA, cooled radiofrequency ablation; SMM, standard medical management.

CONCLUSIONS

The findings of this multicenter study demonstrate that CRFA is superior to SMM in managing chronic SIJ pain. The majority of subjects receiving CRFA reported meaningful improvements in pain, function and quality of life, despite reporting a long duration of pain. CRFA may be particularly well suited to treat SIJ pain, as the results of this and other randomized trials demonstrate. More research is needed to optimize neural targets and better identify potential treatment responders, as well as improve access to care.

Figure 1 Nine target regions for lateral branch blocks and cooled radiofrequency ablation (CRFA) procedures. The nine target regions (orange circles) were situated around the sacral foramina at the S1–S3 levels and in the groove between the sacral ala and articular process, targeting the dorsal ramus of L5. These targets were used for both the lateral branch block and CRFA procedures (ie, the periforaminal technique).

H.U.B

HÔPITAL DE BRU

ACADEM BRUSSE

Gonalgies

H.U.B
HÔPITAL UNIVERSITAIRE DE BRUXELLES
ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT
Hôpital Erasme
ULB
Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola

Pain Physician 2018; 21:41-51 • ISSN 1533-3159

Randomized Trial

Ultrasound-Guided Genicular Nerve Block for Knee Osteoarthritis: A Double-Blind, Randomized Controlled Trial of Local Anesthetic Alone or in Combination with Corticosteroid

Doo-Hwan Kim, MD, Seong-Soo Choi, MD, PhD, Syn-Hae Yoon, MD, So-Hee Lee, MD, Dong-Kyun Seo, MD, In-Gyu Lee, MD, Woo-Jong Choi, MD, PhD, and Jin-Woo Shin, MD, PhD

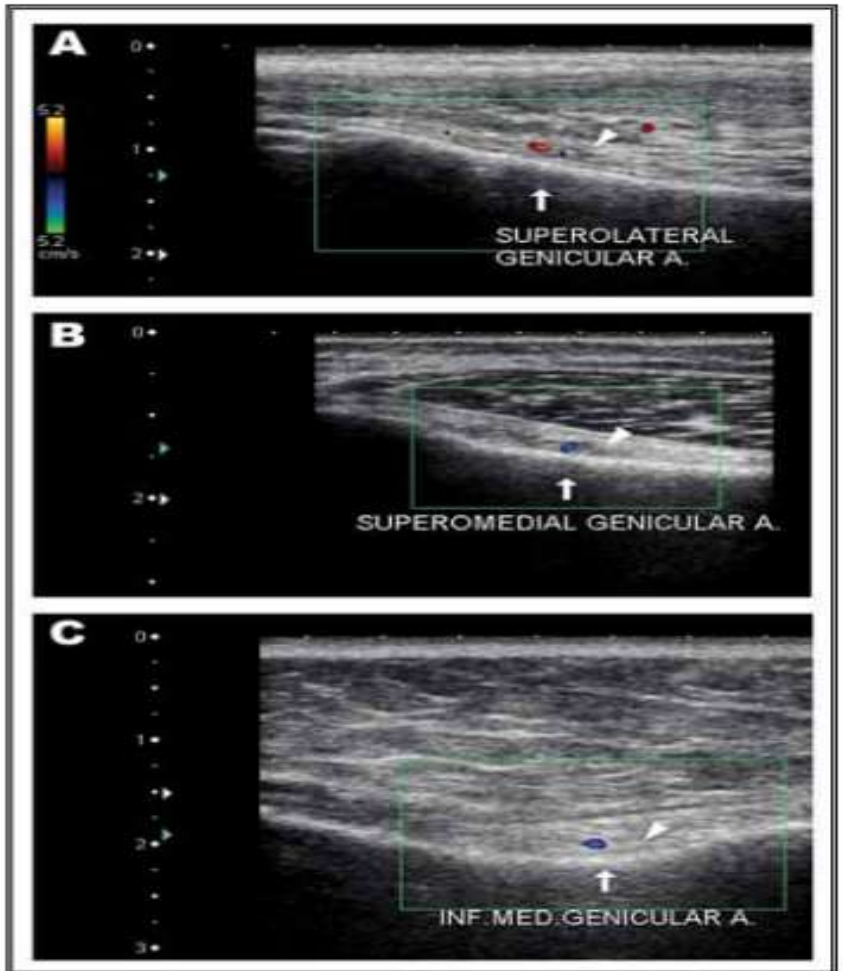


Fig. 1. *Ultrasound-guided identification of GNB target sites. Representative longitudinal images of the knee at the level of the distal femoral condyle and medial tibial metaphysis are shown. The superior lateral (A), superior medial (B), and inferior medial (C) genicular nerves (arrowhead) accompany each genicular artery (white arrow).*

H.U.B HÔPITAL UNIVERSITAIRE DE BRUXELLES ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT

Hôpital Erasme ULB

Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola

European Review for Medical and Pharmacological Sciences 2023; 27: 7073-7080

Ultrasound *vs.* fluoroscopic guidance in genicular nerve radiofrequency thermocoagulation for chronic knee pain: which one is the future?

G. DAĞISTAN[1], E. GÖNÜLLÜ[2]

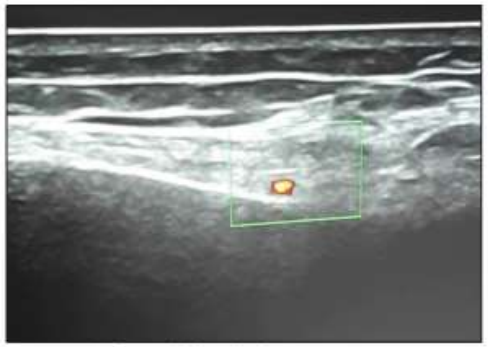


Figure 3. Inferomedial genicular artery.

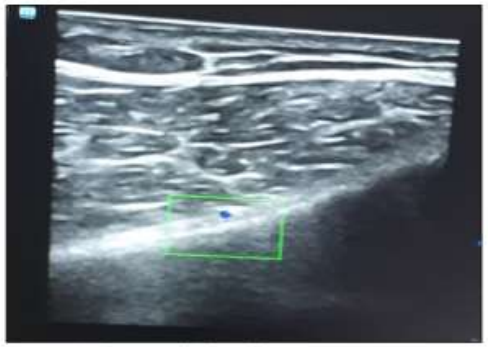


Figure 4. Superomedial genicular artery.

Figure 5. Superolateral genicular artery.

Figure 1. RFT cannulas on AP imaging.

Figure 2. RFT cannulas on lateral imaging.

H.U.B

HÔPITAL UNIVERSITAIRE DE BRUXELLES

ACADEMISCH ZIEKENHUIS BRUSSEL

European Review for Medical and Pharmacological Sciences 2023; 27: 7073-7080

Ultrasound *vs.* fluoroscopic guidance in genicular nerve radiofrequency thermocoagulation for chronic knee pain: which one is the future?

G. DAĞISTAN[1], E. GÖNÜLLÜ[2]

Conclusions

Our study results show that we obtained more successful results with USG-guided GN RFT. We think that the main reasons why USG is preferred for the procedures are because there is no radiation exposure during the procedure, USG is affordable, usable, and portable; target tissue, surrounding soft tissues and vascular structures can be clearly visualized and thus the success of the procedure can be increased, and potential complications can be prevented. Due to all these reasons, we think that the use of USG is safer and more effective than the use of fluoroscopy in RFT of genicular nerves.

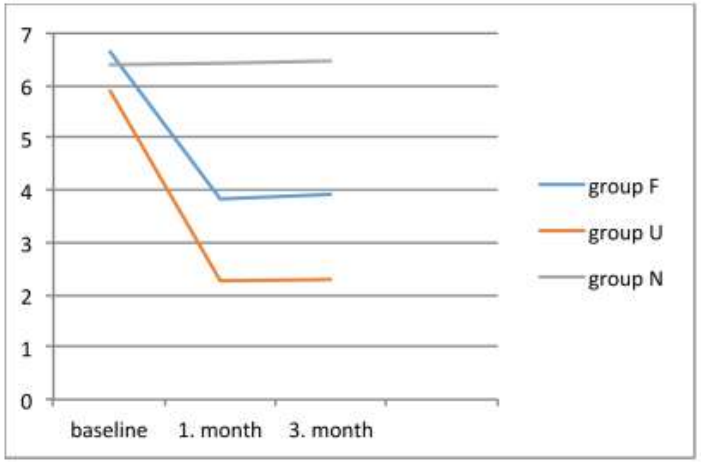


Figure 6. Variations in VAS before and after the procedure.

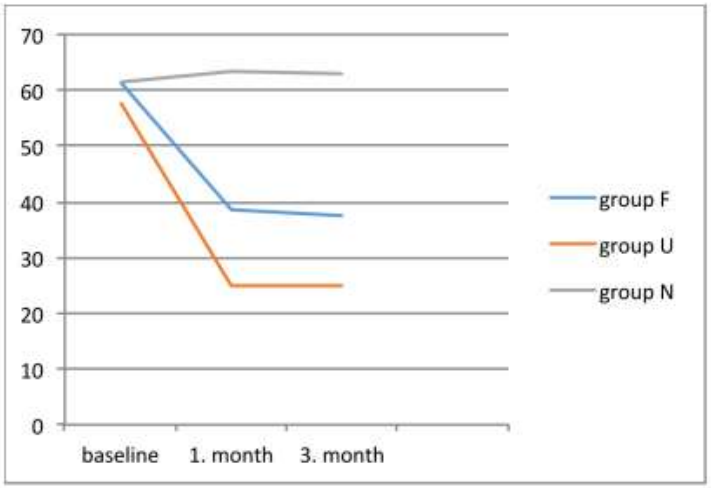


Figure 7. Variations in WOMAC before and after the procedure.

H.U.B HÔPITAL UNIVERSITAIRE DE BRUXELLES ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT

Hôpital Erasme ULB

Hôpital Universitaire des Enfants Reine Fabiola Universitair Kinderziekenhuis Koningin Fabiola

Scapulalgies

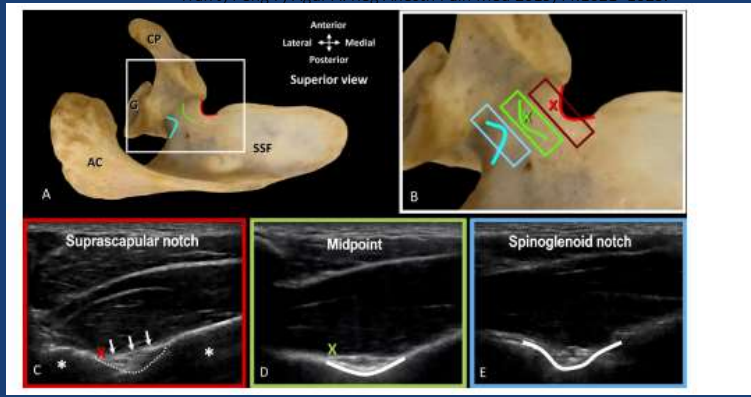
H.U.B
HÔPITAL UNIVERSITAIRE DE BRUXELLES
ACADEMISCH ZIEKENHUIS BRUSSEL

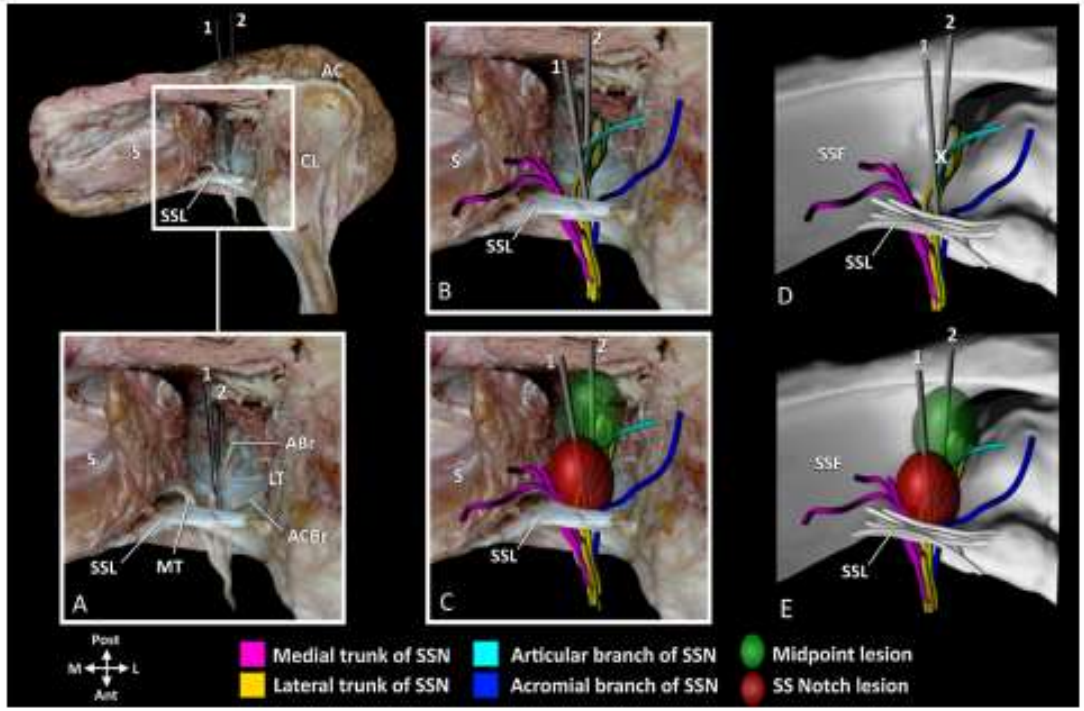
INSTITUT JULES BORDET INSTITUUT
Hôpital Erasme
ULB
Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola

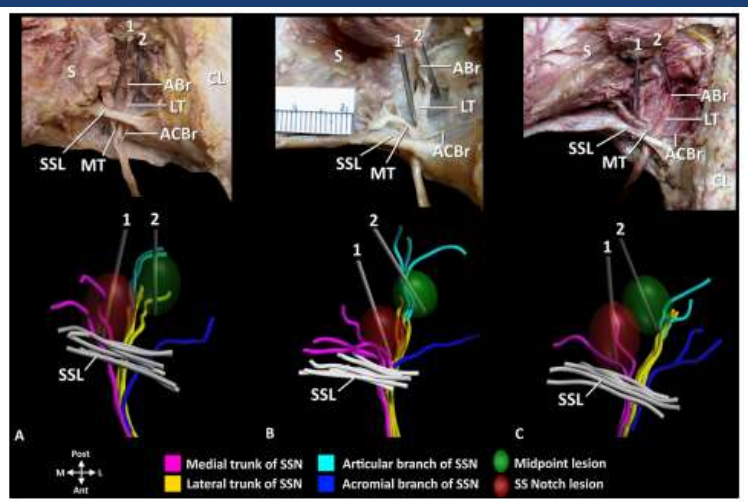
Evaluation of suprascapular nerve radiofrequency ablation protocols: 3D cadaveric needle placement study

John Tran,[1] Philip Peng,[2] Anne Agur[1]

Tran J, Peng P, Agur A. Reg Anesth Pain Med 2019;44:1021–1025.







H.U.B

HÔPITAL UNIVERSITAIRE DE BRUXELLES

ACADEMISCH ZIEKENHUIS BRUSSEL

Received: 8 July 2020 | Accepted: 16 January 2021
DOI: 10.1002/ejp.1735

REVIEW ARTICLE

EJP

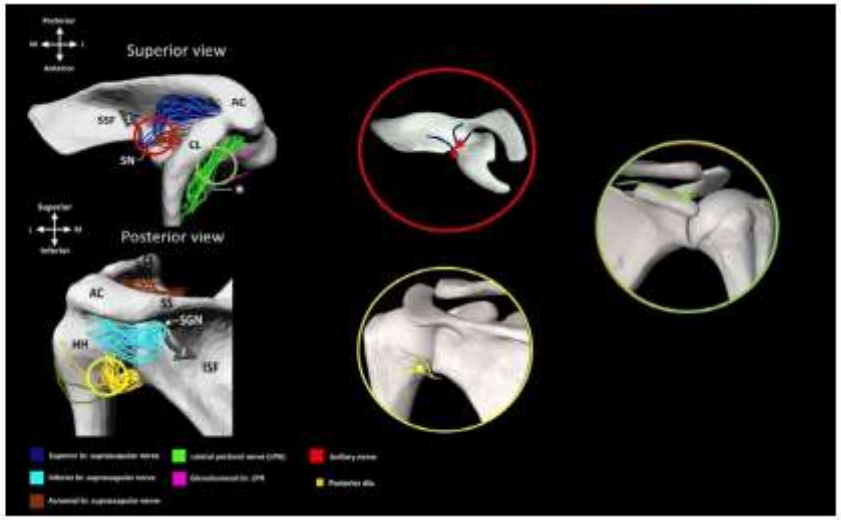
A systematic review and meta-analysis of radiofrequency procedures on innervation to the shoulder joint for relieving chronic pain

Hemkumar Pushparaj[1] | Yasmine Hoydonckx[1,2] | Nimish Mittal[3] | Philip Peng[1] | Steven P. Cohen[4,5] | Xingshan Cao[6] | Anuj Bhatia[1,2]

5 | CONCLUSIONS

This systematic review and meta-analysis revealed that the use of pRF neuromodulation as compared to CMM for chronic shoulder pain in seven RCTs was not associated with analgesic benefit and improved functional outcomes at 3 months after the procedures (GRADE certainty of the evidence: low) but the quality of the evidence was low. No RCTs were available for aRF but all the case series and reports for this modality showed clinically notable improvements in analgesia and function. However, the quality of the included case series that reported benefits from aRF for chronic shoulder pain was low. Majority of the studies included in this systematic review focused on RF procedures on the SSN with only a few publications reporting RF involving the LPN, the AN or the NS. No study reported the ablation of the articular innervations of the shoulder joint close to its capsule. High-quality anatomical dissections, large-scale registries, clinical studies evaluating different imaging techniques for RF electrode guidance and controlled comparative-effectiveness trials, especially for ablative RF, are required to better identify likely treatment responders, and to shed light on the efficacy and effectiveness of RF treatments for shoulder pain.

FIGURE 8 Innervation of the shoulder joint with relevance to potential neural targets (circles indicate potential location of radiofrequency lesions). AC: Acromion; CL: Clavicle; HH: Humoral Head; SS: Scapular Spine; SGN: Spinoglenoid Notch; ISF: Infraspinous Fossa; SSF: Supraspinous Fossa; SN: Scapular Notch; *: Coronoid process of scapula



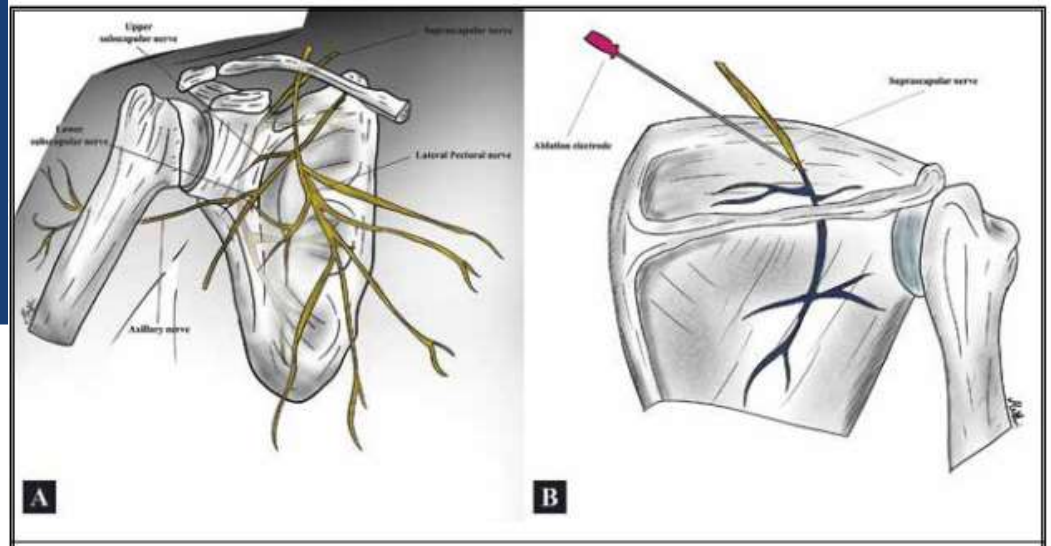


Fig. 2. *RFA of the SSC nerve at the shoulder.*

H.U.B
HÔPITAL UNIVI
DE BRUXELLES
ACADEMISCH Z
BRUSSEL

Pain Physician 2023; 26:125-135 • ISSN 1533-3159

Narrative Review

The Utilization of Radiofrequency Techniques for Upper Extremity Pain Management

Waleed Albishi, MBBS[1], Nasser M. AbuDujain, MBBS[2], Abdulaziz bin Dakhil, BS[3], and Meshari Alzeer, BS[3]

CONCLUSION

Radiofréquence conventionnelle:
Douleur arthrosique facettaire, sacro-iliaque, gonalgie, scapulalgie
Trigéminalgies

Radiofréquence pulsée: douleur neuropathique

Cooled radiofrequency:
Douleur sacro-iliaque, gonalgie, scapulalgie

Radiofréquence conventionnelle +
Radiofréquence pulsée:
Trigéminalgies

Consensus practice guidelines on interventions for lumbar facet joint pain from a multispecialty, international working group

Steven P Cohen,[1] Arun Bhaskar,[2] Anuj Bhatia,[3] Asokumar Buvanendran,[4] Tim Deer,[5] Shuchita Garg,[6] W Michael Hooten,[7] Robert W Hurley,[8] David J Kennedy,[9] Brian C McLean,[10] Jee Youn Moon,[11] Samer Narouze,[12] Sanjog Pangarkar,[13] David Anthony Provenzano,[14] Richard Rauck,[15] B Todd Sitzman,[16] Matthew Smuck,[17] Jan van Zundert,[18,19] Kevin Vorenkamp,[20] Mark S Wallace,[21] Zirong Zhao[22]

Cohen SP, *et al*. *Reg Anesth Pain Med* 2020;**45**:424–467. doi:10.1136/rapm-2019-101243

Consensus practice guidelines on interventions for cervical spine (facet) joint pain from a multispecialty international working group

Robert W Hurley,[1] Meredith C B Adams,[2] Meredith Barad,[3] Arun Bhaskar,[4] Anuj Bhatia,[5] Andrea Chadwick,[6] Timothy R Deer,[7] Jennifer Hah,[8] W Michael Hooten,[9] Narayan R Kissoon,[10] David Wonhee Lee,[11] Zachary Mccormick,[12] Jee Youn Moon,[13,14] Samer Narouze,[15] David A Provenzano,[16,17] Byron J Schneider,[18] Maarten van Eerd,[19] Jan Van Zundert,[19] Mark S Wallace,[20] Sara M Wilson,[21] Zirong Zhao,[22] Steven P Cohen[23]

Hurley RW, *et al*. *Reg Anesth Pain Med* 2022;**47**:3–59. doi:10.1136/rapm-2021-103031

H.U.B
HÔPITAL UNIVERSITAIRE DE BRUXELLES
ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT
Hôpital Erasme
ULB
Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola

Au niveau sympathique

Bloc du ganglion stellaire

Indications:

- CRPS MS
- Facialgies
- Tempête électrique
- Spasme Art. Mam. CABG
- Hyperhydrose
- PTSD

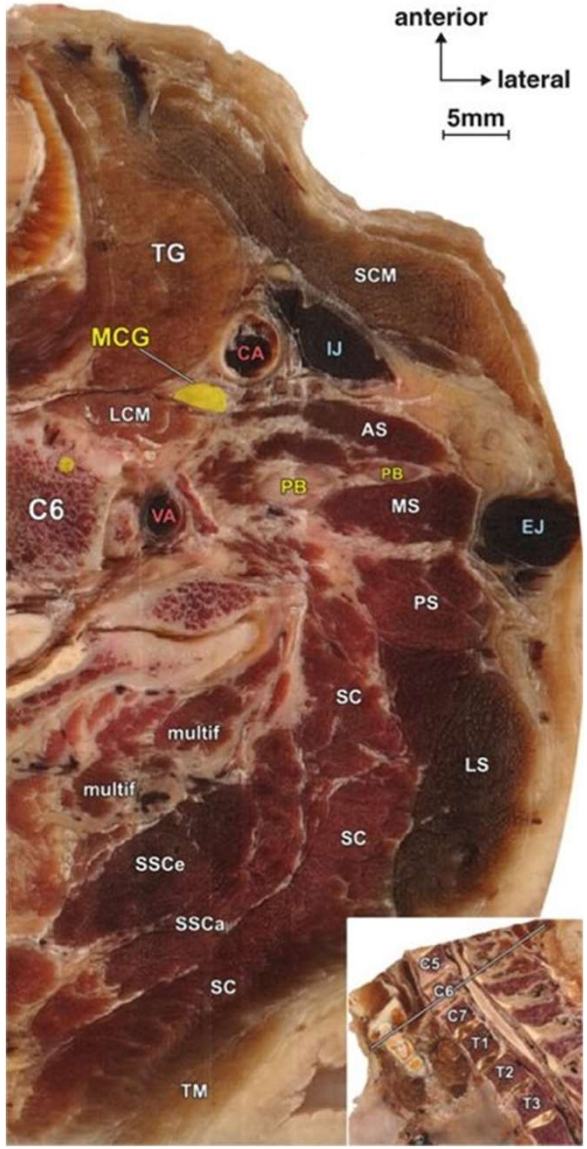
CHRONIC AND INTERVENTIONAL PAIN

REVIEW ARTICLE

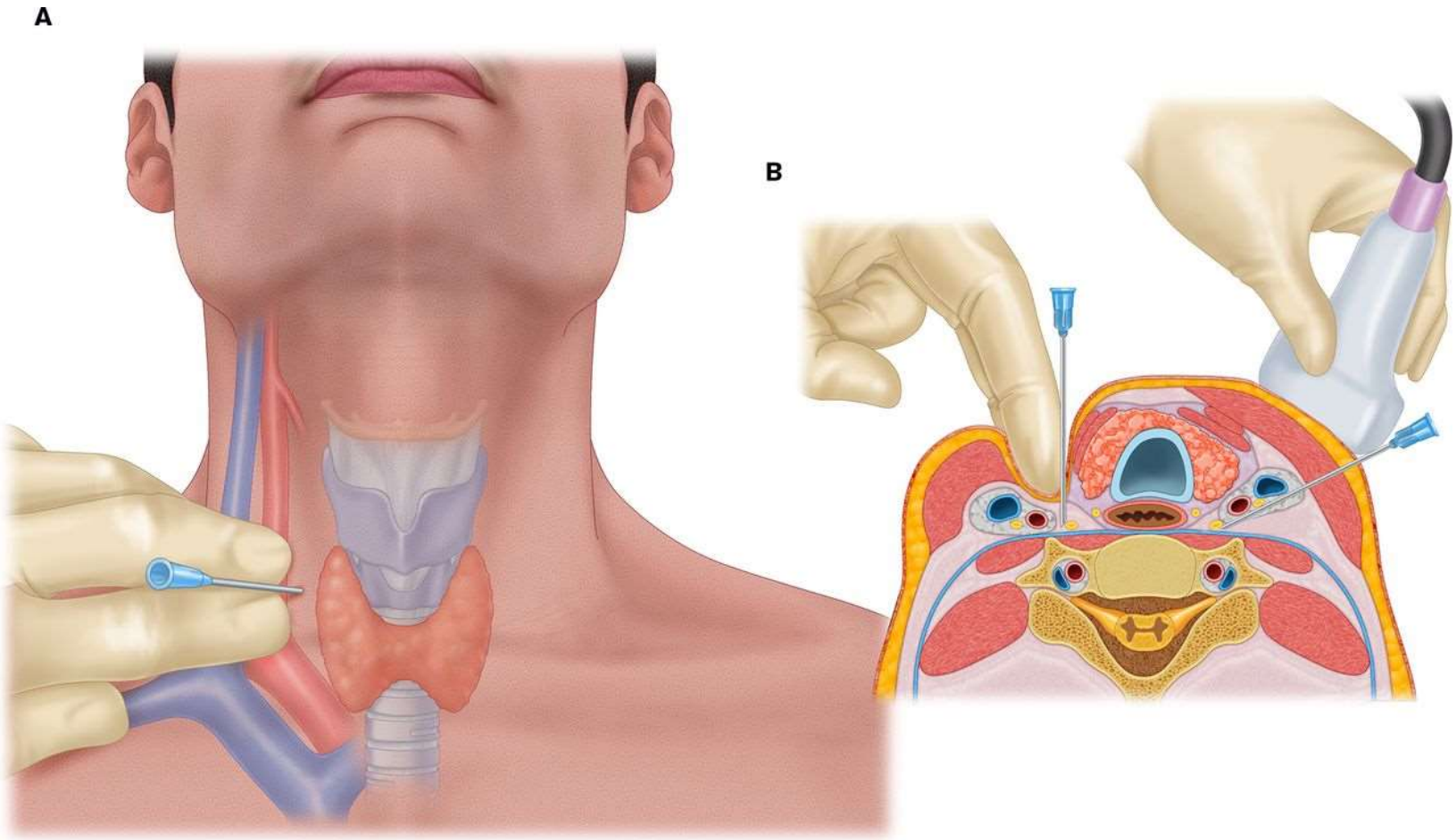
Review of Sympathetic Blocks
Anatomy, Sonoanatomy, Evidence, and Techniques

Samir Baig, MD, Jee Youn Moon, MD, PhD,† and Hariharan Shankar, MBBS*‡*

(*Reg Anesth Pain Med* 2017;42: 377–391)

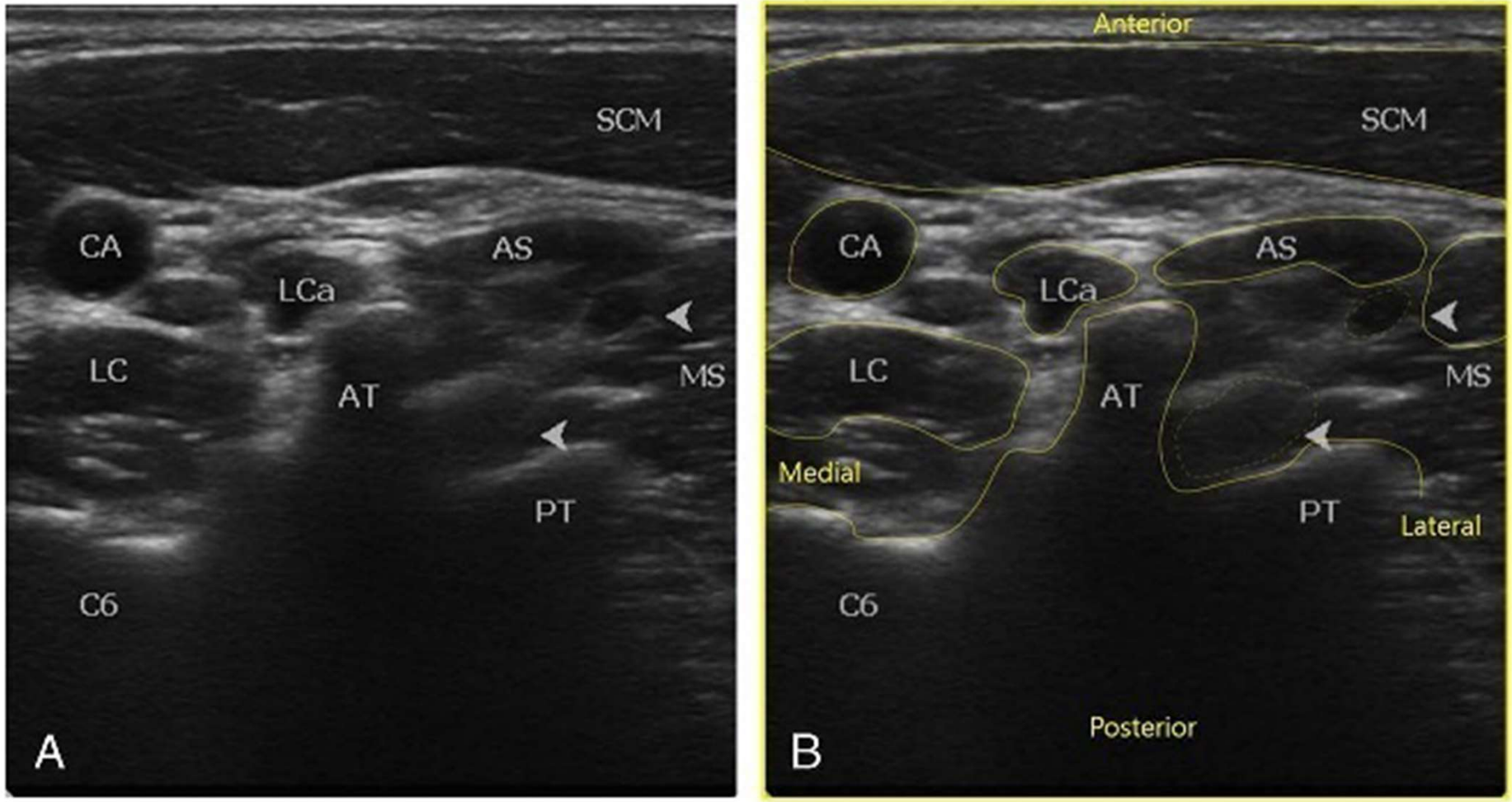

anterior
lateral
5mm
TG
SCM
MCG
CA
IJ
LCM
AS
PB
PB
C6
VA
MS
EJ
PS
SC
multif
multif
LS
SC
SSCe
SSCa
SC
TM
C5
C6
C7
T1
T2
T3

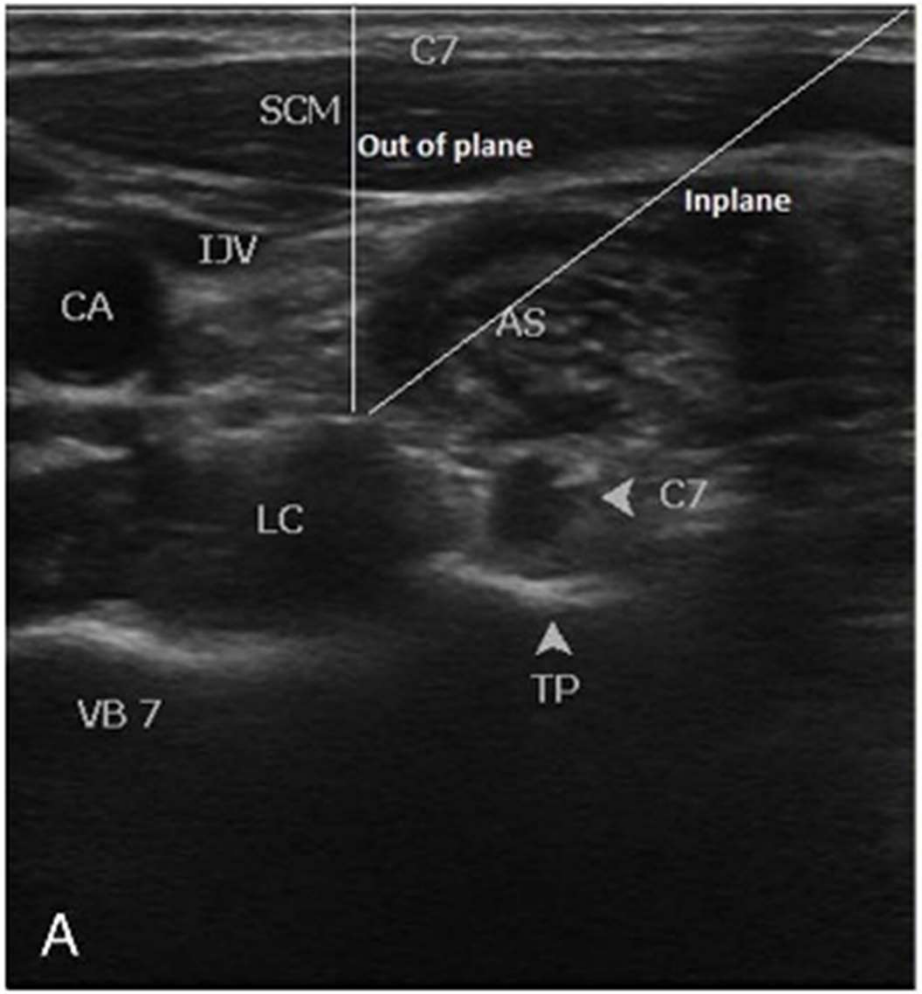
anterior
lateral
5mm
PMA
CL
TG
CA
SV
SCL
AS
SG
LCM
VA
BP
BP
T1
rib
MS
C5
C6
C7
T1
T2
T3

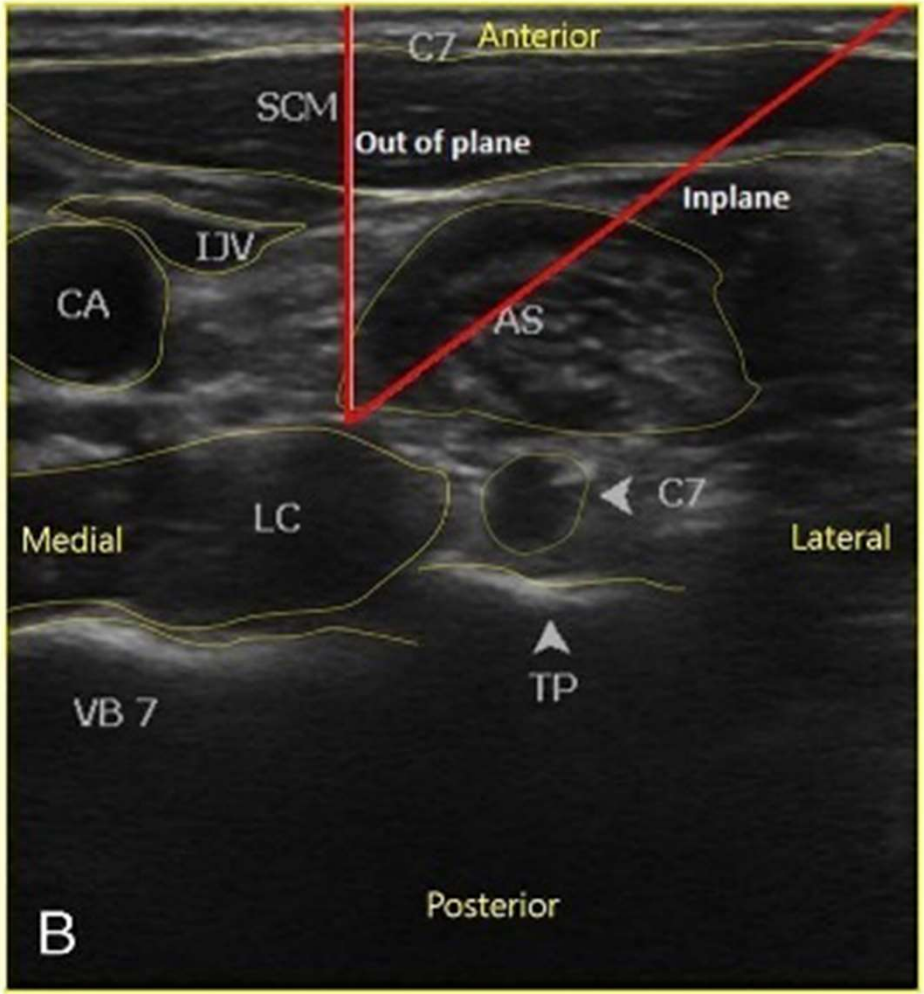


Vasudha Goel et al. Reg Anesth Pain Med 2019;44:669-678

© American Society of Regional Anesthesia & Pain Medicine 2019. No commercial re-use. See rights and permissions. Published by BMJ.


SCM
CA
AS
LCa
LC
AT
MS
PT
C6
A
Anterior
SCM
CA
AS
LCa
LC
AT
MS
Medial
PT
Lateral
C6
Posterior
B


C7
SCM
Out of plane
Inplane
IJV
CA
AS
LC
C7
TP
VB 7
A

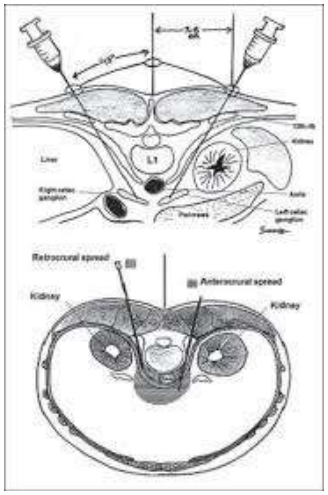

C7
Anterior
SCM
Out of plane
Inplane
IJV
CA
AS
Medial
LC
C7
Lateral
TP
VB 7
Posterior
B

Hôpital Erasme

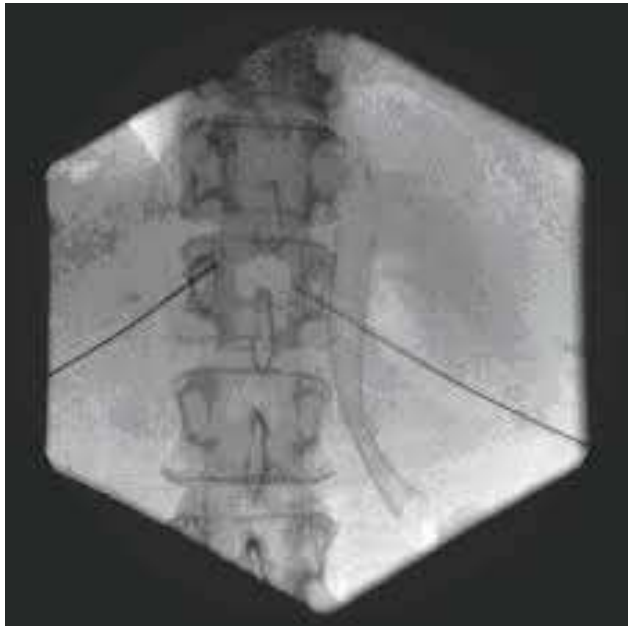
ULB

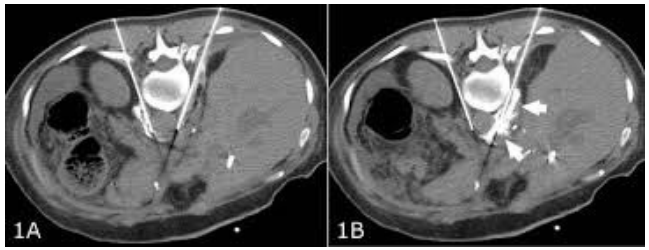
Bloc coeliaque

Indication:
Douleurs viscérales liées au cancer


Liver
L1
Kidney
Kidney

12th rib
S
C

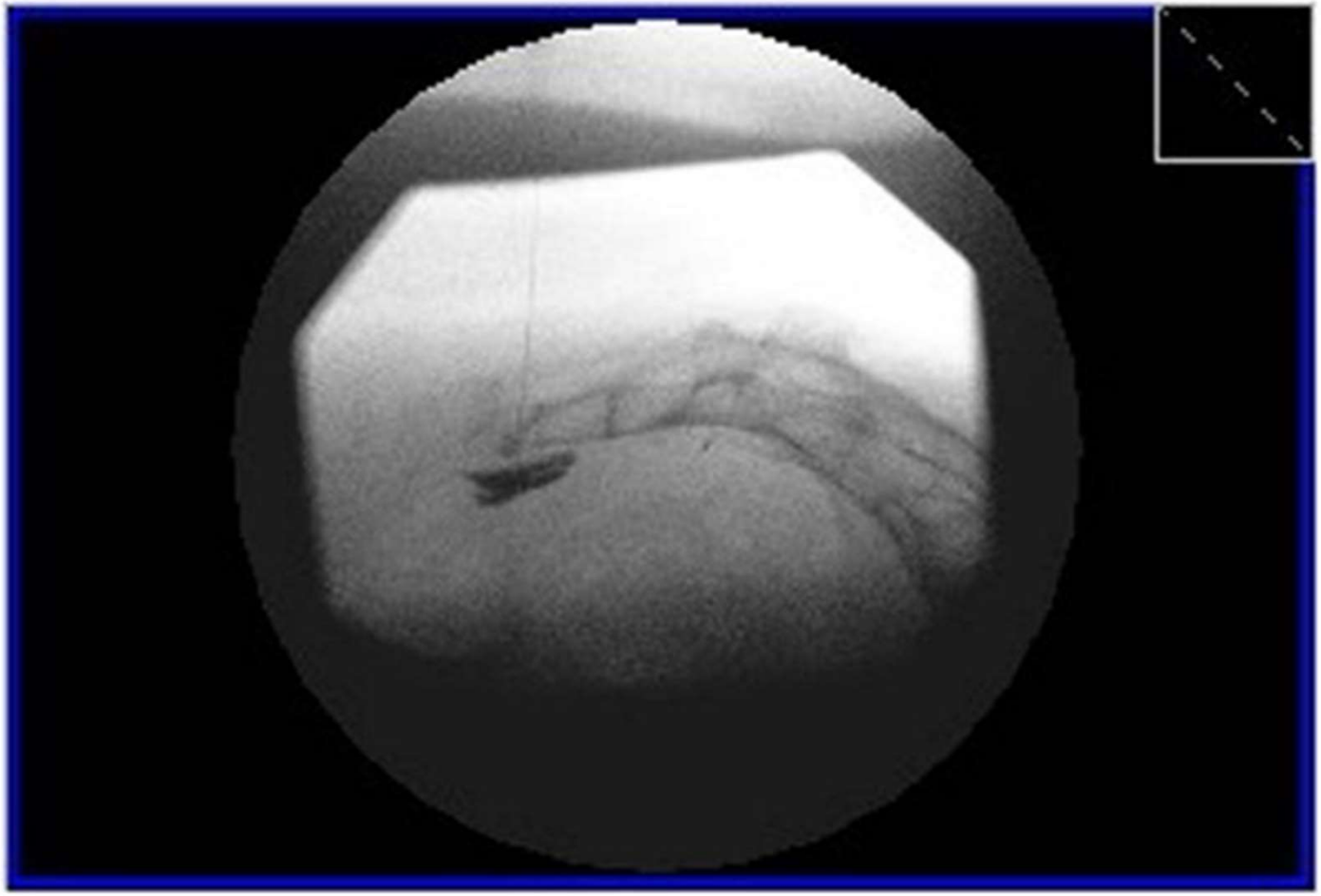


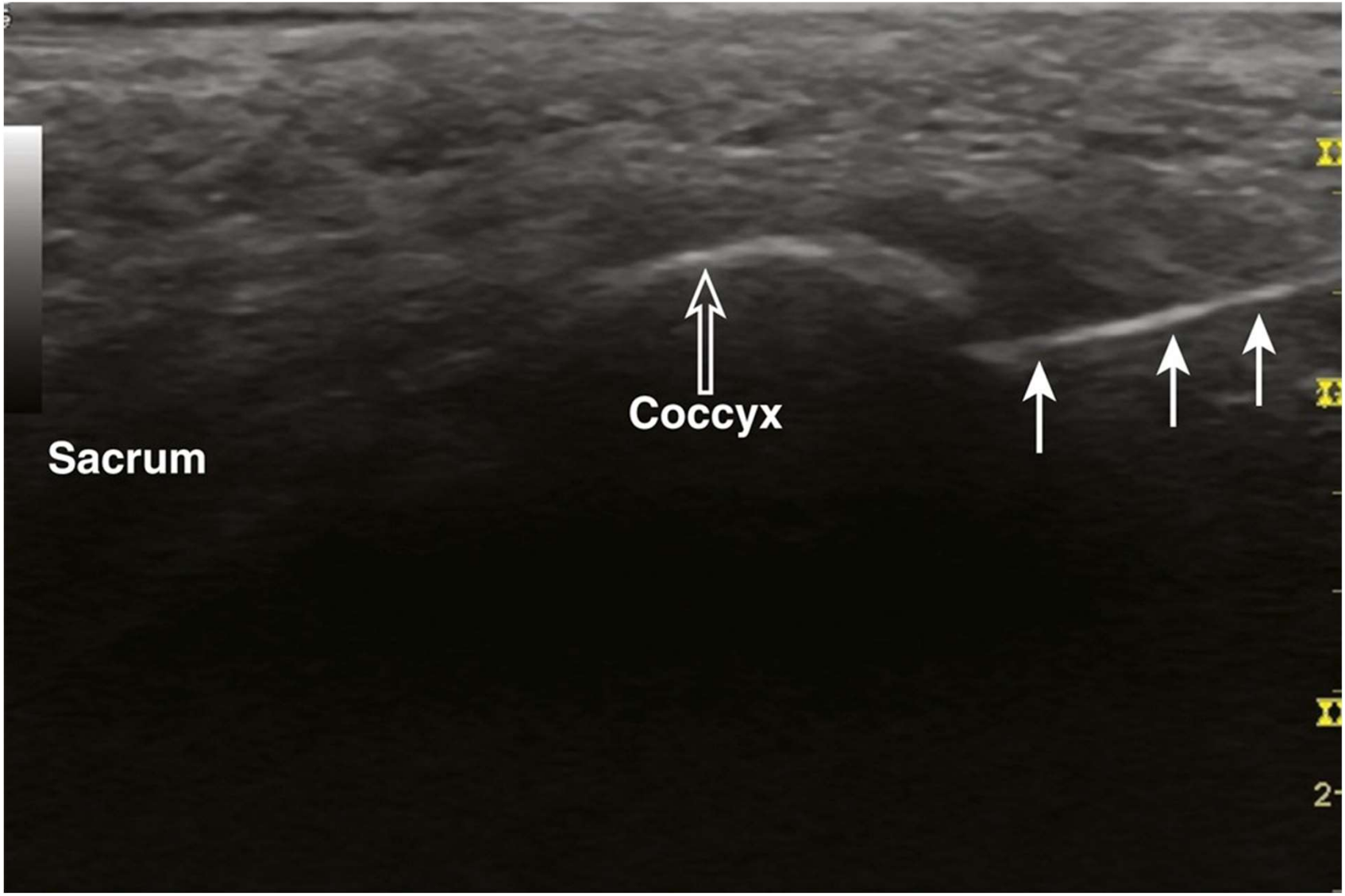

1A
1B

Bloc du ganglion impar

Indications:
Périnéalgies
Coccygodynies
Douleurs viscérales et neuropathiques

4 à 8 ml AL




Coccyx
Sacrum

Journal of Pain Research

Dovepress

REVIEW

Ganglion blocks as a treatment of pain: current perspectives

Osman Hakan Gunduz
Ozge Kenis-Coskun

Department of Physical Medicine and Rehabilitation, Faculty of Medicine, Marmara University, Istanbul, Turkey

This article was published in the following Dove Press jour
Journal of Pain Research

Abstract: The inputs from sympathetic gangl
physiology of various painful conditions such
of different origin, and coccygodynia. Sympat
who suffer from these conditions for over a c
as bupivacaine or neurolytic agents such as al
agent is selected according to its duration of ef
monly used sympathetic blocks are stellate ga
plexus block, superior hypogastric block, and g
methods, effectiveness, and complications of t
the current literature.

Keywords: cancer pain, complex regional pa
pathetic nervous system

Sympatholytic techniques

Technique	Area of pain
Sympathetic nerve blockade	
Stellate (cervicothoracic) ganglion	Facial and upper limb
Lumbar sympathetic chain	Lower limb
Thoracic sympathetic chain	Thoracic (usually laparoscopic by surgeon)
Coeliac plexus	Upper gastrointestinal (pancreatic, gastric, liver cancer)
Superior hypogastric	Pelvic (bladder, uterine cancer)
Ganglion impar	Perineal (pelvic floor cancer)
Chemical sympathectomy	
~~Intravenous regional sympathetic block (Bier's block with guanethidine)~~	~~Upper and lower limb~~
~~Phentolamine infusion (α-antagonist)~~	~~Anywhere, often used for diagnosis~~

Summary of sympathetic blocks

Block	Grade of evidence	Cited indications	Techniques	Potential adverse effects*
Sympathetic ganglia				
Sphenopalatine ganglion	Largely 1C 14 studies $n = 185$	Facial pain, trigeminal neuralgia, headache (cluster/migraine/post-traumatic)	Anatomical landmark CT guidance	Epistaxis
Stellate ganglion	1C 11 studies $n = 240$	Facial and oral pain Pain in distribution of upper limb and thorax	Landmark Ultrasound	Horner's syndrome Injury to carotid artery, trachea, oesophagus Pneumothorax Neuraxial injection, vertebral artery injection
Ganglion impar	1C 4 studies $n = 16$	Perineal pain Vulval cancer pain	Fluoroscopy Ultrasound	Perforation abdominal viscera Erectile and bowel dysfunction
Autonomic plexus				
Coeliac plexus	1B 15 studies $n = 1931$	Intractable cancer (mostly pancreatic) pain Rarely in chronic pancreatitis	Fluoroscopy CT guidance	Diarrhoea Visceral perforation Orthostatic hypotension Abdominal aortic dissection Paraplegia/transient motor paralysis Neuraxial injection
Hypogastric plexus	1C 10 studies $n = 344$	Pelvic pain	Fluoroscopy CT guidance	Visceral perforation Neuraxial injection
Sympathetic chain				
Thoracic chain	2C 2 studies $n = 44$	Upper limb, thoracic and abdominal pain May be effective where stellate ganglion blocks ineffective	Fluoroscopy CT guidance	Pneumothorax
Lumbar chain	1C 11 studies $n = 678$	Lower limb pain/vascular insufficiency/CRPS Peripheral neuropathy	Fluoroscopy CT guidance	Visceral injury Bladder/bowel incontinence

CRPS, complex regional pain syndrome; CT, computed tomography.

* Complications such as bleeding, infection, direct nerve injury, inadvertent intravenous injection and local anaesthetic toxicity are a plausible risk with all techniques and are not mentioned specifically.

Erector spinae

Can J Anesth/J Can Anesth (2021) 68:387–408
https://doi.org/10.1007/s12630-020-01875-2

REVIEW ARTICLE/BRIEF REVIEW

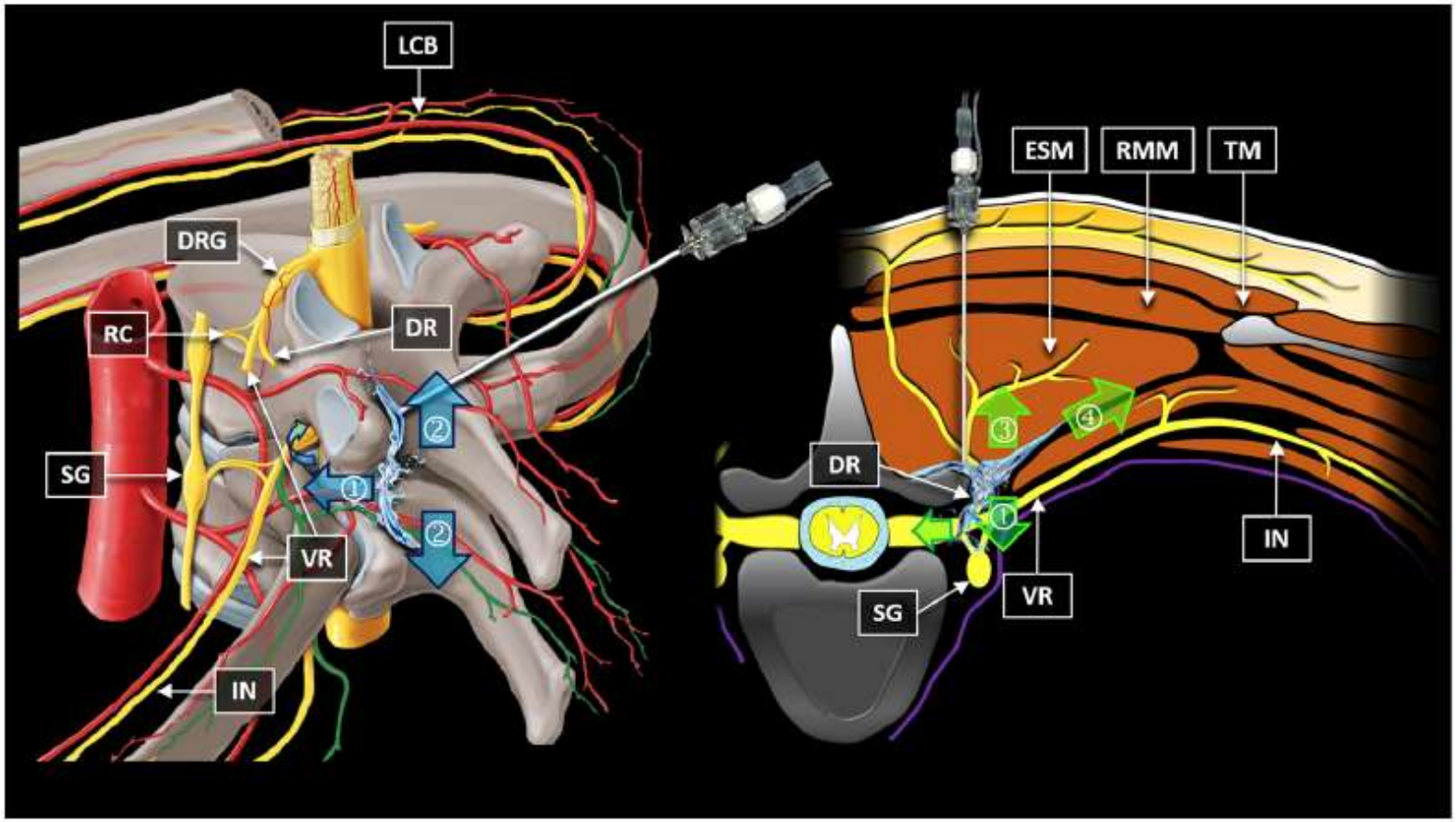
Mechanisms of action of the erector spinae plane (ESP) block: a narrative review

Mécanismes d'action du bloc du plan des muscles érecteurs du rachis (*erector spinae*, ESP) : un compte rendu narratif

Ki Jinn Chin, MBBS (Hons), MMed, FRCPC · Kariem El-Boghdadly, MBBS, FRCA, MSc

Hôpital Erasme

ULB



Journal of Pain Research

Dovepress
open access to scientific and medical research

Open Access Full Text Article

REVIEW

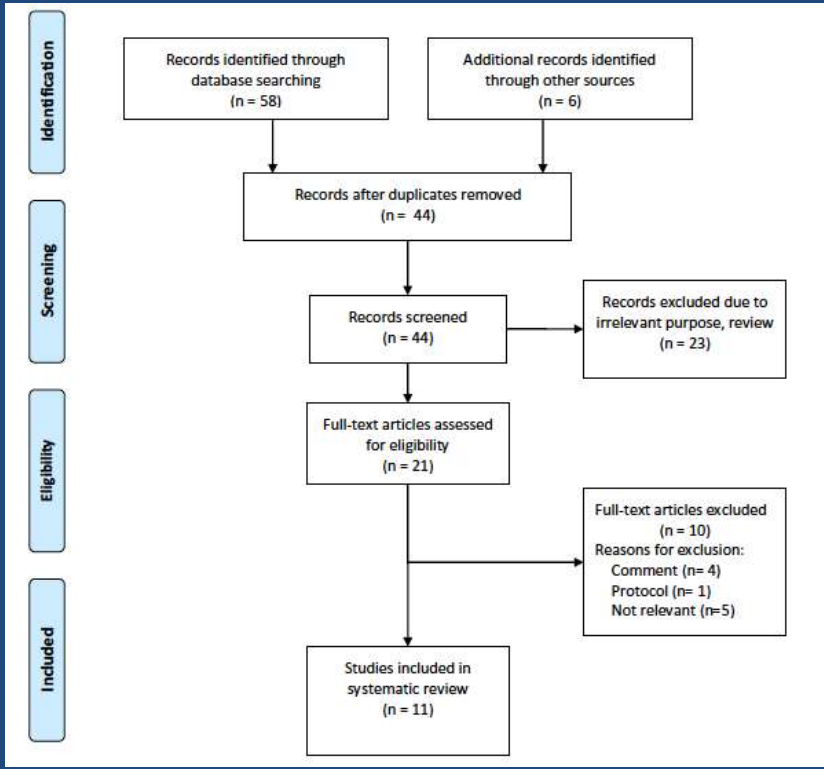
Erector Spinae Plane Block for Lumbar Spinal Surgery: A Systematic Review

Hôpital Erasme

ULB

Yong Qiu
Teng-Jiao Zhang
Zhen Hua

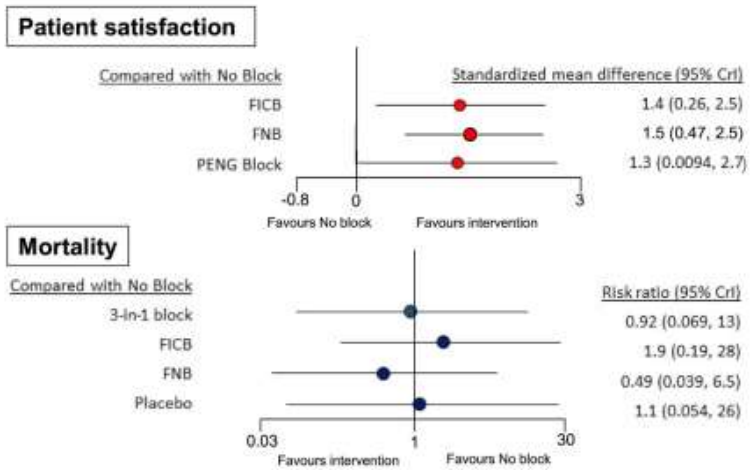
Anesthesiology Department, Beijing Hospital, National Center of Gerontology, Institute of Geriatric Medicine, Chinese Academy of Medical Sciences, Beijing 100730, People's Republic of China

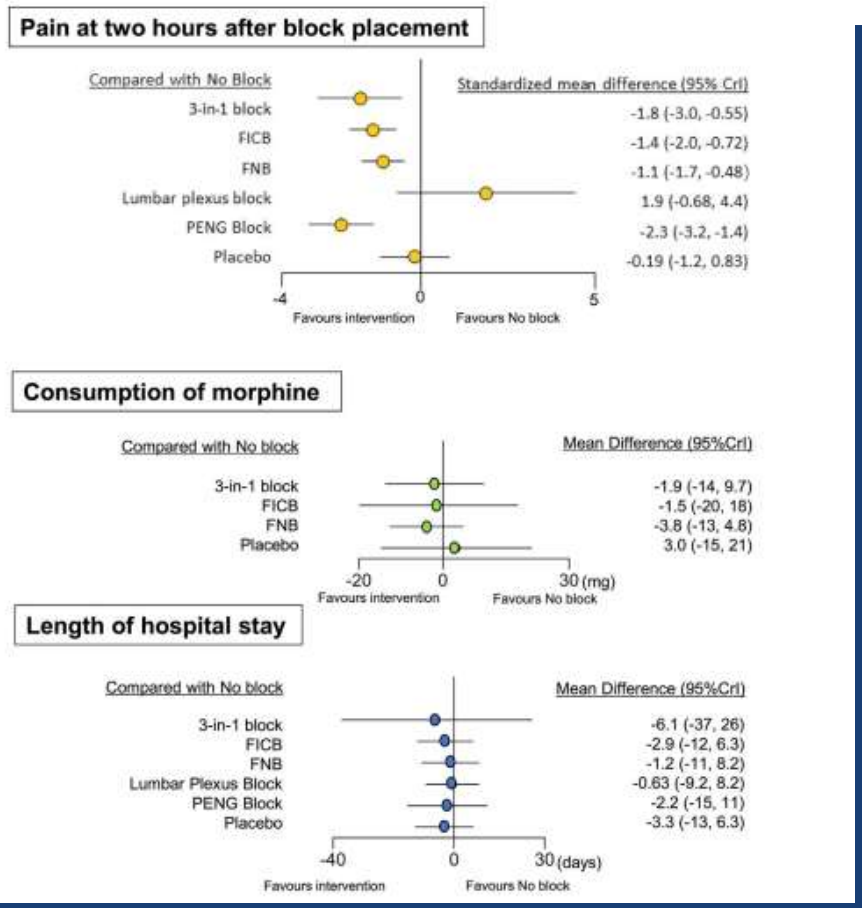


Conclusions

The effectiveness and safety of ESPB for lumbar spine surgery are still controversial. The current evidence is insufficient to support the widespread use of ESPB for lumbar spine surgery. High-quality RCTs are urgently needed.

Fracture de hanche





H.U.B
HÔPITAL UNIVERSITAIRE DE BRUXELLES
ACADEMISCH ZIEKENHUIS BRUSSEL

INSTITUT JULES BORDET INSTITUUT
Hôpital Erasme
ULB
Hôpital Universitaire des Enfants Reine Fabiola
Universitair Kinderziekenhuis Koningin Fabiola

Peripheral Nerve Blocks in the Preoperative Management of Hip Fractures: A Systematic Review and Network Meta-Analysis

Minoru Hayashi, MD; Norio Yamamoto, MD*; Naoto Kuroda, MD; Kenichi Kano, MD; Takanori Miura, MD; Yuji Kamimura, MD, PhD;

Annals of Emergency Medicine Volume 83, NO. 6 : June 2024

Study or Subgroup	SMD	SE	[Not identical] Total	[Not identical] Total	Weight	Std. Mean Difference IV, Fixed, 95% CI
1.1.1 Fascia iliaca compartment block						
Albrecht 2014 (1)	-0.2774	0.3672	15	15	7.1%	-0.28 [-1.00 , 0.44]
Diakomi 2014 (1)	-2.034	0.385	21	20	6.5%	-2.03 [-2.79 , -1.28]
Domac 2015 (1)	-3.885	0.537	20	20	3.3%	-3.88 [-4.94 , -2.83]
Foss 2005a (1)	-0.278	0.29	24	24	11.5%	-0.28 [-0.85 , 0.29]
Hogg 2009 (2)	-0.9521	0.3399	19	20	8.3%	-0.95 [-1.62 , -0.29]
Lindsing 2008 (1)	-1.0609	0.255	33	38	14.8%	-1.06 [-1.56 , -0.56]
Yun 2009 (1)	-1.997	0.387	20	20	6.4%	-2.00 [-2.76 , -1.24]
Subtotal (95% CI)			**152**	**157**	**58.0%**	**-1.17 [-1.42 , -0.92]**
Heterogeneity: Chi² = 51.13, df = 6 (P < 0.00001); I² = 88%						
Test for overall effect: Z = 9.08 (P < 0.00001)						
1.1.2 Femoral nerve block						
Gille 2006 (3)	-0.716	0.206	50	50	22.7%	-0.72 [-1.12 , -0.31]
Murgue 2006 (3)	-1.469	0.412	16	14	5.7%	-1.47 [-2.28 , -0.66]
Ranjit 2016 (4)	-0.6804	0.3262	20	20	9.1%	-0.68 [-1.32 , -0.04]
Szucs 2010 (3)	-1.471	0.46	12	12	4.6%	-1.47 [-2.37 , -0.57]
Subtotal (95% CI)			**98**	**96**	**42.0%**	**-0.89 [-1.19 , -0.60]**
Heterogeneity: Chi² = 4.70, df = 3 (P = 0.20); I² = 36%						
Test for overall effect: Z = 5.89 (P < 0.00001)						
Total (95% CI)			**250**	**253**	**100.0%**	**-1.05 [-1.25 , -0.86]**
Heterogeneity: Chi² = 57.77, df = 10 (P < 0.00001); I² = 83%						
Test for overall effect: Z = 10.73 (P < 0.00001)						
Test for subgroup differences: Chi² = 1.95, df = 1 (P = 0.16), I² = 48.7%						

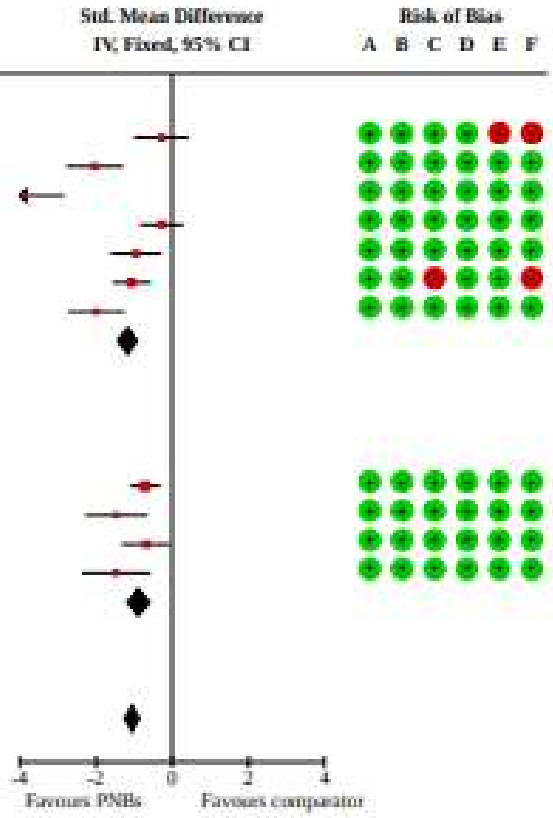
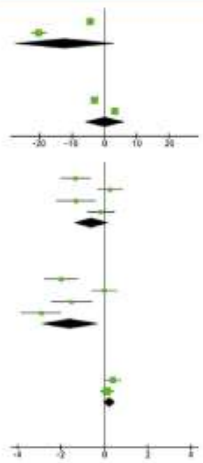


Table 4 Meta-analysis comparing analgesic effect of FIC with NSAID, opioids, and other forms of nerve blockades. Please note that a larger scale is used for NSAID than for opioids and nerve blockades. CI, confidence interval; FIC, fascia iliaca compartment block; NSAIDs, non-steroidal anti-inflammatory drugs; SD, standardised difference; SMD, standardised mean difference

Study or subgroup	FIC			Control			Weight	SMD (95% CI)
	Mean	SD	Total	Mean	SD	Total		
NSAIDs after 10–15 min								
Fujihara and colleagues[43] (2003)	31	18.2	31	92	6.3	25	50.2%	−4.24 (−5.20, −3.27)
Godoy Monzón and colleagues[44] (2010)	29	1.6	92	62.4	1.7	62	49.8%	−20.25 (−22.57, −17,94)
Subtotal			123			87	100.0%	−12.21 (−27,91, 3.49)
Heterogeneity:	$Tau^2=127.48$, $\chi^2=156.61$, df=1 (P<0.001), $I^2=99\%$							
Test for overall effect:	Z=1.52 (P=0.13)							
NSAIDs after 8–12 h								
Fujihara and colleagues[43] (2003)	36	19	31	81	7.8	25	49.9%	−2.94 (−3.71, −2.17)
Godoy Monzón and colleagues[44] (2010)	44	9.1	92	20.3	1.2	62	50.1%	3.33 (2.83, 3.83)
Subtotal			123			87	100.0%	0.20 (−5.94, 6.35)
Heterogeneity:	$Tau^2=19.55$, $\chi^2=179.34$, df=1 (P<0.001), $I^2=99\%$							
Test for overall effect:	Z=0.06 (P=0.95)							
Systemic opioids during rest within 30 min								
Diakomi and colleagues[45] (2014)	22	23	21	52	21	20	25.2%	−1.33 (−2.02, −0.65)
Foss and colleagues,[46] 2007	30	44.4	24	20	29.6	24	26.7%	0.26 (−0.31, 0.83)
McRae and colleagues[47] (2015)	30	29.6	11	70	29.6	13	22.2%	−1.30 (−2.20, −0.41)
Yun and colleagues[48] (2009)	20	6	20	21	7	20	26.0%	−0.15 (−0.77, 0.47)
Subtotal			76			77	100.0%	−0.59 (−1.40, 0.21)
Heterogeneity:	$Tau^2=0.54$, $\chi^2=16.80$, df=3 (P<0.001), $I^2=82\%$							
Test for overall effect:	Z=1.45 (P=0.15)							
Systemic opioids during movement within 120 min								
Diakomi and colleagues[45] (2014)	32	18	21	75	24	20	25.2%	−1.99 (−2.76, −1.23)
Foss and colleagues[46] (2007)	80	22.2	24	80	11.1	24	26.2%	0.00 (−0.57, 0.57)
McRae and colleagues,[47] 2015	20	14.8	11	50	22.2	13	24.2%	−1.51 (−2.44, −0.58)
Yun and colleagues[48] (2009)	21	9	20	40	1	20	24.3%	−2.91 (−3.82, −1.99)
Subtotal			76			77	100.0%	−1.58 (−2.90, −0.25)
Heterogeneity:	$Tau^2=1.67$, $\chi^{22}=35.31$, df=3 (P<0.001), $I^2=92\%$							
Test for overall effect:	Z=2.33 (P=0.02)							
Nerve blockades after 1–2 h								
Newman and colleagues[49] (2013)	54	24	56	44	26	51	41.3%	0.40 (0.01, 0.78)
Reavley and colleagues[50] (2015)	38	25	79	35	25	83	58.7%	0.12 (−0.19, 0.43)
Subtotal			135			134	100.0%	0.23 (−0.03, 0.50)
Heterogeneity:	$Tau^2=0.01$, $\chi^2=1.23$, df=1 (P<0.27), $I^2=19\%$							
Test for overall effect:	Z=1.71 (P=0.09)							



BJA

British Journal of Anaesthesia, 120 (6): 1368–1380 (2018)

doi: 10.1016/j.bja.2017.12.042
Advance Access Publication Date: 5 April 2018
Review Article

REGIONAL ANAESTHESIA

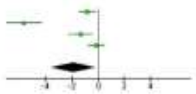
Systematic review of the effects of fascia iliaca compartment block on hip fracture patients before operation

J. Steenberg* and A. M. Møller

Department of Anaesthesiology, Herlev and Gentofte Hospital, Herlev, Denmark

Table 5 Meta-analysis comparing additional preoperative opioid analgesia usage for FIC with opioids. CI, confidence interval; FIC, fascia iliaca compartment block; SD, standardised difference; SMD, standardised mean difference

Study or subgroup	FIC			Control			Weight	SMD (95% CI)
	Mean	SD	Total	Mean	SD	Total		
Diakomi and colleagues[45] (2014)	4.11	3.3	21	7.42	4.65	20	25.8%	−0.81 (−1.45, −0.17)
Foss and colleagues[46] (2007)	0	0.01	24	6	1.48	24	23.3%	−5.64 (−6.95, −4.33)
McRae and colleagues[47] (2015)	0	1.85	11	5	4.63	13	25.0%	−1.33 (−2.23, −0.42)
Yun and colleagues[48] (2009)	12.5	19	20	15	20.5	20	25.9%	−0.12 (−0.74, 0.50)
Total			76			77	100.0%	−1.89 (−3.63, −0.14)
Heterogeneity:	$Tau^2=2.96$, $\chi^2=56.88$, df=3 (P<0.001), $I^2=95\%$							
Test for overall effect:	Z=2.12 (P=0.03)							



Conclusion

This review revealed a superior analgesic effect of FIC compared with opioids during movement and an equivalent effect compared with NSAIDs, opioids, and other nerve blocks in hip fracture patients before operation. FIC had lower preoperative analgesia consumption and a longer time for first request compared with opioids. FIC reduced time to perform spinal anaesthesia. Block success rate was found to be high and there were very few adverse effects. There is insufficient evidence to conclude anything on preoperative analgesic consumption or first request compared with NSAIDs and other nerve blocks, postoperative analgesic consumption for preoperative applied FIC compared with NSAIDs, opioids and other nerve blocks, incidence and severity of delirium, length of stay, or mortality.

Orthopaedics & Traumatology: Surgery & Research 108 (2022) 103135

Contents lists available at ScienceDirect

Orthopaedics & Traumatology: Surgery & Research

journal homepage: www.elsevier.com

Original article

Comparison of pericapsular nerve group (PENG) block with fascia iliaca compartment block (FICB) for pain control in hip fractures: A double-blind prospective randomized controlled clinical trial

Faramarz Mosaffa[a], Mehrdad Taheri[a], Alireza Manafi Rasi[b], Hamidreza Samadpour[a], Elham Memary[a], Alireza Mirkheshti[a,*]

[a] Department of Anesthesiology, Shahid Beheshti University of Medical Sciences, Tehran, Iran
[b] Department of Orthopedics, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Fig. 1. Fascia iliaca block. FA: femoral artery; FI: fascia iliaca; FN: femoral nerve; N: needle.

Fig. 2. PENG block. FA: femoral artery; IPE: iliopubic eminence; N: needle; PT: psoas tendon.

Table 2
Characteristics of blocks procedure.

Variable	FICB ($n = 22$)	PENG ($n = 30$)	p-value
VAS score before blocks (baseline)	4.63 ± 1.39	4.33 ± 0.88	$p = 0.37$
VAS score 15 minutes after blocks	3.73 ± 0.98	3.2 ± 0.55	$p = 0.031$
VAS score in the sitting position for spinal/epidural	2.82 ± 1.22	2.93 ± 0.78	$p = 0.70$
VAS score when entering recovery	2.82 ±1.05	3.47 ±1.52	$p = 0.076$
VAS score before recovery delivery	2.91 ± 1.1	3.47 ± 1.04	$p = 0.073$
VAS score 6 h after post-surgery	3.45 ± 1.47	3.46 ± 1.27	$p = 0.97$
VAS score 12 h after post-surgery	3.91 ± 1.48	3.01 ± 1.08	$p = 0.021$
The fentanyl dose for painless placement in the sitting position	18.18 ± 32.89	6.66 ± 17.28	$p = 0.14$
The total dose of fentanyl used during surgery	109.09 ± 75.01	133.33 ± 80.22	$p = 0.27$
The first time of the analgesic drug consumption after surgery	2.58 ± 2	4.7 ± 3.1	$p = 0.007$
The total dose of morphine consumed during 24 hours	74.37 ± 18.87	54 ± 25.67	$p = 0.008$
Bleeding during surgery	518.18 ± 337.55	365 ± 290.92	$p = 0.086$
Side effect after surgery (Yes/No) (%)	4.8/95.2	0/100	$p = 0.24$

H.U.B

HÔPITAL UNIVERSITAIRE DE BRUXELLES

ACADEMISCH ZIEKENHUIS BRUSSEL

Merci pour votre attention