Nerve blocks for the Treatment of Orofacial Pain

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BA British Association of Oral Surgeons

OS

King's College Hospital NHS

NHS Trust

Outline

- Introduction
- Issues with nerve blocks
- Evidence for therapeutic peripheral nerve blocks
- Evidence for Local Anaesthetic (LA) therapeutic peripheral nerve blocks for orofacial pain
- Evidence for Botulinum Toxin A (BTX) therapeutic peripheral nerve blocks for orofacial pain

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Learning objectives

- To be familiar with the several limitations of neural blockade as a therapeutic tool for chronic pain
- To recognise that the premise for diagnostic and therapeutic blocks outcomes maybe flawed.
- To accept that therapeutic blocks for Orofacial Pain have limited evidence base and to recognise how we may address this

Definitions

Types of Nerve blocks

- **Therapeutic** nerve blocks are used to treat painful conditions. Such nerve blocks contain local anaesthetic that can be used to control acute pain.
  - Nerve blocks can be used, in some cases, to avoid surgery.
- **Diagnostic** nerve blocks are used to determine sources of pain. These blocks typically contain an anaesthetic with a known duration of relief.
- **Prognostic** nerve blocks predict the outcomes of given treatments. For example, a nerve block may be performed to determine if more permanent treatments (such as surgery) would be successful in treating pain.
- **Pre-emptive** nerve blocks are meant to prevent subsequent pain from a procedure that can cause problems including phantom limb pain.

Central nerve block includes Gasserian, epidural and spinal anaesthesia.

Neurolytic block causes temporary degeneration of nerve fibers through the application of chemicals, heat, or freezing, produces a block that may persist for weeks, months, or indefinitely

Definitions

- **Nerve block** or **regional nerve blockade** is any deliberate interruption of action potential (transduction and or transmission) for pain relief.
- Local anaesthetic nerve block (sometimes referred to as simply "nerve block") is a short-term block, usually lasting hours or days, involving the injection of an local anaesthetic
- Other agents may be combined with LA for example corticosteroid or antibiotic or Botulinum Toxin A.
- Included
  - Blocks
  - Infiltrations
  - Intra articular injections
  - Intra muscular injections
  - Topical LA
  - Deep block injections
    - Peripheral Sphenopalatine and Stellate

  Excluded
  - Trigger point injections
  - Central
    - Gasserian Ganglion
  - No agent
    - Dry needling
    - Acupuncture

Pain is complex
Trigeminal chronic pain has additional challenges

The role of neural blockade as a **therapeutic tool** in painful conditions may be compromised due to several characteristic of chronic pain including;

- social, emotional, financial, and legal factors effecting the patient
- the pathophysiology of clinical pain
- the site of nociception
- the pathway of afferent neural signals.

Information gained from blocks may then be applied to the choice of medicines or surgical therapy or neuroablative therapies.

Biopsychosocial model of pain
Championed by Butler and Moseley and others. 2000

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Nerve blocks issues

The diagnostic and therapeutic use of neural blockade rests on three premises.

- First, pathology causing pain is located in an exact peripheral location, and impulses from this site travel via a unique and consistent neural route.
- Second, injection of local anaesthetic totally abolishes sensory function of intended nerves and does not affect other nerves.
- Third, relief of pain after local anaesthetic block is attributable solely to block of the target afferent neural pathway. The validity of these assumptions is limited by complexities of anatomy, physiology, and psychology of pain perception and the effect of local anaesthetics on impulse conduction.

Hogan QH, **Abram** SE. Neural blockade for diagnosis and prognosis. A review. Anesthesiology. 1997 Jan;86(1):216-41. Review.

Possible neurophysiological flaws in diagnostic/ therapeutic block use

- Nociceptor Activity
- Afferent and efferent interactions
- Sympathetic contributions
- Spinal processing
- Convergence and referred pain
- Plasticity before and after injury

Hogan QH, **Abram** SE. Neural blockade for diagnosis and prognosis. A review. Anesthesiology. 1997 Jan;86(1):216-41. Review.

Possible nonspecific treatment effects in pain that may undermine therapeutic PNB outcome.

- Placebo effect <https://en.wikipedia.org/wiki/Placebo
  - A placebo is a substance or treatment with no active therapeutic effect
  - This psychological phenomenon, in which the recipient perceives an improvement in condition due to personal expectations, rather than the treatment itself
- Pygmalion effect <https://en.wikipedia.org/wiki/Pygmalion_effect
  - hereby higher expectations lead to an increase in performance. A corollary of the Pygmalion effect is the golem effect, in which low expectations lead to a decrease in performance; both effects are forms of self-fulfilling prophecy.
- Hawthorne effect <https://en.wikipedia.org/wiki/Hawthorne_effect
  - also referred to as the **observer effect**, is a type of reactivity in which individuals modify an aspect of their behavior in response to their awareness of being observed
- From the epidemiology perspective, they refer such things are “bias”.

Thanks to Don Nixdorf

Criteria for interpretation of outcome of PNB

Ratios Describing Efficacy of Tests

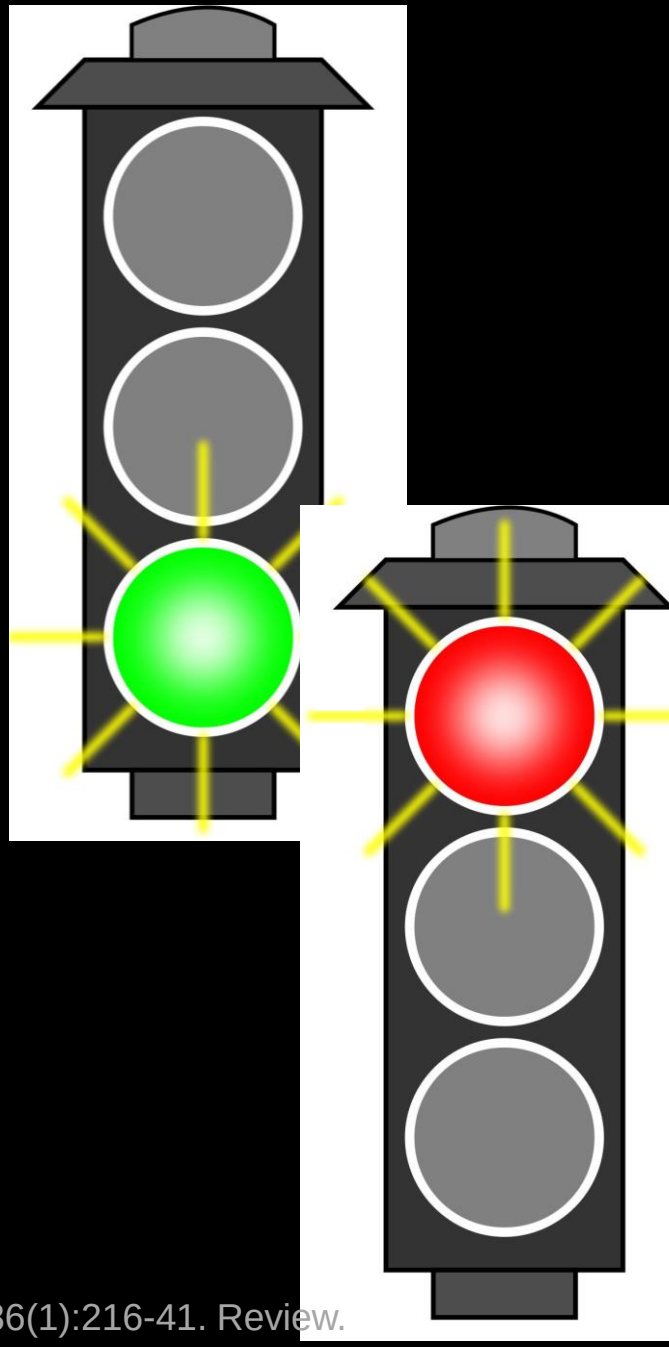
	Disease Present	Disease Absent
Test positive	a	c
Test negative	b	d
Sensitivity (true-positive rate)	=	a/(a + b)
False-positive rate	=	c/(c + d)
Specificity (true-negative rate)	=	d/(c + d)
False-negative rate	=	b/(a + b)
Positive predictive value	=	a/(a + c)
Negative predictive value	=	d/(b + d)

The proper interpretation of a positive test must take into consideration the prevalence of the condition. **For example, a test with a 95% specificity rate will have a positive result in 5% of healthy subjects**. If the condition being sought is rare (e.g., occurs in only 2% of the test group), false-positive responses will outnumber true-positive tests, and the majority of positive results will occur in subjects who actually are healthy.

Hogan QH, **Abram** SE. Neural blockade for diagnosis and prognosis. A review. Anesthesiology. 1997 Jan;86(1):216-41. Review.

Therefore……

- **False positive response to PNB**
  - A nerve block distal to the primary site of nerve pathology may alter pain perception by interrupting antidromic impulses, contrary to the common assumption that axonal function must be interrupted proximal to the area of injury to provide relief.
  - If pain relief follows sympathetic blockade, lack of anaesthesia to touch does not assure that pain relief is by sympathetic interruption, because a subtle somatic block could produce analgesia without anaesthesia, resulting in pain relief independent of a sympathetic mechanism.
  - A selective large fibre block would create eliminate touch evoked pain but not response to nociceptive or thermal stimuli
  - Interruption of one limb of the convergent inputs may be sufficient to provide complete pain relief, leading to false assumptions about the source of the pain.
  - Infiltration of a painful trigger point in the affected muscle may reduce the combined input to a level below the pain threshold, and the mistaken interpretation would be that the pain is entirely somatic, without any visceral source.
  - Afferent blockade of conditioning stimuli could lead to normalization of dorsal horn responsiveness and profound, prolonged relief.
  - Denervation may additionally produce sufficient sensitization of WDR neurons that non noxious stimulation, including stimuli from outside the original receptive field, can produce pain. Blockade of such stimulation could falsely indicate the site of pathology.



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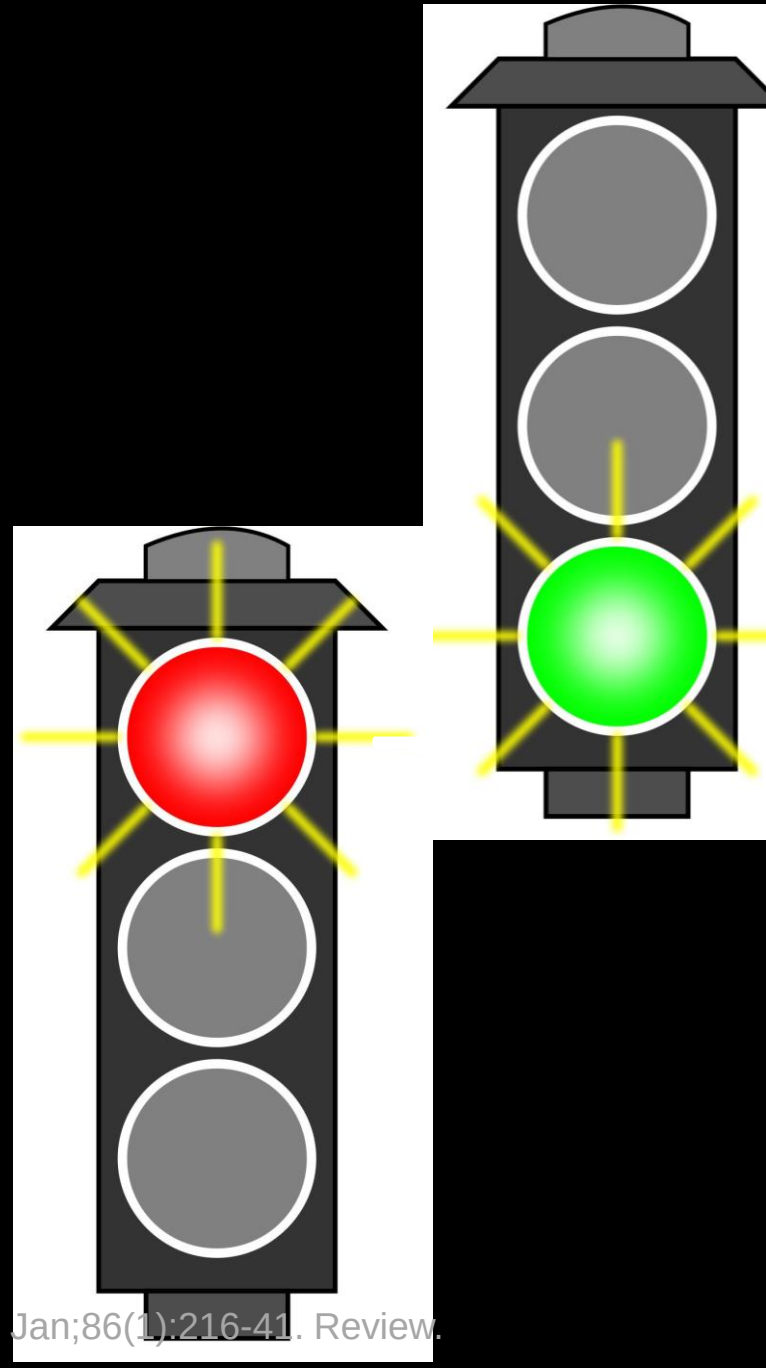
Therefore……

- **False negative response to PNB**
  - Dorsal root ganglia of injured nerves participate in abnormal impulse generation resulting in poor response to PNBs this may increase after peripheral blockade
  - Conceivably, loss of large fibre activity after peripheral or neuraxial blockade could increase dorsal horn cell activity, particularly if there is preservation of C-fibre input, producing a paradoxical increase in pain
  - A diagnostic block that interrupted small, but not large, fibres could fail to relieve touch-evoked pain even if the remainder of the extremity is insensitive to nociceptive or thermal stimuli.
  - Afferent blockade of conditioning stimuli with spinal sensitization pain might persist independent of afferent activity.
  - blockade of an injured nerve may not provide relief of pain and allodynia if the receptive field of sensitized dorsal horn neurons has spread beyond the distribution of the injured nerve, again leading to the mistaken conclusion that the injured nerve is not involved.



Hogan QH, **Abram** SE. Neural blockade for diagnosis and prognosis. A review. Anesthesiology. 1997 Jan;86(1):216-41. Review.

And yet more confounding factors……

Possible confounding practical issues with Peripheral Nerve block (PNB)

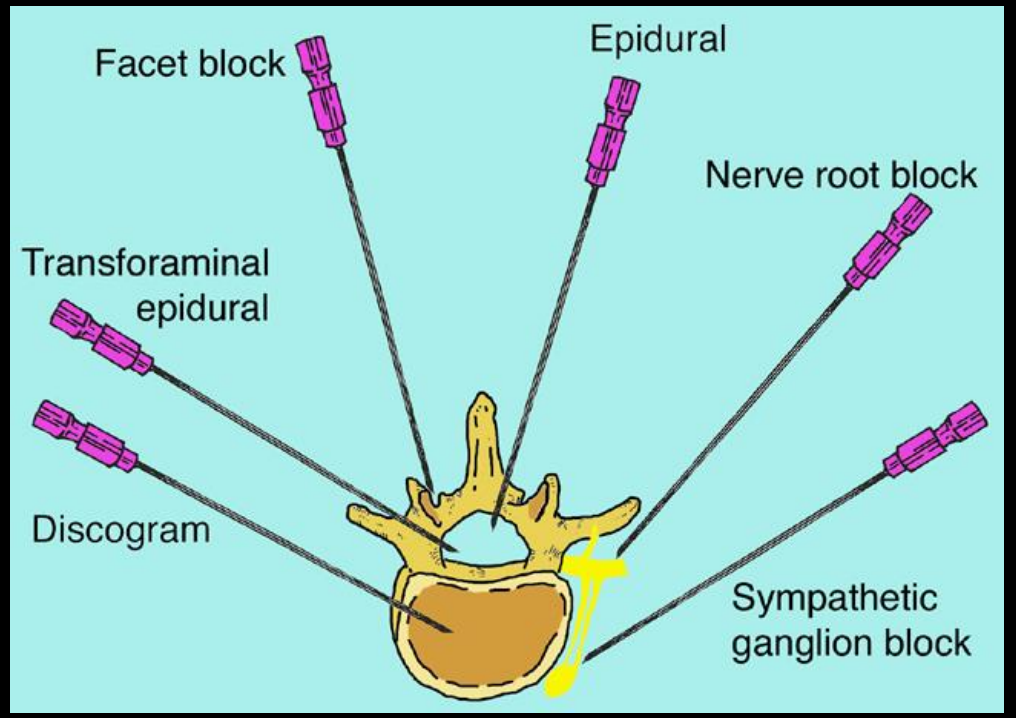
Consideration of the subtle, complex, and variable action of local anaesthetics should inspire caution in the interpretation of blocks.

Variability may be due to;

- Patient anxiety
- Pain condition
- Site
  - Block or regional
- LA
  - Agent
  - Agent concentration
  - Volume
  - Adjunctive
    - Sulphates
    - Epinephrine content
  - Repeated?
- Adjunctive agents
  - Corticosteroid
  - Antibiotics
- Alternative
  - Botulinum Toxin A

Neural Blockade confounding factors in interpreting success or failure of the therapeutic PNB

- Intensity of blockade
- Differential blockade
- Degree of blockade
- Systemic effects
- Psychosocial issues
- Anatomic issues
- Pathophysiology of pain
- Refractory pain
- The placebo effect



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Placebo

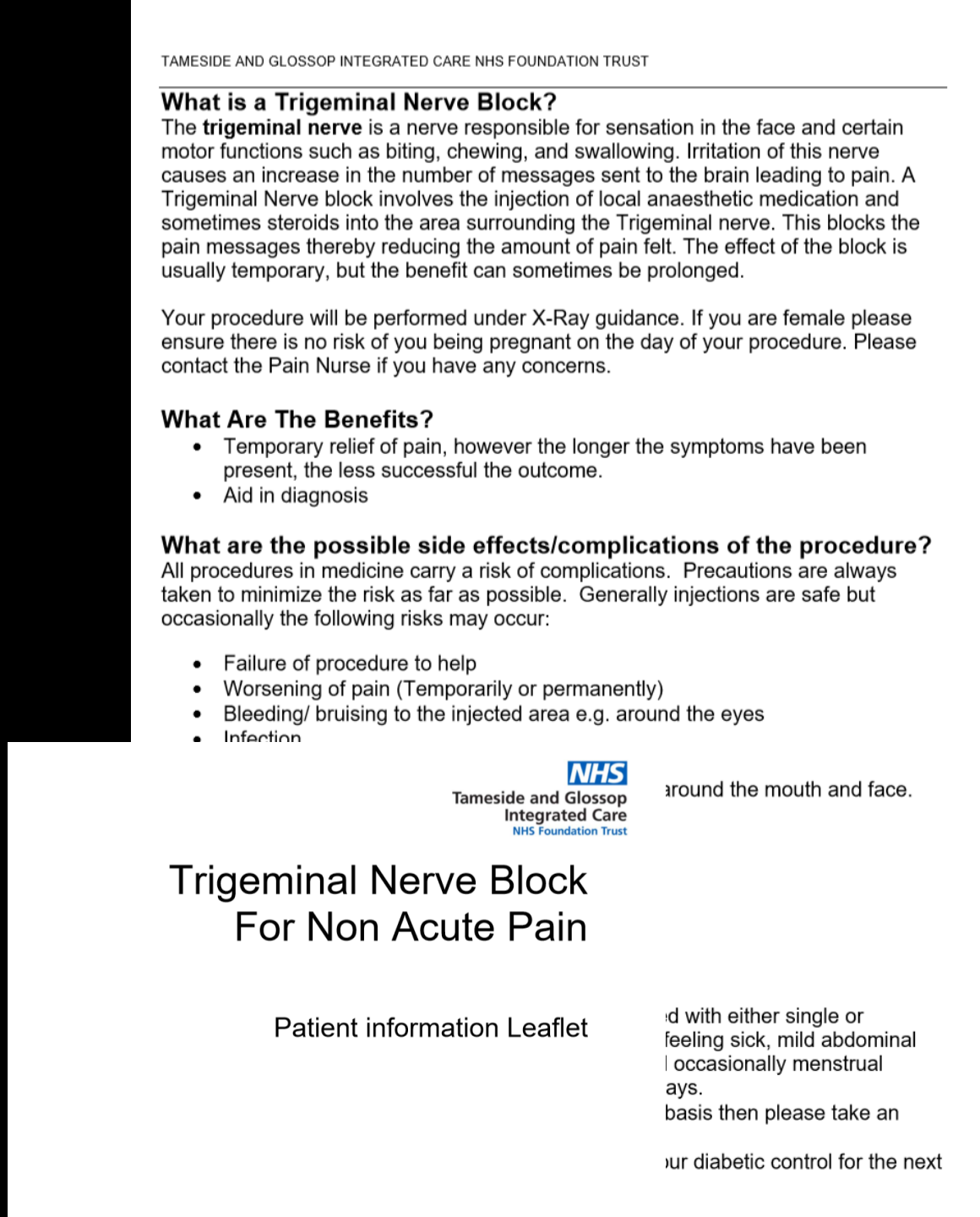
Compelling evidence with regard to placebo responses to PNBs leads to the conclusion that the ambiguity created by these responses is a major impediment to the valid use of neural blockade for diagnosis or treatment of pain.

Hogan QH, **Abram** SE. Neural blockade for diagnosis and prognosis. A review. Anesthesiology. 1997 Jan;86(1):216-41. Review.

Practical aspects
Consent and training

What basic principles should be followed to ensure a safe and successful peripheral nerve block?

- Patients should be informed about the potential risks and benefits of PNB and allowed to decide on the anaesthetic they prefer.
- Not all patients are good candidates for regional anaesthetics. For example, performing PNB after trauma or on highly anxious patients.
- The clinician must have knowledge of the anatomy, technique, and equipment necessary to perform the most appropriate block for a given situation.
- The use of aseptic technique, correct equipment (B-bevel needles, nerve stimulators, ultrasound), and basic physiologic monitoring is mandatory.
- The area in which the PNB is performed should have immediate access to resuscitative equipment and medications



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What is a Trigeminal Nerve Block?

The **trigeminal nerve** is a nerve responsible for sensation in the face and certain motor functions such as biting, chewing, and swallowing. Irritation of this nerve causes an increase in the number of messages sent to the brain leading to pain. A Trigeminal Nerve block involves the injection of local anaesthetic medication and sometimes steroids into the area surrounding the Trigeminal nerve. This blocks the pain messages thereby reducing the amount of pain felt. The effect of the block is usually temporary, but the benefit can sometimes be prolonged.

Your procedure will be performed under X-Ray guidance. If you are female please ensure there is no risk of you being pregnant on the day of your procedure. Please contact the Pain Nurse if you have any concerns.

What Are The Benefits?

- Temporary relief of pain, however the longer the symptoms have been present, the less successful the outcome.
- Aid in diagnosis

What are the possible side effects/complications of the procedure?

All procedures in medicine carry a risk of complications. Precautions are always taken to minimize the risk as far as possible. Generally injections are safe but occasionally the following risks may occur:

- Failure of procedure to help
- Worsening of pain (Temporarily or permanently)
- Bleeding/ bruising to the injected area e.g. around the eyes
- Infection

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around the mouth and face.

Trigeminal Nerve Block
For Non Acute Pain

Patient information Leaflet

d with either single or
feeling sick, mild abdominal
occasionally menstrual
ays.
basis then please take an

ur diabetic control for the next

Practical aspects

What Risks?

- There may be inadvertent damage to anatomic structures by the advancing needle. Examples include
  - direct trauma to the nerve or spinal cord by intraneural injection of local anaesthetic
  - nerve laceration
  - vascular injury with resulting hematoma formation
- The drugs that are injected may have undesirable local and systemic effects.
  - Allergic reactions to local anaesthetics are rare. Ester local anaesthetics are derivatives of para-aminobenzoic acid, a known allergen, and therefore more likely to cause allergic reactions than the amide local anaesthetics.
  - Any local anaesthetic injected intravascularly has the potential for systemic reactions, including seizures and cardiovascular collapse.

Table 5 Potential adverse reactions to anaesthetic blocks and recommended actions.

Potential adverse effects	Actions
Local pain	Perform infiltration slowly, with fine-gauge needle. Avoid lateral motions. Limit steroid use. Local cold application.
Lesion to peripheral nerve	If patient experiences sharp radiating pain, remove needle and insert again.
Haematoma	Be aware of any anticoagulant or antiplatelet drugs. Palpate to avoid the temporal and occipital arteries. Apply local compression for several minutes.
Local infection	Avoid infiltration if infection is present. Aseptic measures (sterile technique, local antiseptic)
Vasovagal syncope	Where possible, no blockades on fasting patients Consider performing nerve block on the patient in a decubitus position; delay return to a standing position if the situation recommends it. Limit the number of nerves to be blocked in a single session. For elderly patients or those with a history of syncope, avoid lidocaine at high doses (5%). In a vasovagal episode, place patient in the Trendelenburg position; if no response, start atropine and fluid replacement.
Allergy to local anaesthesia	
Intradural infiltration	
Teratogenicity	
Local anaesthetic systemic toxicity	
Alopecia Corticoid-induced dermal atrophy Hypochromia	

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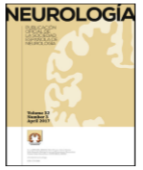

REVIEW

Consensus recommendations for anaesthetic peripheral nerve block☆

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

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[b] Servicio de Neurología, Hospital Clínico San Carlos, Departamento de Medicina, Universidad Complutense de Madrid, Madrid, Spain
[c] Servicio de Neurología, Hospital Clínico Universitario de Valladolid, Valladolid, Spain
[d] Sección de Neurología, Hospital de Viladecans, Viladecans, Barcelona, Spain

Practical aspects
Minimising risks

- Correct training
- It is essential to ensure correct needle placement
  - Avoid intravascular placement
  - Avoid epineural and or intraneural placement
  - Always aspirate
- Knowledge of the anatomy of the target region and the surrounding structures is necessary.
- Knowledge of the equipment and the pharmacology of local anesthetics is also required.
- Do not perform a PNB with which you are unfamiliar or not trained to do.

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- Evidence for therapeutic peripheral nerve blocks for pain
- Evidence for Local Anaesthetic (LA) therapeutic peripheral nerve blocks for orofacial pain
- Evidence for Botulinum Toxin A (BTX) therapeutic peripheral nerve blocks for orofacial pain

What is the evidence for therapeutic PNBs in pain?

Evaluating the evidence

- GRADE is a systematic and explicit approach to making judgements about quality of evidence and strength of recommendations.
- It was developed by the **Grading of Recommendations, Assessment, Development and Evaluations** (GRADE) Working Group, and it is now widely seen as the most effective method of linking evidence-quality evaluations to clinical recommendations.

Levels and Grades of Evidence

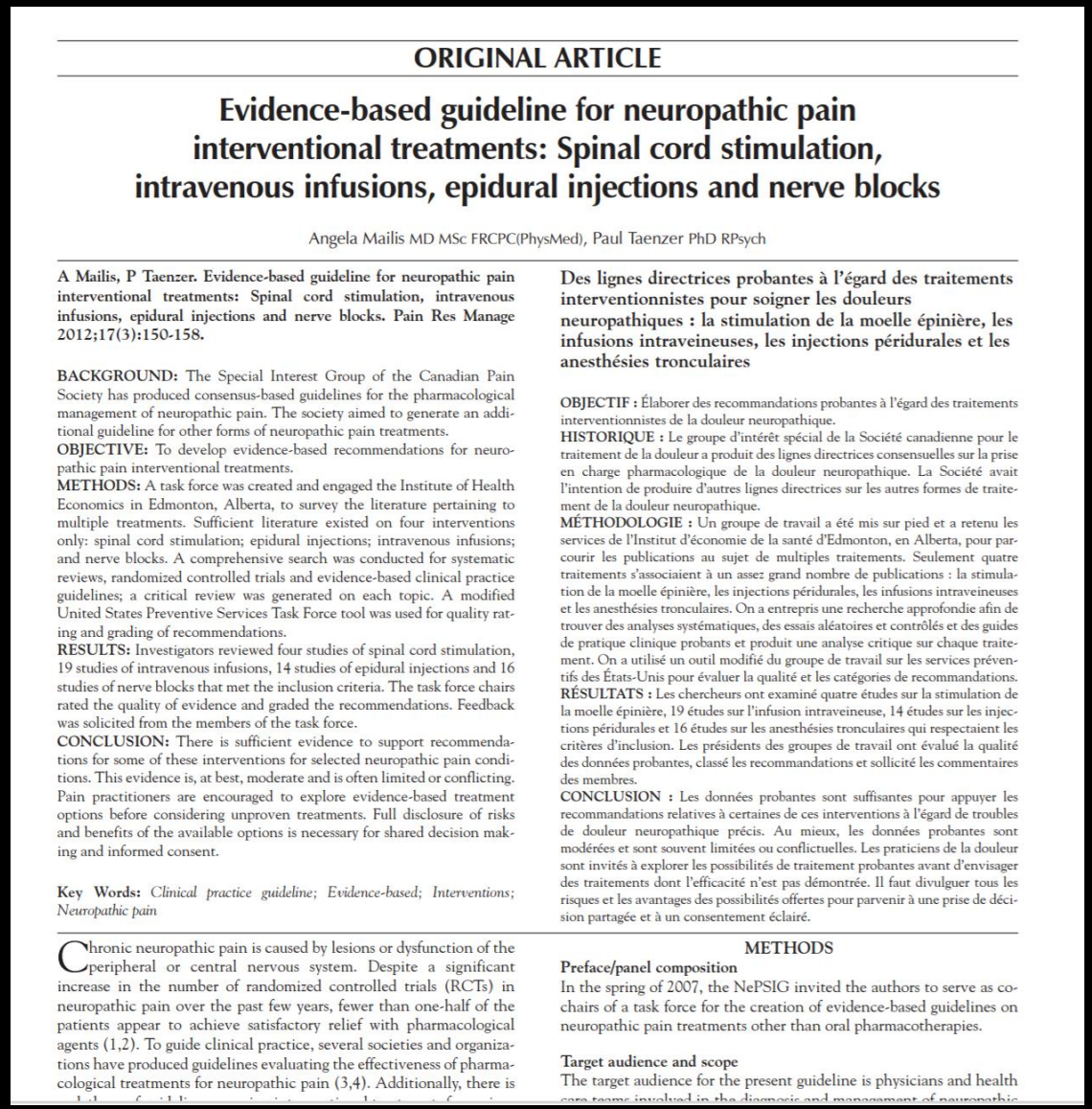
Levels of Evidence and Grades of Recommendations

Grade of recommendation	Level of evidence	Interventions
A	1a	Systematic review of randomized controlled trials
	1b	Individual randomized controlled trial
B	2a	Systematic review of cohort studies
	2b	Individual cohort study
	3a	Systematic review of case-control studies
	3b	Individual case-control study
C	4	Case series
D	5	Expert opinion without explicit critical appraisal or based on physiology or bench research

LA PNB evidence
Spinal

Recommendations for nerve blocks

- The HTA retrieved four SRs (33,50,56,57), six RCTs (58-63) and six CPGs (7,8,10,11,64,65). One SR (50) and three CPGs (11,64,65) were excluded due to poor quality. The recommendations refer to commonly used blocks. **nerve blocks for lumbar radiculopathy**: the task force cannot justify a general recommendation, but suggests that these interventions be used with caution depending on the circumstances, with full disclosure to the patient of the limited evidence and potential risks. Evidence quality: Fair; Certainty: Moderate; Strength of recommendation: **Grade C-B**
- **Iv regional guanethidine and Bier blocks for cRPS** i: IV regional guanethidine and Bier blocks are not recommended for the treatment of CRPS I. Evidence quality: Good; Certainty: Moderate; Strength of recommendation: **Grade B**
- **Stellate ganglion blocks for PHN**: Stellate ganglion blocks are not recommended for the treatment of PHN. Evidence quality: Fair; Certainty: Moderate; Strength of recommendation: **Grade C**
- **Peroneal nerve blocks for lumbar radicular pain**: Peroneal nerve blocks are not recommended for the treatment of lumbar radicular pain. Evidence quality: Good; Certainty: Moderate; Strength of recommendation: **Grade B**
- **Selective nerve root blocks for cervical radiculopathy**: : Moderate; Strength of recommendation: Grade I Stellate ganglion blocks for CRPS i: There is insufficient evidence to evaluate effectiveness of stellate ganglion blocks in CRPS I. Evidence quality: Fair to Poor; Certainty: Moderate; Strength of recommendation: **Grade D**



ORIGINAL ARTICLE

Evidence-based guideline for neuropathic pain interventional treatments: Spinal cord stimulation, intravenous infusions, epidural injections and nerve blocks

Angela Mailis MD MSc FRCPC(PhysMed), Paul Taenzer PhD RPsych

A Mailis, P Taenzer. Evidence-based guideline for neuropathic pain interventional treatments: Spinal cord stimulation, intravenous infusions, epidural injections and nerve blocks. Pain Res Manage 2012;17(3):150-158.

BACKGROUND: The Special Interest Group of the Canadian Pain Society has produced consensus-based guidelines for the pharmacological management of neuropathic pain. The society aimed to generate an additional guideline for other forms of neuropathic pain treatments.
OBJECTIVE: To develop evidence-based recommendations for neuropathic pain interventional treatments.
METHODS: A task force was created and engaged the Institute of Health Economics in Edmonton, Alberta, to survey the literature pertaining to multiple treatments. Sufficient literature existed on four interventions only: spinal cord stimulation; epidural injections; intravenous infusions; and nerve blocks. A comprehensive search was conducted for systematic reviews, randomized controlled trials and evidence-based clinical practice guidelines; a critical review was generated on each topic. A modified United States Preventive Services Task Force tool was used for quality rating and grading of recommendations.
RESULTS: Investigators reviewed four studies of spinal cord stimulation, 19 studies of intravenous infusions, 14 studies of epidural injections and 16 studies of nerve blocks that met the inclusion criteria. The task force chairs rated the quality of evidence and graded the recommendations. Feedback was solicited from the members of the task force.
CONCLUSION: There is sufficient evidence to support recommendations for some of these interventions for selected neuropathic pain conditions. This evidence is, at best, moderate and is often limited or conflicting. Pain practitioners are encouraged to explore evidence-based treatment options before considering unproven treatments. Full disclosure of risks and benefits of the available options is necessary for shared decision making and informed consent.

Key Words: *Clinical practice guideline; Evidence-based; Interventions; Neuropathic pain*

Des lignes directrices probantes à l'égard des traitements interventionnistes pour soigner les douleurs neuropathiques : la stimulation de la moelle épinière, les infusions intraveineuses, les injections péridurales et les anesthésies tronculaires

OBJECTIF : Élaborer des recommandations probantes à l'égard des traitements interventionnistes de la douleur neuropathique.
HISTORIQUE : Le groupe d'intérêt spécial de la Société canadienne pour le traitement de la douleur a produit des lignes directrices consensuelles sur la prise en charge pharmacologique de la douleur neuropathique. La Société avait l'intention de produire d'autres lignes directrices sur les autres formes de traitement de la douleur neuropathique.
MÉTHODOLOGIE : Un groupe de travail a été mis sur pied et a retenu les services de l'Institut d'économie de la santé d'Edmonton, en Alberta, pour parcourir les publications au sujet de multiples traitements. Seulement quatre traitements s'associaient à un assez grand nombre de publications : la stimulation de la moelle épinière, les injections péridurales, les infusions intraveineuses et les anesthésies tronculaires. On a entrepris une recherche approfondie afin de trouver des analyses systématiques, des essais aléatoires et contrôlés et des guides de pratique clinique probants et produit une analyse critique sur chaque traitement. On a utilisé un outil modifié du groupe de travail sur les services préventifs des États-Unis pour évaluer la qualité et les catégories de recommandations.
RÉSULTATS : Les chercheurs ont examiné quatre études sur la stimulation de la moelle épinière, 19 études sur l'infusion intraveineuse, 14 études sur les injections péridurales et 16 études sur les anesthésies tronculaires qui respectaient les critères d'inclusion. Les présidents des groupes de travail ont évalué la qualité des données probantes, classé les recommandations et sollicité les commentaires des membres.
CONCLUSION : Les données probantes sont suffisantes pour appuyer les recommandations relatives à certaines de ces interventions à l'égard de troubles de douleur neuropathique précis. Au mieux, les données probantes sont modérées et sont souvent limitées ou conflictuelles. Les praticiens de la douleur sont invités à explorer les possibilités de traitement probantes avant d'envisager des traitements dont l'efficacité n'est pas démontrée. Il faut divulguer tous les risques et les avantages des possibilités offertes pour parvenir à une prise de décision partagée et à un consentement éclairé.

Chronic neuropathic pain is caused by lesions or dysfunction of the peripheral or central nervous system. Despite a significant increase in the number of randomized controlled trials (RCTs) in neuropathic pain over the past few years, fewer than one-half of the patients appear to achieve satisfactory relief with pharmacological agents (1,2). To guide clinical practice, several societies and organizations have produced guidelines evaluating the effectiveness of pharmacological treatments for neuropathic pain (3,4). Additionally, there is

METHODS

Preface/panel composition

In the spring of 2007, the NePSIG invited the authors to serve as co-chairs of a task force for the creation of evidence-based guidelines on neuropathic pain treatments other than oral pharmacotherapies.

Target audience and scope

The target audience for the present guideline is physicians and health

PNB Why add corticosteroid to LA? Rationale (Systematic Review 2018)

- **BACKGROUND:** I.V. and perineural dexamethasone have both been found to prolong loco-regional analgesia compared with controls without dexamethasone. It is unclear whether perineural administration offers advantages when compared with i.v. dexamethasone.
- **METHODS:** A systematic literature search was performed to identify randomized controlled double-blind trials that compared i.v. with perineural dexamethasone in patients undergoing surgery. Using the random effects model, risk ratio (for binary variables), weighted mean difference (for continuous variables) and 95% confidence intervals were calculated. We applied trial sequential analysis to assess the risks of type I and II error, meta-regression for the study of the dose responsive relationship, and the Grading of Recommendations Assessment, Development, and Evaluation system.
- **RESULTS** We identified 10 randomized controlled double-blind trials (783 patients). When using conventional meta-analysis of nine low risk of bias trials, we found a statistically significantly longer duration of analgesia, our primary outcome with perineural dexamethasone (241 min, 95%CI, 87, 394 min). When trial sequential analysis was applied, this result was confirmed. Meta-regression did not show a dose-response relationship. Despite the precision in the results, using the Grading of Recommendations Assessment, Development, and Evaluation system (GRADE), we assessed the quality of the evidence for our primary outcome as low.
- **CONCLUSIONS** There is evidence that perineural dexamethasone prolongs the duration of analgesia compared with i.v. dexamethasone. Using GRADE, this evidence is low quality C.

Heesen M, Klimek M, Imberger G, Hoeks SE, Rossaint R, Straube S **Co-administration of dexamethasone with peripheral nerve block: intravenous vs perineural application: systematic review, meta-analysis, meta-regression and trial-sequential analysis.** Br J Anaesth. 2018 Feb;120(2):212-227. doi: 10.1016/j.bja.2017.11.062. Epub 2017 Nov 22.

LA PNB evidence Headaches

- LA plus steroid
- Level II-IV (GRADE B-D) for ONB in Migraine, Cluster headache
- Level II (GRADE B) Cervicogenic HA
  - The best available studies indicate that the C2–3 zygapophysial joints are the most common source of cervicogenic headache,16,19,39,40 accounting for about 70% of cases.
- **Migraine Botoxin A (GRADE B-A) Level I-III**

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REVIEW

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KEYWORDS
Anaesthesic block;
Cervicogenic headache;
Cluster headache;
Migraine;
Greater occipital nerve;
Pericranial neuralgia

Abstract
Introduction: Anaesthetic block, alone or in combination with other treatments, represents a therapeutic resource for treating different types of headaches. However, there is significant heterogeneity in patterns of use among different professionals.
Development: This consensus document has been drafted after a thorough review and analysis of the existing literature and our own clinical experience. The aim of this document is to serve as guidelines for professionals applying anaesthetic blocks. Recommendations are based on the levels of evidence of published studies on migraine, trigeminal autonomic cephalalgias, cervicogenic headache, and pericranial neuralgias. We describe the main technical and formal considerations of the different procedures, the potential adverse reactions, and the recommended approach.

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Cervicogenic headache: an assessment of the evidence on clinical diagnosis, invasive tests, and treatment

Nikolai Bogduk, Jayantilal Govind*

Cervicogenic headache is characterised by pain referred to the head from the cervical spine. Although the International Headache Society recognises this type of headache as a distinct disorder, some clinicians remain sceptical. Laboratory and clinical studies have shown that pain from upper cervical joints and muscles can be referred to the head. Clinical diagnostic criteria have not proved valid, but a cervical source of pain can be established by use of fluoroscopically guided, controlled, diagnostic nerve blocks. In this Review, we outline the basic science and clinical evidence for cervicogenic headache and indicate how opposing approaches to its definition and diagnosis affect the evidence for its clinical management. We provide recommendations that enable a pragmatic approach to the diagnosis and management of probable cervicogenic headache, as well as a rigorous approach to the diagnosis and management of definite cervical headache.

Lancet Neurol 2009; 8: 959–68
See Reflection and Reaction page 875

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*Dr Govind died on June 16, 2009

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Introduction

Cervicogenic headache is pain referred to the head from a source in the cervical spine. Unlike other types of headache, cervicogenic headache has attracted interest from disciplines other than neurology, in particular manual therapists and interventional pain specialists, who believe that they can find the source of pain among the joints of the cervical spine. Neurologists differ in their acceptance of this disorder. The International Headache Society recognises cervicogenic headache as a distinct disorder[1] and one chapter in a leading headache textbook acknowledges that injuries to upper cervical joints can cause headache after whiplash,[2] although another chapter indicates that this concept is

The mechanism underlying the pain involves convergence between cervical and trigeminal afferents in the trigeminocervical nucleus (figure 1).[4,5] In this nucleus, nociceptive afferents from the C1, C2, and C3 spinal nerves converge onto second-order neurons that also receive afferents from adjacent cervical nerves and from the first division of the trigeminal nerve (V), via the trigeminal nerve spinal tract. This convergence has been shown anatomically and physiologically in laboratory animals.[5–8] Convergence between cervical afferents allows for upper cervical pain to be referred to regions of the head innervated by cervical nerves (occipital and auricular regions). Convergence with trigeminal afferents allows for referral into the parietal,

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BEST PRACTICE & RESEARCH

7

Diagnostic nerve blocks in chronic pain

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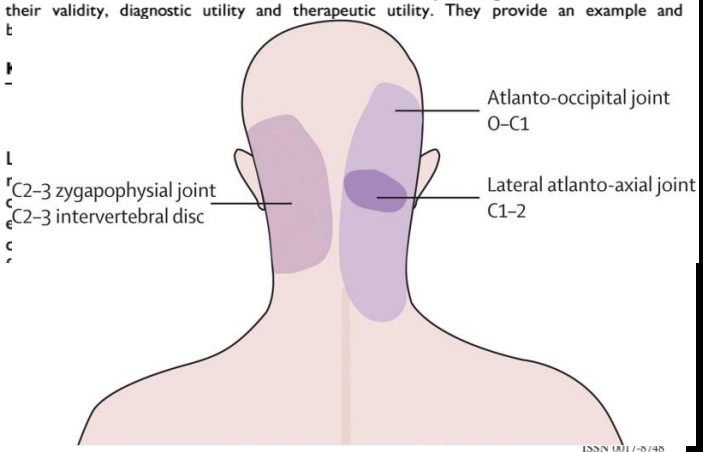
Diagnostic blocks are used to obtain information about the source of a patient's pain. As such they differ in principle and in practice from regional anaesthetic blocks. In order to be valid, diagnostic blocks must be precise and target-specific. They must be controlled in order to exclude false-positive responses. Sympathetic blocks have traditionally been performed without pharmacological controls, but studies have shown that the features of complex regional pain syndromes can be relieved equally well when normal saline is administered as when local anaesthetic is used. This warns that sympathetic blocks must be controlled in each and every case lest false conclusions be drawn about the response. Medial branch blocks of the lumbar and of the cervical dorsal rami have been extensively investigated in order to establish their validity, diagnostic utility and therapeutic utility. They provide an example and



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Review Article

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

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

From The Headache Center of Southern California – Neurology, Encinitas, CA, USA (A. Blumenfeld and J. Schim); Doylestown Hospital, Doylestown, PA, USA (A. Ashkenazi); Headache Clinic at Middletown Medical, Middletown, NY, USA (U. Napchan); North Texas Center for Head, Face & TMJ Pain, Texas A&M University, Baylor College of Dentistry, Plano, TX, USA (S.D. Bender); Abington Headache Center – Neurology, Warminster, PA, USA (B.C. Klein); Albert Einstein College of Medicine/Montefiore Medical Center, Bronx, NY, USA (R. Berliner and M.S. Robbins); Department of Neurology, Georgetown University Hospital, Washington, DC, USA (J. Ailani); Departments of Neurology & Neurotherapeutics and Ophthalmology, University of Texas

BTX NB
Rational for Neuropathic pain (NP)

The level of efficacy for BoNT treatment in each category of NP is defined according to the published guidelines of the **American Academy of Neurology.**

Onabotulinumtoxin A is effective for;

Grade A evidence in (non orofacial) **postherpetic neuralgia.**

Grade B evidence in (non orofacial) **posttraumatic neuralgia and painful diabetic neuropathy**

BUT……LOW level of evidence for orofacial pain conditions!!!

The data on complex regional pain syndrome, carpal tunnel syndrome, occipital neuralgia, and phantom limb pain are preliminary and await conduction of randomized, blinded clinical trials.

Much remains to be learned about the most-effective dosage and technique of injection, optimum dilutions, and differences among BoNTs in the treatment of neuropathic pain.

Mittal SO, Safarpour D, Jabbari B. Botulinum Toxin Treatment of Neuropathic Pain. Semin Neurol. 2016 Feb;36(1):73-83. doi: 10.1055/s-0036-1571953. Epub 2016 Feb 11.

Dr Nadine Attal Safety and efficacy of repeated injections of botulinum toxin A in peripheral neuropathic pain (BOTNEP): a randomised, double-blind, placebo-controlled trial. Lancet **Volume 15, No. 6** p555–565, May 2016

What is the evidence for treatment for orofacial pain? Systematic Review

J Oral Rehabil. 2017 Oct;44(10):800-826. doi: 10.1111/joor.12539. Epub 2017 Jul 29.

Pharmacological treatment of oro-facial pain - health technology assessment including a systematic review with network meta-analysis.

Häggman-Henrikson B[1,2,3], Alstergren P[1,4,5], Davidson T[3,6], Högestätt ED[7], Östlund P[2,8], Tranaeus S[2,8], Vitols S[8,9], List T[1,4,5].

Author information

Abstract

This health technology assessment evaluated the efficacy of pharmacological treatment in patients with oro-facial pain. Randomised controlled trials were included if they reported pharmacological treatment in patients ≥18 years with chronic (≥3 months) oro-facial pain. Patients were divided into subgroups: TMD-muscle [temporomandibular disorders (TMD) mainly associated with myalgia]; TMD-joint (TMD mainly associated with temporomandibular joint pain); and burning mouth syndrome (BMS). The primary outcome was pain intensity reduction after pharmacological treatment. The scientific quality of the evidence was rated according to GRADE. An electronic search in PubMed, Cochrane Library, and EMBASE from database inception to 1 March 2017 combined with a handsearch identified 1552 articles. After screening of abstracts, 178 articles were reviewed in full text and 57 studies met the inclusion criteria. After risk of bias assessment, 41 articles remained: 15 studies on 790 patients classified as TMD-joint, nine on 375 patients classified as TMD-muscle and 17 on 868 patients with BMS. Of these, eight studies on TM
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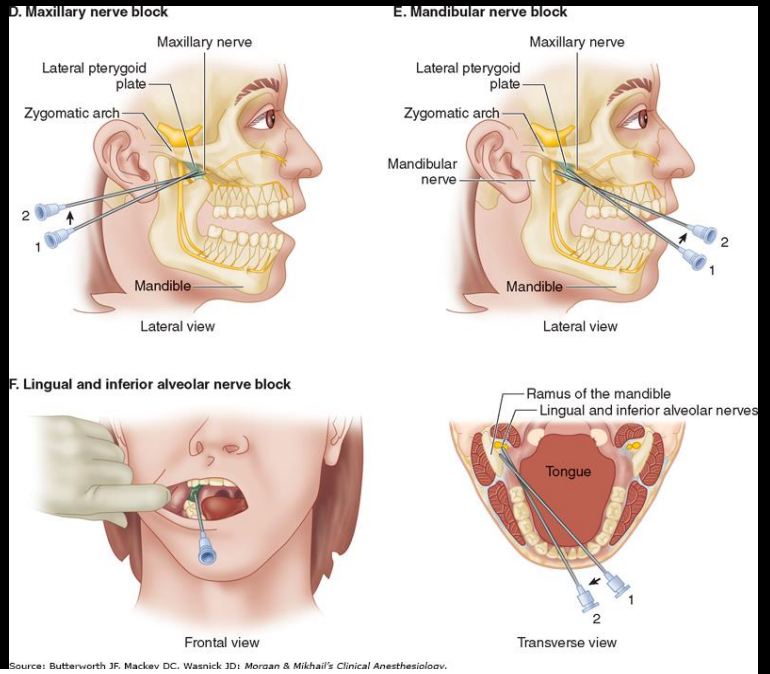
as well as corticosteroid and hyaluronate injections are effective treatments for TMD-joint pain. The network meta-analysis showed that clonazepam and capsaicin reduced pain intensity in BMS, and the muscle relaxant cyclobenzaprine, for the TMD-muscle group. In conclusion, based on a limited number of studies, evidence provided with network meta-analysis showed that clonazepam and capsaicin are effective in treatment of BMS and that the muscle relaxant cyclobenzaprine has a positive treatment effect for TMD-muscle pain.



Injection of corticosteroids and hyaluronate may be effective for TMD joint pain Grade C

What is the evidence for treatment for orofacial pain? Systematic Review

- Data sourcesElectronic searches of PubMed, the Cochrane Library, Embase, the National Health Service Economic Evaluation Database and HTA until March 2017. Also handsearched referenced in the original articles. Grey literature was not included.Study selectionRandomised controlled trials with more than ten participants with oro-facial pain duration of more than three months were sub grouped into: TMD-muscle pain (TMD-m), TMD-joint pain (TMD-j), burning mouth syndrome (BMS) and other oro-facial pain.
- Studies include any pharmacological treatment against another pharmacological, non-pharmacological treatment, placebo or no treatment. The primary outcome was change in pain intensity and the secondary outcome was the effect on quality of life.. Two authors independently extracted data that were later assessed according to a modified GRADE system.
- Results Forty-one studies, rated medium to low risk of bias, were included in qualitative analysis on patients with TMD-j pain (15 studies, n = 790), TMD-m pain (nine studies, n = 375), BMS (17 studies n = 868).
- For the TMD-j group five studies support NSAIDs and nine corticosteroid and hyaluronate injections. Eight of the nine TMD-m studies were included in a network meta-analysis (NMA), they support cyclobenzaprine, botulinum toxin injections and topical treatment with Ping-On ointment.
- Five of the 17 BMS studies included in a NMA support topical capsaicin and clonazepam.
- Of the remaining 12, five showed no effect while the remaining support alpha lipoic acid, gabapentin, clonazepam, amisulpride and SSRIs.

The authors concluded that clonazepam and capsaicin are effective for BMS while cyclobenzaprine, a muscle relaxant, has a positive treatment effect on TMJ-m. Evidence from the narrative synthesis suggests NSAIDs, corticosteroid and hyaluronate injections are effective for TMD-j pain.

Fischoff D, Spivakovsky S. **Are pharmacological treatments for oro-facial pain effective?** Evid Based Dent.2018 Mar 23;19(1):28-29. doi: 10.1038/sj.ebd.6401294.

Outline

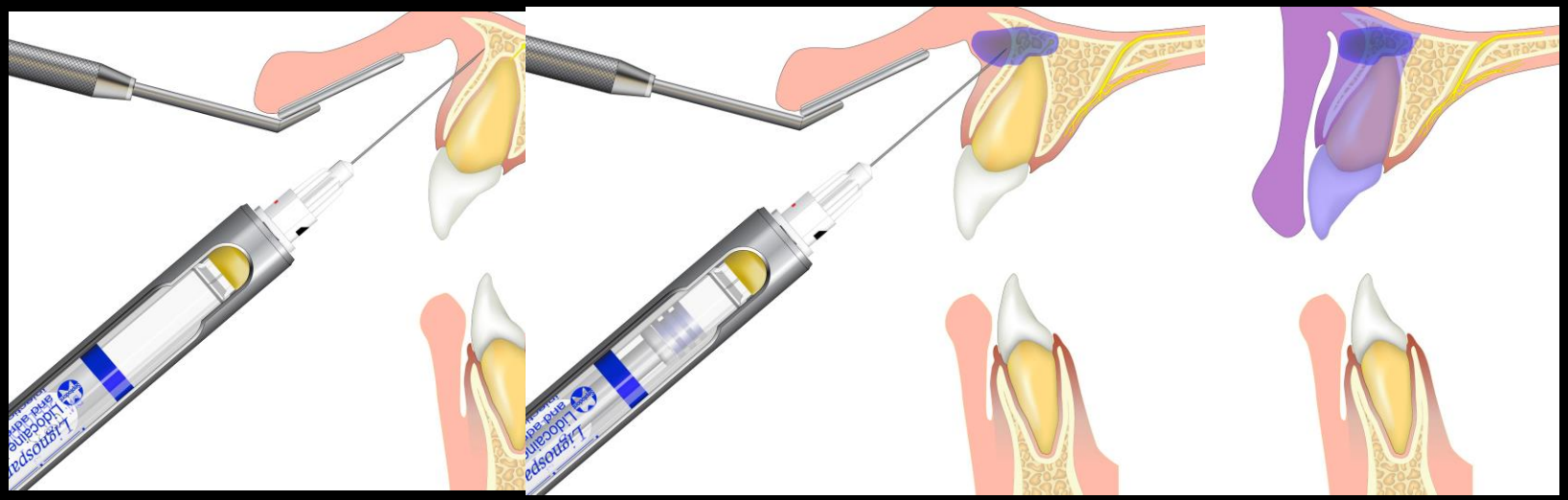
- Introduction
- Issues with nerve blocks
- Evidence for therapeutic peripheral nerve blocks
- Evidence for Local Anaesthetic (LA) therapeutic peripheral nerve blocks for orofacial pain
- Evidence for Botulinum Toxin A (BTX) therapeutic peripheral nerve blocks for orofacial pain

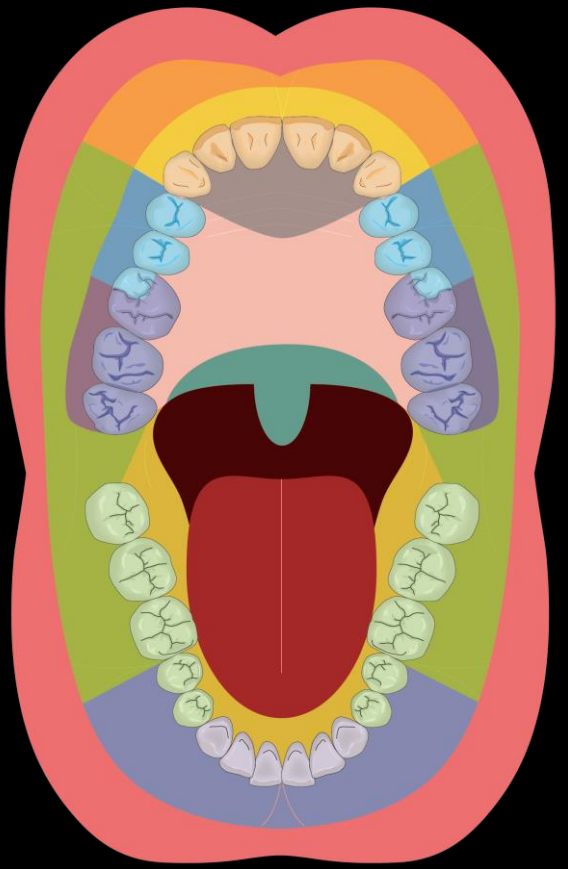
LA therapeutic Nerve bocks for OFP Region

- Trigeminal
  - Inferior alveolar
  - Lingual
  - Intra oral infiltration
  - Auriculotemporal
  - Infraorbital
- Temporomandibular
  - Muscular
  - Intracapsular
  - Extracapsular
- Cervical nerves
  - Occipital nerve block
- Sympathetic Stellate
- Sphenopalatine ganglion

Trigeminal nerve LA PNBs (infiltrations or blocks)

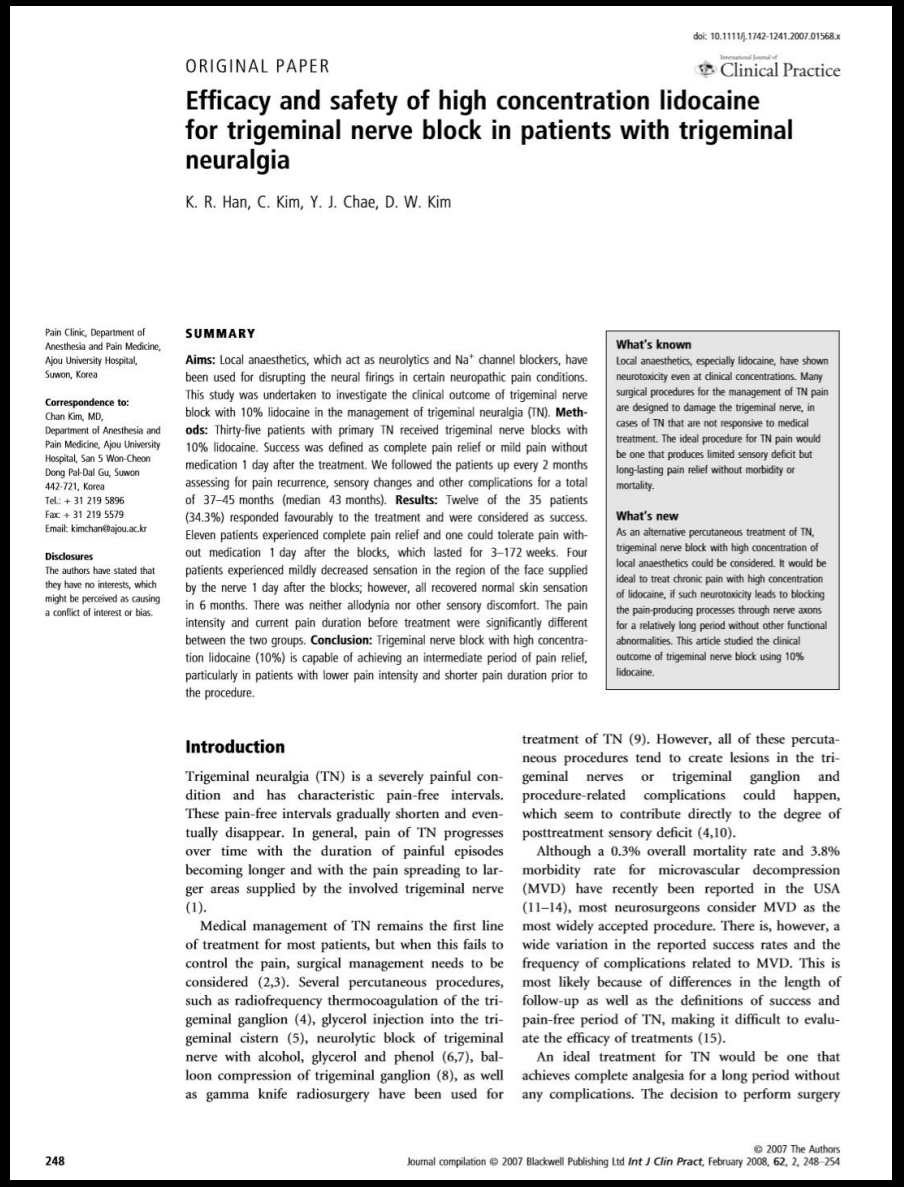
For TN





LA NB (V2, IDBs, Mental N)
for TN

- Case series 35 cases refractory TN 10% lidocaine multi site block / infiltrations
  - 11/35 pts complete pain relief and 35% pts responded favourably. Lasting 3-172 days
  - Multiple site injection including IDB for refractory TN and non classical TN
- Evidence Grade C



doi: 10.1111/j.1742-1241.2007.01568.x

ORIGINAL PAPER

International Journal of Clinical Practice

Efficacy and safety of high concentration lidocaine for trigeminal nerve block in patients with trigeminal neuralgia

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Disclosures
The authors have stated that they have no interests, which might be perceived as causing a conflict of interest or bias.

SUMMARY

Aims: Local anaesthetics, which act as neurolytics and Na^+ channel blockers, have been used for disrupting the neural firings in certain neuropathic pain conditions. This study was undertaken to investigate the clinical outcome of trigeminal nerve block with 10% lidocaine in the management of trigeminal neuralgia (TN). **Methods:** Thirty-five patients with primary TN received trigeminal nerve blocks with 10% lidocaine. Success was defined as complete pain relief or mild pain without medication 1 day after the treatment. We followed the patients up every 2 months assessing for pain recurrence, sensory changes and other complications for a total of 37–45 months (median 43 months). **Results:** Twelve of the 35 patients (34.3%) responded favourably to the treatment and were considered as success. Eleven patients experienced complete pain relief and one could tolerate pain without medication 1 day after the blocks, which lasted for 3–172 weeks. Four patients experienced mildly decreased sensation in the region of the face supplied by the nerve 1 day after the blocks; however, all recovered normal skin sensation in 6 months. There was neither allodynia nor other sensory discomfort. The pain intensity and current pain duration before treatment were significantly different between the two groups. **Conclusion:** Trigeminal nerve block with high concentration lidocaine (10%) is capable of achieving an intermediate period of pain relief, particularly in patients with lower pain intensity and shorter pain duration prior to the procedure.

What's known
Local anaesthetics, especially lidocaine, have shown neurotoxicity even at clinical concentrations. Many surgical procedures for the management of TN pain are designed to damage the trigeminal nerve, in cases of TN that are not responsive to medical treatment. The ideal procedure for TN pain would be one that produces limited sensory deficit but long-lasting pain relief without morbidity or mortality.

What's new
As an alternative percutaneous treatment of TN, trigeminal nerve block with high concentration of local anaesthetics could be considered. It would be ideal to treat chronic pain with high concentration of lidocaine, if such neurotoxicity leads to blocking the pain-producing processes through nerve axons for a relatively long period without other functional abnormalities. This article studied the clinical outcome of trigeminal nerve block using 10% lidocaine.

Introduction

Trigeminal neuralgia (TN) is a severely painful condition and has characteristic pain-free intervals. These pain-free intervals gradually shorten and eventually disappear. In general, pain of TN progresses over time with the duration of painful episodes becoming longer and with the pain spreading to larger areas supplied by the involved trigeminal nerve (1).

Medical management of TN remains the first line of treatment for most patients, but when this fails to control the pain, surgical management needs to be considered (2,3). Several percutaneous procedures, such as radiofrequency thermocoagulation of the trigeminal ganglion (4), glycerol injection into the trigeminal cistern (5), neurolytic block of trigeminal nerve with alcohol, glycerol and phenol (6,7), balloon compression of trigeminal ganglion (8), as well as gamma knife radiosurgery have been used for treatment of TN (9). However, all of these percutaneous procedures tend to create lesions in the trigeminal nerves or trigeminal ganglion and procedure-related complications could happen, which seem to contribute directly to the degree of posttreatment sensory deficit (4,10).

Although a 0.3% overall mortality rate and 3.8% morbidity rate for microvascular decompression (MVD) have recently been reported in the USA (11–14), most neurosurgeons consider MVD as the most widely accepted procedure. There is, however, a wide variation in the reported success rates and the frequency of complications related to MVD. This is most likely because of differences in the length of follow-up as well as the definitions of success and pain-free period of TN, making it difficult to evaluate the efficacy of treatments (15).

An ideal treatment for TN would be one that achieves complete analgesia for a long period without any complications. The decision to perform surgery

Case report Tetsusuke YOSHIMOTO, Takako TSUDA, Keiichi SUNOHARA, Hirofumi OYAMA, Hiroaki ITOH, Hiroyuki HIRATE, Tetsuya TAMURA, Yasuhiro NOZAKI, Hirotada KATSUYA. Repeated peripheral trigeminal nerve block improved prolonged postoperative nerve palsies Journal of Japan Society of Pa in Volume 14 (2007) Issue 2 Pages 144-149

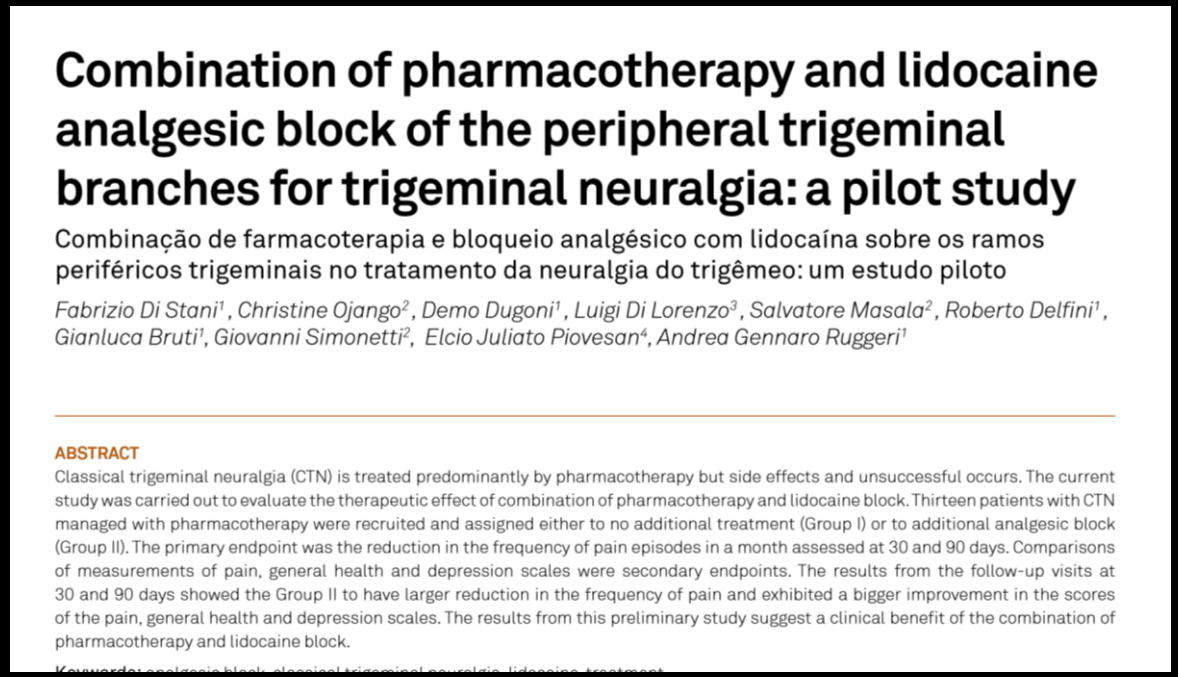
LA NB (V2, IDBs, Mental N)
for TN

The study evaluated the therapeutic effect of combination of pharmacotherapy and lidocaine block.

13 patients with CTN managed with pharmacotherapy were recruited and assigned either to no additional treatment (Group I) or to additional analgesic block (Group II).

The primary endpoint was the reduction in the frequency of pain episodes in a month assessed at 30 and 90 days.

Comparisons of measurements of pain, general health and depression scales were secondary endpoints.



Combination of pharmacotherapy and lidocaine analgesic block of the peripheral trigeminal branches for trigeminal neuralgia: a pilot study

Combinação de farmacoterapia e bloqueio analgésico com lidocaína sobre os ramos periféricos trigeminais no tratamento da neuralgia do trigêmeo: um estudo piloto

Fabrizio Di Stani[1], Christine Ojango[2], Demo Dugoni[1], Luigi Di Lorenzo[3], Salvatore Masala[2], Roberto Delfini[1], Gianluca Bruti[1], Giovanni Simonetti[2], Elcio Juliato Piovesan[4], Andrea Gennaro Ruggeri[1]

ABSTRACT

Classical trigeminal neuralgia (CTN) is treated predominantly by pharmacotherapy but side effects and unsuccessful occurs. The current study was carried out to evaluate the therapeutic effect of combination of pharmacotherapy and lidocaine block. Thirteen patients with CTN managed with pharmacotherapy were recruited and assigned either to no additional treatment (Group I) or to additional analgesic block (Group II). The primary endpoint was the reduction in the frequency of pain episodes in a month assessed at 30 and 90 days. Comparisons of measurements of pain, general health and depression scales were secondary endpoints. The results from the follow-up visits at 30 and 90 days showed the Group II to have larger reduction in the frequency of pain and exhibited a bigger improvement in the scores of the pain, general health and depression scales. The results from this preliminary study suggest a clinical benefit of the combination of pharmacotherapy and lidocaine block.

Keywords: analgesic block, classical trigeminal neuralgia, lidocaine, treatment

- **Group II (LA + medication) at 30 and 90 days have larger reduction in the frequency of pain and exhibited a bigger improvement in the scores of the pain, general health and depression scales.**
- **The results from this preliminary study suggest a clinical benefit of the combination of pharmacotherapy and lidocaine block**.

Evidence Grade C

Di Stani F Ojango C, Dugoni D, Di Lorenzo L, Masala S, Delfini R, Bruti G, Simonetti G, Piovesan EJ, Ruggeri AG. Combination of pharmacotherapy and lidocaine analgesic block of the peripheral trigeminal branches for trigeminal neuralgia: a pilot study. Arq Neuropsiquiatr. 2015 Aug;73(8):660-4. doi: 10.1590/0004-282X20150077.

LA mixed PNB for TN pre-emptive radiofrequency

- Prospective study to establish the preoperative and perioperative analgesic effects of preoperative single peripheral nerve block.
- Sixty patients with classic trigeminal neuralgia who were scheduled to undergo radiofrequency thermocoagulation of the gasserian ganglion were randomly divided into a control group (n = 30) and a nerve block group (n = 30).
- Patients in the nerve block group were treated with single peripheral nerve block using **1% lidocaine and betamethasone** on the day of admission.
- Average pain, worst pain, quality of sleep, and analgesia satisfaction were evaluated before surgery. The incidence and intensity of perioperative episodic pain were determined before the needle reached the gasserian ganglion.
- Compared with the control group, a single peripheral nerve block significantly attenuated
  - average pain ($P < 0.01$)
  - worst pain ($P < 0.01$),
  - ameliorated the quality of sleep ($P < 0.01$),
  - increased analgesia satisfaction ($P < 0.01$).
- Moreover, patients in the nerve block group experienced a decrease in incidence ($P < 0.01$) and intensity ($P < 0.01$) of episodic pain during surgery as compared with the participants in the control group.
- These results demonstrate that a single peripheral nerve block may be an effective way to relieve preoperative and perioperative intolerable pain of trigeminal neuralgia.

Weng Z, Halawa MA, Liu X, Zhou X, Yao S. Analgesic effects of preoperative peripheral nerve block in patients with trigeminal neuralgia undergoing radiofrequency thermocoagulation of gasserian ganglion. J Craniofac Surg 2013 Mar;24(2):479-82. doi: 10.1097/SCS.0b013e31827c7d6f

LA NB
for Great Auricular Neuralgia

- Lidocaine and Tetracycline
- Great Auricular neuralgia

- Case report
- Grade D

Clinical Case Report

Medicine®

OPEN

Treatment of great auricular neuralgia with real-time ultrasound-guided great auricular nerve block

A case report and review of the literature

Younghoon Jeon, MD, PhD[a], Saeyoung Kim, MD, PhD[b,*]

Abstract

Rationale: The great auricular nerve can be damaged by the neck surgery, tumor, and long-time pressure on the neck. But, great auricular neuralgia is very rare condition. It was managed by several medication and landmark-based great auricular nerve block with poor prognosis.

Patient concerns: A 25-year-old man presented with a pain in the left lateral neck and auricle.

Diagnosis: He was diagnosed with great auricular neuralgia.

Interventions: His pain was not reduced by medication. Therefore, the great auricular nerve block with local anesthetics and steroid was performed under ultrasound guidance.

Outcomes: Ultrasound guided great auricular nerve block alleviated great auricular neuralgia.

Lessons: This medication-resistant great auricular neuralgia was treated by the ultrasound guided great auricular nerve block with local anesthetic agent and steroid. Therefore, great auricular nerve block can be a good treatment option of medication resistant great auricular neuralgia.

Abbreviations: NRS = numeric rating scale, SCM = sternocleidomastoid muscle.

Keywords: cervical plexus, great auricular nerve, nerve block, neuralgia, ultrasonography

LA Supra orbital NB for Migraine

- Usually supraorbital NB PLUS Greater occipital nerve block (GON)

- The study prior to updated BTX migraine protocol
- Evidence Grade C-B

Bovim G, Sand T. Cervicogenic headache, migraine without aura and tension-type headache. Diagnostic blockade of greater occipital and **supra**-**orbital** nerves. **Pain**. 1992 Oct;51(1):43-8.

Trigeminal nerve PNBs (infiltrations)

- Lingual / BMS/ Lingual Nerve injury

LA lingual PNB
No studies for Therapeutics

- But we have some evidence from experimental studies that topical and Lingual nerve blocks may ne diagnostic and have potential therapeutic effect

LA lingual PN Block for BMS

- A randomised, double-blind crossover design was used to investigate the effects of lingual nerve block on spontaneous burning pain and a possible correlation with the effects of topical clonazepam, the patient's response to a psychological questionnaire, and the taste and heat thresholds. **17 patients**
- The spontaneous burning was measured with a visual analogue scale (VAS) just before and 15 min after injection.
- **The decreases in VAS score after lidocaine or saline injection were not significantly different (2.7+/-3.9 and 2.0+/-2.6, respectively; n=20).**
- Two groups of patients could be identified: in a **"peripheral group"** (n=10) the VAS decrease due to lingual nerve injection was 4.3+/-3.1cm after lidocaine and 0.9+/-0.3 cm after saline (p=0.02).
- In a **"central group**" (n=7), there were an increase in pain intensity score (-0.8+/-2.6 cm) after lidocaine and a decrease (1.5+/-3.0 cm) after saline (p=0.15).
- An **increase** in the hospital anxiety and depression **(HAD) score** and a **decreased taste sensitivity and heat pain threshold** of painful oral area were seen in patients compared with age-and-sex-matched controls ($p<0.05$).
- **Topical clonazepam** treatment tended to be more effective ($p=0.07$) and **HAD score lower ($p<0.03$) in the peripheral than in the central group**. These results suggest that the neuropathic disorder associated with stomatodynia may be predominantly peripheral, central or mixed depending on the individual.
- Topical application of clonazepam and HAD may serve as indicators of which mechanism is dominating.

Grémeau-Richard C, Dubray C, Aublet-Cuvelier B, Ughetto S, Woda A. Effect of lingual nerve block on burning mouth syndrome (stomatodynia): a randomized crossover trial. Pain. 2010 Apr;149(1):27-32. doi: 10.1016/j.pain.2009.11.016. Epub 2010 Jan 18.

LA lingual PN Infiltration
Experimental LA in Burning mouth syndrome

Tested the effect of a topical anaesthetic (dyclonine HCl) on patients' intensity ratings for oral burning, taste dysgeusia and the taste of two chemical stimuli (1.0 M NaCl and 1.0 M sucrose).
A total of 33 patients (9 male and 24 female, average age: 60 yr) are included in this analysis. The anaesthetic reduced the perceptual intensity of both chemicals in these patients on four out of five post anaesthesia trials ($p < 0.01$).

The BMS cohort included **12 patients whose burning increased ($p < 0.001$),** 14 patients whose burning did not change, and **7 patients whose burning decreased ($p < 0.001$)**

Baseline dysgeusias (n = 13) decreased in intensity ($p < 0.001$) after anaesthesia, suggesting BMS dysgeusia is related to the activation of peripheral taste mechanisms.
Evidence Grade C

Formaker BK, Mott AE , Frank ME The effects of topical anaesthesia on oral burning in burning mouth syndrome. Ann N Y Acad Sci. 1998 Nov 30;855:776-80.

ORIGINAL ARTICLE

Effect of a local anesthetic lozenge in relief of symptoms in burning mouth syndrome

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[1]*Clinical Research Centre, Copenhagen University Hospital, Hvidovre;* [2]*Section for Pharmaceutical Design and Drug Delivery, Department of Pharmacy, Faculty of Health and Medical Sciences, University of Copenhagen, Copenhagen;* [3]*Section for Oral Medicine, Clinical Oral Physiology, Oral Pathology and Anatomy, Department of Odontology, Faculty of Health and Medical Sciences, University of Copenhagen, Copenhagen, Denmark*

OBJECTIVE: Patients with burning mouth syndrome (BMS) often represent a clinical challenge as available agents for symptomatic treatment are few and often ineffective. The aim was to evaluate the effect of a bupivacaine lozenge on oral mucosal pain, xerostomia, and taste alterations in patients with BMS.
METHODS: Eighteen patients (4 men and 14 women) aged 39–71 years with BMS were included in this randomized, double-blinded, placebo-controlled, crossover trial. Lozenges (containing bupivacaine or placebo) were administrated three times a day for 2 weeks for two separate treatment periods. Assessment of oral mucosal pain, xerostomia, and taste alterations was performed in a patient diary on a visual analog scale (ranging from 0 to 100 mm) before and after the lozenge was dissolved.
RESULTS: The bupivacaine lozenge significantly reduced the burning oral pain ($P < 0.001$), increased the sense of taste disturbances ($P < 0.001$), and had no impact on xerostomia, when adjusted for the treatment period.
CONCLUSIONS: Our results indicate that the bupivacaine lozenge offers a novel therapeutic modality to patients with BMS, although without alleviating effect on the associated symptoms, taste alterations, and xerostomia.

Oral Diseases (2016) **22**, 123–131

Introduction

Burning mouth syndrome (BMS) is an oral pain condition characterized by a persistent painful burning, itching, or stinging sensation in a clinically normal-appearing oral mucosa, where no dental or systemic causes have been identified (Zakrzewska *et al*, 2005; Jaaskelainen, 2012). Psychological factors may impact the pathogenesis but it is still unsettled whether BMS is caused by a psychosomatic or psychogenic disorder or whether the persistent oral pain influences the psychosocial behavior (Pedersen *et al*, 2004). It is a severe, disabling condition that often impairs the patient's quality of life, as no optimal treatment exists (Lopez-Jornet *et al*, 2008; Ni Riordain *et al*, 2010). The burning sensation is mainly located on the tongue, but frequently affects other areas of the oral mucosa such as the anterior part of the hard palate and the lips (Grushka, 1987; Bergdahl and Bergdahl, 1999; Pedersen *et al*, 2004). In addition to the burning sensation patients often present with altered perception of taste (dysgeusia) and sensations of dry mouth (xerostomia) despite an often normal salivary secretion (Bergdahl and Bergdahl, 1999; Pedersen *et al*, 2004; Zakrzewska *et al*, 2005). The diagnosis of BMS is based on a clinical examination and ruling out any systemic or local explanations for the symptoms (Jaaskelainen, 2012; Sun *et al*, 2013). The prevalence in the adult population is not well estimated and ranges from 0.7% to 15% due to lack of adherence to

LA lingual PN Infiltration
Our research

Dr Kiran Beneng Dr Matthew Howard and TR in press

BMS LA Results

Three groups were identified;

- Peripheral group with decrease in pain after LA (n=5)
- Central group with increase in pain after LA (n=2)
- Mixed group no change in pain after LA (n=2)

A significant increase in CBF was noted in BMS patients compared to controls with a cluster seen unilaterally within the insula extending anteriorly and inferiorly to the fronto-orbital complex.

Following treatment with LA, rCBF decreases were seen in the BMS group on the ipsilateral side to the LA. CBF changes were noted within S2, insula cortex, fronto-orbital cortex, the primary auditory complex and the putamen.

Conversely, there was a significant increase in CBF in controls, compared to BMS patients following LA administration with changes predominantly noted around the midline in the cingulate gyrus, hippocampus, parahippocampal gyrus, cerebellum and brainstem.

Evidence Grade C

LA for BMS
Possible conclusions

- LA PNB infiltration very useful tool for phenotyping BMS patients into three groups and may be useful for treatment decisions in the future
- 33% of BMS pts may benefit from LA infiltration / topical bupivacaine combined with capsaicin and or topical clonazepam treatment
- LA lingual blocks are effective / ineffective (or as effective as saline blocks)
- Elevated HADs predominant factor in predictive poor response to PNB

Trigeminal nerve PNBs (Pre-Botox infiltrations)

Anterior Middle Posterior Superior Blocks
Mandibular ridge infiltrations

Pre Botox LA injections for focal neuropathic pain

Lidocaine 2% (1:80K epinephrine) 1-2mls infiltrations
positive response prerequisite for BTX treatment

PDAP 1 or primary localised intra oral Ne Pain

- 7 patients
- Mean age 55yrs
- 60% Female
- Site
  - 40% mandibular posterior molar region
  - 40% posterior maxillary molar region
  - 20% anterior maxilla
- Response rate
  - Complete 3 (1 hour-30days)
  - Partial 2
  - None 2

PPTTN localised intra oral Ne Pain

- 18 patients
- Mean age 42 yrs
- 75% female
- Site
  - 15% mandibular posterior molar region
  - 5% posterior maxillary molar region
  - 80% anterior maxilla
- Response rate
  - Complete 14 (duration 1 hour -42 days)
  - Partial 2
  - None 2

Versatis patches
5% Lidocaine patches

Recommended for

- Extraoral PHN
- Extraoral neuropathic pain
- For myofascial pain

Evidence Grade C

EFNS GUIDELINES

EFNS guidelines on the pharmacological treatment of neuropathic pain: 2009 revision

N. Attal[a,b], G. Cruccu[a,c], R. Baron[a,d], M. Haanpää[a,e], P. Hansson[a,f], T. S. Jensen[a,g] and T. Nurmikko[a,h]

[a]EFNS Panel Neuropathic Pain; [b]INSERM U987, Centre d'Evaluation et de Traitement de la Douleur, Hôpital Ambroise Paré, APHP, Boulogne-Billancourt, and Université Versailles-Saint-Quentin,Versailles, France; [c]Department of Neurological Sciences, La Sapienza University, Rome, Italy; [d]Division of Neurological Pain Research and Therapy, Department of Neurology, Universitatsklinikum Schleswig-
University Hospital, Helsinki, Finland;
partment of Neurosurgery, Karolinska
Research Center, Aarhus University Hospital,
Sciences, University of Liverpool, Liverpool,

an Federation of Neurological Soci-
evidence about the pharmacological

rane Database and Medline. Trials
lition. All class I and II randomized
ass studies were considered only in
ents administered using repeated or
d they are feasible in an outpatient

diabetic polyneuropathies and post-

Original Article

The British Pain Society

British Journal of Pain
0(0) 1–7

DOI: 10.1177/2049463713483459
bjp.sagepub.com
SAGE

Case studies illustrating the management of trigeminal neuropathic pain using topical 5% lidocaine plasters

Nadine Khawaja, Zehra Yilmaz and Tara Renton

Abstract

Chronic trigeminal pain, with its severe related functional problems, is difficult to treat. Treatment is often empirically based on medications used for other chronic pain conditions. Systemic sodium channel and calcium channel blocking agents may cause a multitude of complications that are often poorly tolerated by the patient.

Aim: The aim of this case report was to assess the efficacy
pain and reducing adjuvant medication in patients with orofac
Method: Fourteen patients with chronic orofacial pain conditi
were instructed to wear 5% lidocaine plasters for 12 hours ea
included post-surgical neuropathy (n = 10), multiple sclerosi

Am J Phys Med Rehabil. 2012 Oct;91(10):871-82.

Therapeutic effects of lidocaine patch on myofascial pain syndrome of the upper trapezius: a randomized, double-blind, placebo-controlled study.

Lin YC[1], Kuan TS, Hsieh PC, Yen WJ, Chang WC, Chen SM.

Author information

J Pain Palliat Care Pharmacother. 2004;18(3):15-34.

Topical lidocaine patch therapy for myofascial pain.

Dalpiaz AS[1], Lordon SP, Lipman AG.

Author information

Abstract

An open label study of topical lidocaine 5% patches was conducted for myofascial pain management based on the hypothesis that electrical dysfunction is a component of myofascial pain and therefore sodium channel blockade may be useful in managing myofascial pain. The efficacy of topical lidocaine patch therapy for myofascial pain impact of the therapy on associated quality of life were investigated in the one-month trial. Principal outcome measures were Brief Pain Inventory- Short Form for pain intensity and quality of life score changes. Twenty-seven patients with moderate-severe myofascial pain were enrolled. Eighteen had low back pain. Two patients reported complete pain relief and 3 reported a lot of relief. Mean improvements for average pain intensity (7, 14, and 28 days), general activity (7 and 28 days), mood and sleep (7, 14, and 28 days), walking (14 and 28 days), and ability to work, relationships, and enjoyment of life (28 days) were significant ($P < 0.05$). These results suggest lidocaine patches may be useful in the management of myofascial pain.

ical 5% lidocaine patch with placebo patch in the treatment of myofascial pain

l, placebo-controlled study, 60 participants were randomly assigned, placing 31
cts in the placebo patch group. We used the Verbal Rating Scale (VRS), the
neck, and the Neck Disability Index to evaluate the subjective pain intensity,
y of the neck, respectively. Outcome measures were performed before (day 0) the
h on the seventh day (day 7), and 1 wk (day 14) and 3 wks (day 28) after the

ot differ at baseline. Pain intensity assessed by the VRS decreased at day 7 in
ere was no significant difference between the two groups in the VRS, the
e Neck Disability Index. At day 14, the experimental group continued to improve in
ravated (VRS, 1.5). The difference is significant ($P = 0.03$). In addition, the Neck
significantly as compared to that in the placebo group. The pain-relieving effect of
ntly different between the two groups at day 28 in the VRS and the Neck Disability
nges of motion were significantly different through the periods of this study.

atch is probably superior to the placebo patch in relieving pain and in reducing
wk for treating patients with myofascial pain syndrome of the upper trapezius.

Department of Oral Surgery, King's College London, London, UK

Chronic orofacial pain is comparable with other pain

LA therapeutic Nerve bocks for OFP Region

- Trigeminal
  - Inferior alveolar
  - Lingual
  - Intra oral infiltration
  - Auriculotemporal
  - Infraorbital
- Temporomandibular
  - Muscular
  - Intracapsular
  - Extracapsular
- Cervical nerves
  - Occipital nerve block
- Sympathetic Stellate
- Sphenopalatine ganglion

TMD

Types of blocks

- Intramuscular injections valuable in determining the source of pain and therapeutic value

Fine PG, Milano R, Hare BD (1988) The effects of myofascial trigger points injections are naloxone reversible. Pain 32: 15-20.

- Auriculotemporal block helps to identify whether the painful structure is a site or source of pain

Schmidt B, Pogrel MA, Necoechea M, Kearns G (1998) The distribution of the auriculotemporal nerve around the temporomandibular joint. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 86: 165-168.

- Intra articular injections

Henny FA (1954) Intra-articular injection of hydrocortisone into the temporomandibular joint. J Oral Surg 12: 314-319.

- *Dry needling*
  - *Gonzalez-Perez LM, Infante-Cossio P, Granados-Nuñez M, Urresti-Lopez FZ (2012) Treatment of temporomandibularmyofascial pain with deep dry needling. Med Oral Patol Oral Cir Bucal 17: e781–e785.*
  - *APTA (2013) Description of dry needling in clinical practice: an educational resource paper. APTA Public Policy, Practice, and Professional Affairs Unit.*
  - *Dommerholt J (2011) Dry needling - peripheral and central considerations. J Man ManipTher 19:223-227.*
  - *Kalichman L, Vulfsons S (2010) Dry needling in the management of musculoskeletal pain. J Am Board Fam Med 23: 640-646.*
  - *Hong CZ (1994)Lidocaine injection versus dry needling to myofascial trigger point. The importance of the local twitch response. Am J Phys Med Rehabil73:256–263.*
  - *Ruoff GE (1995) Technique of trigger point injection. In: Pfenninger JL, Fowler GC. (eds.) Procedures for primary care physicians. Mosby, St. Louis.*
- *Trigger point injections*
  - *Melzack R (1981)Myofascial trigger points: relation to acupuncture and mechanisms of pain. Arch Phys Med Rehabil 62: 114–117.*
  - *Travell JG, Simons DG (1999)Travell and Simons' myofascial pain and dysfunction; the trigger point manual. (2ndedn),Lippincott Williams & Wilkins, Baltimore.*
  - *Fernandez-Carnero J, La Touche R, Ortega-Santiago R, Galan-del-Rio F, Pesquera J, et al. (2010) Short -term effects of dry needling of active myofascial trigger points in the masseter muscle in patients with temporomandibular disorders. J Orofac Pain 24: 106-112.*

LA IM NB
TMD criteria

- Myalgia
- Arthralgia
- Dysfunction +/- locking
- Arthritis

Type of TMD DC not reported or trialled

Mixed region injections

No prognostic indicators for treatment outcome

No Axis II

Clinical Review: Current Concepts

Pain Medicine
Neuromuscular Medicine

Emerging Concepts in the Treatment of Myofascial Pain: A Review of Medications, Modalities, and Needle-based Interventions

Thiru Mandyam Annaswamy, MD, MA, Arthur J. De Luigi, DO, Bryan J. O'Neill, MD, Nandita Keole, MD, David Berbrayer, MD

Abstract: Significant developments and changes in the use of interventions and treatments for the management of myofascial pain syndrome have occurred in the past 10 years. These emerging concepts have changed the approach for clinicians who manage these pain disorders. However, wide variations in practice patterns prevail, and no clear consensus exists regarding when and how to use these interventions; in addition, awareness of the evidence basis behind their use is limited. This review examines the most recent advances in the treatment of myofascial pain syndromes. Specifically, the evidence basis of various emerging interventions is reviewed and recommendations for routine clinical practice and their rationale are provided. The purpose of this review is to provide the clinician with a better understanding of emerging concepts in the interventions used for myofascial pain syndromes.

PM R 2011;3:940-961

INTRODUCTION

Pain is one of the most common reasons for a patient's visit to the outpatient clinic, and myofascial pain syndrome (MPS) is diagnosed in nearly a third of patients who have musculoskeletal pain disorders [1]. No standard, universally accepted biochemical, electrodiagnostic, diagnostic-imaging, or physical examination criteria exist for a diagnosis of MPS. However, the widely accepted description by Travell and Simon [2] is that MPS is a disorder characterized by acute or chronic nonspecific pain that affects a small number of muscles and involves single or multiple trigger points (TrPs) that usually are located in tight bands within affected muscles.

Simons et al [3] subsequently proposed an "integrated hypothesis" theory that incorporates local myofascial, biomechanical, and central nervous system factors that could account for the major clinical characteristics of MPS and TrPs. This integrated hypothesis includes previously proposed theories such as presynaptic, synaptic, and postsynaptic mechanisms of abnormal depolarization; abnormalities in release of acetylcholine; acetylcholinesterase dysfunction; abnormal acetylcholine-receptor activity; the energy crisis theory; abnormality in muscle spindle function; and the motor endplate hypothesis. Postural stresses, inefficient biomechanics, and repetitive overuse are the most frequently described etiologies [1]. Despite this lack of consensus in diagnosing MPS and a poor understanding of underlying mechanisms of action, or more likely because of these reasons, various treatments have been used to manage it.

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Disclosure: nothing to disclose

A.J.D.L. PM&R Residency, PM&R Service, Department of Orthopaedics & Rehabilitation, Walter Reed Army Medical Center, Washington, DC; Department of Neurology, Uniformed Services University of Health Sciences, Bethesda, MD.
Disclosure: nothing to disclose

B.J.O. The Neurologic Group of Bucks/Montgomery Counties, North Wales, PA; Department of Rehabilitation Medicine, Thomas Jefferson University, Philadelphia PA
Disclosure: nothing to disclose

N.K. Oncologic Rehabilitation and Pain Management, Integris Cancer Institute of Okla-

LA Masseteric Nerve Block NB Vs TrgP Inj vs BRA TMD myalgia

- To compare the efficacy of a regional masseteric nerve block (MNB) in the management of myofascial pain of masseteric origin, relative to trigger point injection (TrP-Inj) and intra-oral stabilization appliance (IOA).
- **Sixty patients** met the eligibility criteria and were grouped based on their treatment regimen; IOA, TrP-Inj or MNB. Pain scores recorded at pre-treatment (baseline), 30 minutes post-treatment, and 2 weeks post-treatment were analyzed.
- Treatment with MNB resulted in significant reduction in pain at 30 minutes and two weeks post-treatment compared to TrP-Inj and IOA.
- MNB provided an immediate and sustained therapeutic effect for the management of myofascial pain for at least up to two weeks. MNB is a simple and valuable tool in the management of myogenous pain, especially for the non-orofacial pain practitioner.

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Efficacy of regional nerve block in management of myofascial pain of masseteric origin

Samuel Y. P. Quek, Gayathri Subramanian, Jasma Patel, Sowmya Ananthan, Julyana G. Zagury & Junad Khan

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To link to this article: https://doi.org/10.1179/2151090314Y.0000000026

Published online: 27 Oct 2016.

Evidence Grade C

LA Masseteric NB
TMD myalgia

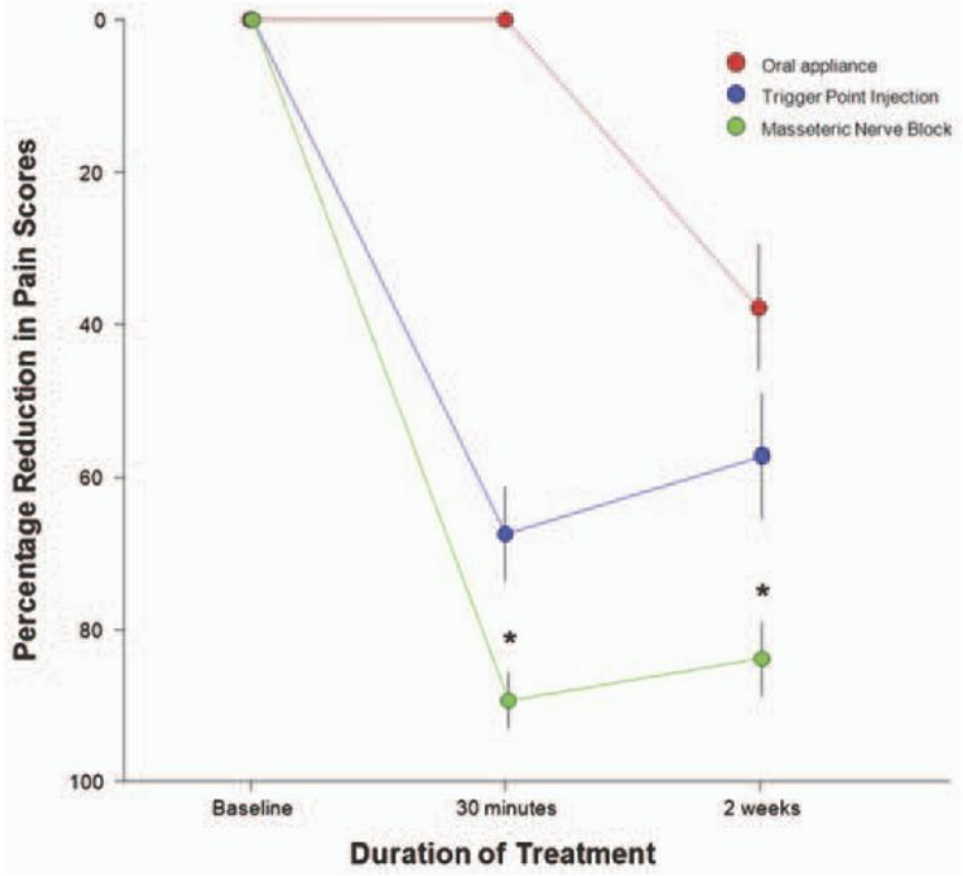


Figure 3 Percentage reduction in pain scores reported by individual patients in each treatment group, with standard deviation depicted at each time point.

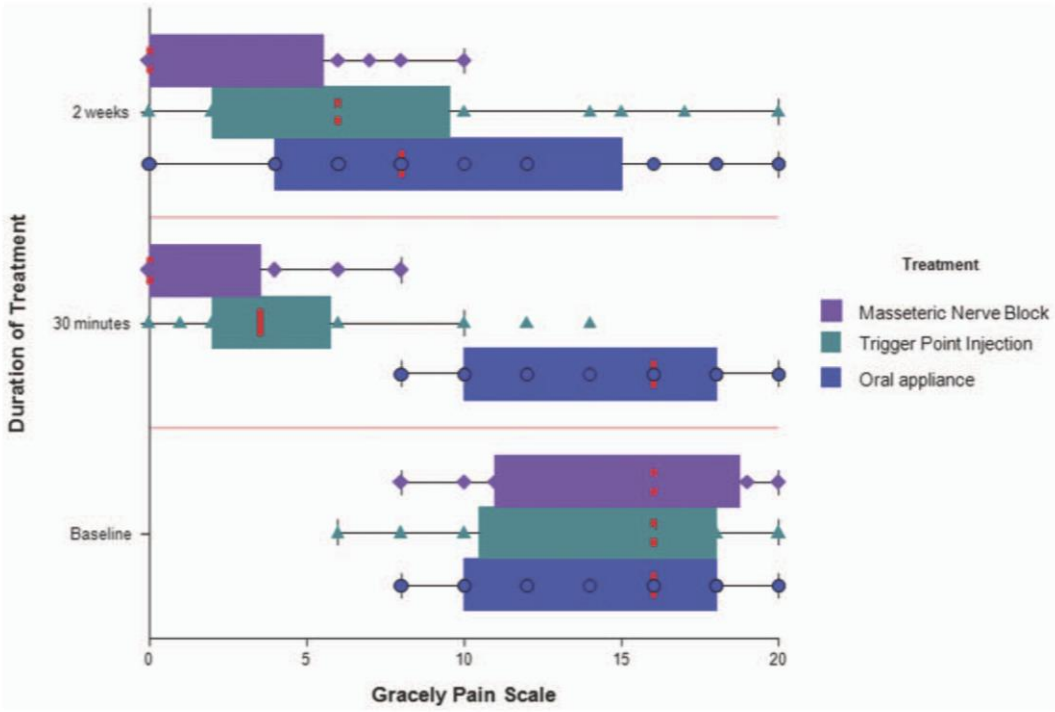
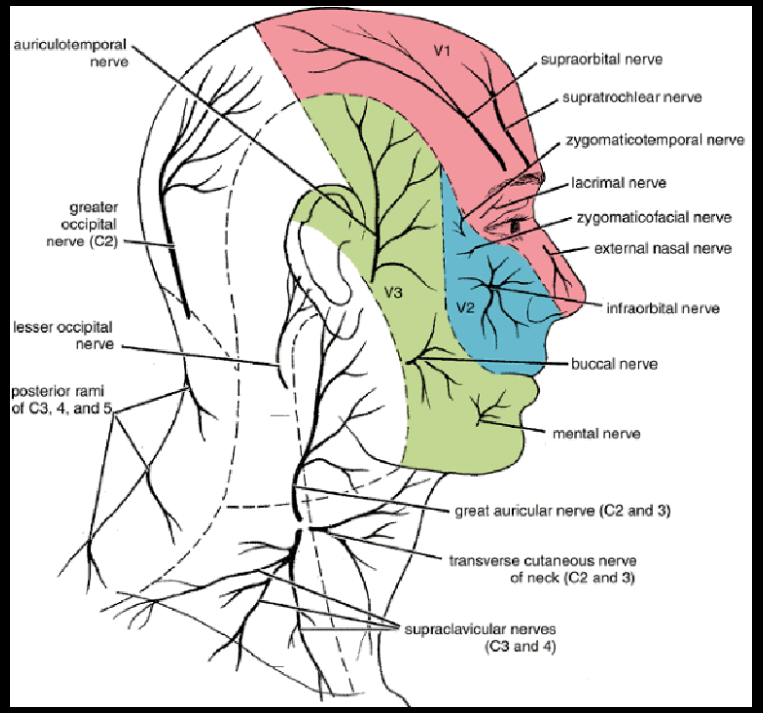


Figure 2 Notched box plots overlaid with the raw pain data points.

LA Auriculotemporal NB
TMD myalgia

- Land marks and technique



https://pocketdentistry.com/wp-content/uploads/285/F000109f10-09ae-9780323082204.jpg

LA auriculotemporal PNB TMD dysfunction

Acute TMD CLWoR

- Only one of 22 suitable studies selected used Auriculotemporal PNB with LA for acute management of disc displacement with no reduction Evidence Grade C

Table.
(continued)

Comparison (Study)	Primary Outcome	Follow-up (short-term & long-term)	No. of Patients (Trials)	Relative Effect (95% CI)[a]	*p* Value for Between-group Difference[b]	Overall Risk of Bias	Outcome Measurement Tool/Scale[c]
14. Arthrocentesis *vs.* ATN LA block (Sahlstrom *et al.*, 2013)	Pain[d] (no ITT)	3 mo (ST)	37 (1 RCT)	MD 24.60 (6.06 to 43.14)	$p < .01$ favors LA	Unclear	VAS (0-100) at movements
	Pain (ITT)	3 mo (ST)	45 (1 RCT)	RR 0.72 (0.46 to 1.14)	NS	Unclear	Reduced pain ≥ 30%
	MMO[d]	3 mo (ST)	37 (1 RCT)	MD -4.90 (–10.00 to 0.20)	NS ($p = .06$ toward LA)	Unclear	aMMO (mm)

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CLINICAL REVIEW

TMJ Disc Displacement without Reduction Management: A Systematic Review

M. Al-Baghdadi[1,2*], J. Durham[1,2], V. Araujo-Soares[2], S. Robalino[2], L. Errington[3], and J. Steele[2,4]

ABSTRACT: *Various interventions have been used for the management of patients with temporomandibular joint (TMJ) disc displacement without reduction (DDwoR), but their clinical effectiveness remains unclear. This systematic review investigated the effects of these interventions and is reported in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Electronic and manual searches up to November 1, 2013, were conducted for English-language, peer-reviewed, publications of randomized clinical trials comparing any form of conservative or surgical interventions for patients with clinical and/or radiologic diagnosis of acute or chronic DDwoR. Two primary outcomes (TMJ pain intensity and maximum mouth opening) and a number of secondary outcomes were examined. Two reviewers performed data extraction and risk of bias assessment. Data collection and analysis were performed according to Cochrane recommendations. Twenty-or no intervention. Meta-analysis on homogenous groups was conducted in 4 comparisons. In most comparisons made, there were no statistically significant differences between interventions relative to primary outcomes at short- or long-term follow-up (p > .05). In a separate analysis, however, the majority of reviewed interventions reported significantly improved primary outcome measures from their baseline levels over time (p < .05). Evidence levels, however, are currently insufficient for definitive conclusions, because the included studies were too heterogeneous and at an unclear to high risk of bias. In view of the comparable therapeutic effects, paucity of high-quality evidence, and the greater risks and costs associated with more complex interventions, patients with symptomatic DDwoR should be initially treated by the simplest and least invasive intervention.*

Key Words: temporomandibular joint surgery, internal derangement, closed

reduction (DDwoR) is a specific temporomandibular disorder (TMD) that can cause TMJ pain and limited mouth opening (painful locking), sometimes called a "closed lock" (Okeson, 2007). DDwoR can be acute or chronic depending on the duration of locking (Sembronio *et al.*, 2008; Saitoa *et al.*, 2010). Its incidence among TMD patients is estimated at 2% to 8% (Manfredini *et al.*, 2011; Poveda-Roda *et al.*, 2012).

Various interventions have been suggested for DDwoR, but to date, the most efficacious/effective approach is still unclear, which may result in management being based more on experience than evidence (Durham *et al.*, 2007). The aim of this systematic review, therefore, was to investigate the effects of different conservative and surgical interventions used in the management of TMJ DDwoR.

Methods

Protocol and Registration

This systematic review was conducted in accordance with the Cochrane

DuPont JS Jr. **Simplified anesthesia blocking of the temporomandibular joint.** Gen Dent. 2004 Jul-Aug;52(4):318-20

Al-Baghdadi M, Durham J, Steele J **Timing interventions in relation to temporomandibular joint closed lock duration: a systematic review of 'locking duration'.** J Oral Rehabil. 2014 Jan;41(1):24-58. doi: 10.1111/joor.12126. Epub 2014 Jan 7.

LA Auriculotemporal NB > intra articular NB TMD mixed

- There is a need for systematic studies regarding the pathophysiology and pain mechanisms of somatosensory function in the temporomandibular joint (TMJ). So far, the effects on somatosensory functions of local anesthetics (LA) applied to the auriculotemporal (AT) nerve or intraarticularly (IA) into the TMJ have not been studied systemically.
- This study aimed to examine in a double-blinded, placebo-controlled manner the effects of LA on mechanical and thermal sensitivity in the TMJ area.
- **Twenty-eight healthy subjects** (27.4 +/- 6.2 years) without temporomandibular disorders (TMD) participated.
- The subjects received an **AT nerve block (n = 14)** or an **IA injection (n = 14)** with LA (**Bupivacaine, 2.5 mg/ml**) on one side, and **a placebo injection (isotonic saline) on the contralateral side**.
- Mechanical (tactile and pin-prick) and thermal sensitivity (40 and 5 degrees C) were assessed at 11 standardized points in the TMJ area before injections (baseline) as well as 30 min, 1 and 2 h after injections. All stimuli were rated by the subjects on a 0-100 numerical rating scale (NRS). TMJ pressure pain threshold (PPT) and pressure pain tolerance (PPTOL) were assessed laterally over both TMJs using an algometer.
- IA injections with LA were not associated with any changes in sensitivity of the TMJ or surrounding area.
- In contrast, AT nerve blocks with LA caused a decrease over time in the pin-prick sensitivity ($P = 0.016$), which however, did not differ significantly from saline, and an increase of the PPTs 30 min ($P = 0.010$) and PPTOLs 30 min, 1 h and 2 h ($P < 0.05$) after LA injections in comparison to saline.
- No other measures showed a significant change after the injections. **Our results showed that IA bupivacaine injection in healthy subjects has no effect on the sensitivity of the TMJ or surrounding area, while AT nerve block has a more pronounced effect on deep mechanical, but not on superficial mechanical or thermal sensitivity**

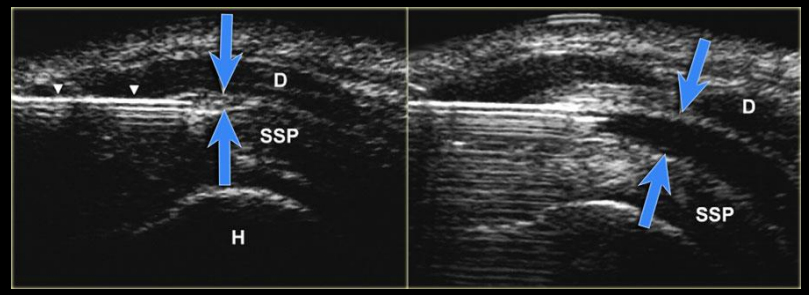
Ayesh EE, Ernberg M, Svensson P. Effects of local anesthetics on somatosensory function in the temporomandibular joint area. Exp Brain Res. 2007 Jul;180(4):715-25. Epub 2007 Feb 15.

Evidence Grade C

LA + Triamcinolone / Dexamethasone intra articular NB TMD mixed

On occasion it is indicated to inject directly into the temporomandibular joint (TMJ). This type of injection would **be indicated for therapeutic and not diagnostic reasons**.

- Intracapsular injection of corticosteroids significantly reduces TMJ pain. 1 It is indicated for acute and painful arthritic TMJ that has not responded to other modalities of treatment and when the joint is still acutely inflamed, such as in the case of polyarthritic disorders and in acute disc displacements without reduction.2-4
- The use of **triamcinolone or dexamethasone, in addition to 2% lidocaine** without epinephrine, is generally used for TMJ injections
- Ultrasound may be required prior to injecting into the joint space. It has been suggested in animal studies that steroid injections may increase osteoclastic activity.5
- **There is no evidence that a single steroid injection causes damage**; however, multiple injections may do,6 therefore the quantity of steroid injections should be carefully considered due to the possibility of bone resorption in the site of injection.
- Temporomandibular joint injection. **Injections of sodium hyaluronate** in osteoarthritis of the knee has shown improvement of symptoms;7 however, results for the management of TMD have been inconclusive and more studies are warranted.8,9



Evidence Grade C

1. Wenneberg B, Kopp S, Gröndahl HG. Long-term effect of intra-articular injections of a glucocorticosteroid into the TMJ: a clinical and radiographic 8-year follow-up. J Craniomandib Disord. 1991;5(1):11–18. 2. Kopp S, Akerman S, Nilner M. Short-term effects of intra-articular sodium hyaluronate, glucocorticoid, and saline injections on rheumatoid arthritis of the temporomandibular joint. J Craniomandib Disord. 1991;5(4):231–238. 3. Samiee A, Sabzerou D, Edalatpajouh F, Clark GT, Ram S. Temporomandibular joint injection with corticosteroid and local anesthetic for limited mouth opening. J Oral Sci. 2011;53(3):321–325. 4. Stoll ML, Good J, Sharpe T, et al. Intra-articular corticosteroid injections to the temporomandibular joints are safe and appear to be effective therapy in children with juvenile idiopathic arthritis. J Oral Maxillofac Surg. 2012;70(8):1802–1807. 5. 38. El-Hakim IE, Abdel-Hamid IS, Bader A. Tempromandibular joint (TMJ) response to intra-articular dexamethasone injection following mechanical arthropathy: a histological study in rats. Nt J Oral Maxillofac Surg. 2005;34(3):305–310. 6. Toller PA. Use and misuse of intra-articular corticosteroids in treatment of temporomandibular joint pain. Proc R Soc Med. 1977;70(7):461–463. Manfredini D, Piccotti F, Guarda-Nardini L. Hyaluronic acid in the treatment of TMJ disorders: a systematic

LA Hyaluronic acid NB TMD intracapsular Syst Rev

Cochrane 2012

- de Souza RF, Lovato da Silva CH, Nasser M, Fedorowicz Z, Al-Muharraqi MA **Interventions for treating osteoarthritis in the temporomandibular joint**
- This review **found weak evidence indicating that intra-articular injections of sodium hyaluronate** (a natural constituent of cartilage) and betamethasone (an anti-inflammatory steroid) had equivalent effectiveness in reducing pain and discomfort. Occlusal appliances when compared with diclofenac sodium (a non-steroid anti-inflammatory drug) showed a similar pain reduction, as did a comparison between the food supplement glucosamine and ibuprofen (a non-steroid anti-inflammatory)
- **Evidence Grade C**

Manfredini D, Piccotti F, Guarda-Nardini L. Hyaluronic acid in the treatment of TMJ disorders: a systematic review of literature. Cranio. 2010;28(3):166–176.

Int J Oral Maxillofac Surg. 2016 Dec;45(12):1531-1537. doi: 10.1016/j.ijom.2016.06.004. Epub 2016 Jun 30.

Are intra-articular injections of hyaluronic acid effective for the treatment of temporomandibular disorders? A systematic review.

Goiato MC[1], da Silva EV[2], de Medeiros RA[2], Túrcio KH[2], Dos Santos DM[2].

Author information

Abstract

This systematic review aimed to investigate whether intra-articular injections of hyaluronic acid (HA) are better than other drugs used in temporomandibular joint arthrocentesis, for the improvement of temporomandibular disorder (TMD) symptoms. Two independent reviewers performed an electronic search of the MEDLINE and Web of Science databases for relevant studies published in English up to March 2016. The key words used included a combination of 'hyaluronic acid', 'viscosupplementation', 'intra-articular injections', 'corticosteroids', or 'non steroidal anti inflammatory agents' with 'temporomandibular disorder'. Selected studies were randomized clinical trials and prospective or retrospective studies that primarily investigated the application of HA injections compared to other intra-articular medications for the treatment of TMD. The initial screening yielded 523 articles. After evaluation of the titles and abstracts, eight were selected. Full texts of these articles were accessed and all fulfilled the inclusion criteria. Intra-articular injections of HA are beneficial in improving the pain and/or functional symptoms of TMDs. However, other drug therapies, such as corticosteroid and non-steroidal anti-inflammatory drug injections, can be used with satisfactory results. Well-designed clinical studies are necessary to identify an adequate protocol, the number of sessions needed, and the appropriate molecular weight of HA for use.

Cochrane 2003 **Temporomandibular joint disorders (TMD) refer to a group of heterogeneous pain and dysfunction conditions involving the masticatory system, reducing life quality of the sufferers. Intra-articular injection of hyaluronate for TMD has been used for nearly two decades but the clinical effectiveness of the agent has not been summarized in the form of a systematic review.**

- **OBJECTIVES:** To assess the effectiveness of intra-articular injection of hyaluronate both alone and in combination with other remedies on temporomandibular joint disorders.
- **SEARCH STRATEGY:** Intensive electronic and handsearches were carried out. The Oral Health Group's Trials Register (September 2001), The Cochrane Library CENTRAL database (Issue 3, 2001), MEDLINE (1966- May 2001), PubMed (up to March 2002), EMBASE (1974 - August 2001), SIGLE (1980 - December 2001), CBMdisc (1983 - July 2001, in Chinese) and Chinese Medical Library were searched. All the Chinese professional journals in the oral health field were handsearched and conference proceedings consulted. There was no language restriction.
- **REVIEWER'S CONCLUSIONS: There is insufficient, consistent evidence to either support or refute the use of hyaluronate for treating patients with TMD. Further high quality RCTs of hyaluronate need to be conducted before firm conclusions with regard to its effectiveness can be drawn**

Shi Z Guo C , Awad M **Hyaluronate for temporomandibular joint disorders.** Cochrane Database Syst Rev. 2003;(1):CD002970.

Corticosteroid Intra articular NBs
TMD Dysfunction (IDs). Systematic review 2013

Intra articular injection of corticosteroids and hyaluronate may be effective for internal derangements

Evidence Grade C-B

Wenneberg B, Kopp S, Gröndahl HG. Long-term effect of intra-articular injections of a glucocorticosteroid into the TMJ: a clinical and radiographic 8-year follow-up. J Craniomandib Disord. 1991;5(1):11–18. Kopp S, Akerman S, Nilner M. Short-term effects of intra-articular sodium hyaluronate, glucocorticoid, and saline injections on rheumatoid arthritis of the temporomandibular joint. J Craniomandib Disord. 1991;5(4):231–238. Samiee A, Sabzerou D, Edalatpajouh F, Clark GT, Ram S. Temporomandibular joint injection with corticosteroid and local anesthetic for limited mouth opening. J Oral Sci. 2011;53(3):321–325. Stoll ML, Good J, Sharpe T, et al. Intra-articular corticosteroid injections to the temporomandibular joints are safe and appear to be effective therapy in children with juvenile idiopathic arthritis. J Oral Maxillofac Surg. 2012;70(8):1802–1807. El-Hakim IE, Abdel-Hamid IS, Bader A. Tempromandibular joint (TMJ) response to intra-articular dexamethasone injection following mechanical arthropathy: a histological study in rats. Nt J Oral Maxillofac Surg. 2005;34(3):305–310. Toller PA. Use and misuse of intra-articular corticosteroids in treatment of temporomandibular joint pain. Proc R Soc Med. 1977;70(7):461–463.

Dental Press J Orthod. 2013 Sep-Oct;18(5):128-33.

Intra-articular injections with corticosteroids and sodium hyaluronate for treating temporomandibular joint disorders: a systematic review.

Machado E, Bonotto D, Cunali PA.

Abstract

INTRODUCTION: In some cases, conservative treatment of internal derangements of the Temporomandibular Joint (TMJ) is considered little responsive. Thus, it is necessary to accomplish treatments that aim at reducing pain and improve function in patients who present arthrogenic temporomandibular disorders.

OBJECTIVE: This study, by means of a systematic review of the literature, aimed to analyze the effectiveness of intra-articular injections with corticosteroids and sodium hyaluronate for treating internal derangements of the TMJ.

METHODS: Carry out a research in the following databases: MEDLINE, Cochrane, EMBASE, Pubmed, Lilacs, and BBO, considering publications issued between 1966 and October 2010, focusing on randomized or quasi-randomized controlled clinical trials, single or double-blind.

RESULTS: After applying the inclusion criteria we collected 9 articles, 7 of which were randomized controlled double-blind clinical trials and 2 randomized controlled single-blind clinical trials.

CONCLUSION: After analyzing the literature, it was found that intra-articular injection with corticosteroids and sodium hyaluronate seems to be an effective method for treating internal derangements of the TMJ. However, further randomized controlled clinical trials, with representative samples and longer follow-up time must be carried out in order to assess the real effectiveness of this technique.

LA + corticosteroid intra articular NB> Na hyaluronate> placebo TMD mixed Systematic Reviews

Corticosteroids are widely used for treatment of temporomandibular joint (TMJ) osteoarthritis (OA). This study investigated the effects of corticosteroids on TMJOA compared with placebo or hyaluronate.

- **MATERIALS AND METHODS:** The authors designed and implemented a systematic review and meta-analysis to compare the effects of **intra-articular injection of corticosteroid, hyaluronate, or placebo for** patients with TMJOA. The authors searched related randomized controlled studies electronically in multiple English- and Chinese-language electronic databases. The predictor variable was intra-articular injection with corticosteroid, hyaluronate, or placebo. Primary outcome variables were pain intensity and maximal mouth opening. Other variables included success rate and adverse events. Meta-analyses were performed with Rev Man 5.3.
- **RESULTS:** Eight studies met the inclusion criteria. Meta-analysis showed that **corticosteroid injections after arthrocentesis** were superior to placebo in relieving pain as assessed with the visual analog scale (mean difference [MD], -0.74; 95% confidence interval [CI], -1.34 to -0.13; P = .02; I^2 = 0%) in the long-term, but was inferior in increasing maximal mouth opening (MD, -2.06; 95% CI, -2.76 to -1.36; P < .00001; I^2 = 28%). Although corticosteroid and hyaluronate injections without arthrocentesis decreased pain and improved maximal mouth opening, the corticosteroid group had a significantly lower success rate (odds ratio = 0.41; 95% CI, 0.17-1.00; P = .05; I^2 = 0%) than the hyaluronate group in the short term.
- **CONCLUSION:** Corticosteroid injections after arthrocentesis are recommended for patients with TMJOA to relieve joint pain rather than increase maximal mouth opening. Corticosteroid and hyaluronate have marked effectiveness on TMJOA; however, hyaluronate might be the better alternative to some extent.

Evidence Grade C-B

Liu Y, Wu J, Fei W, Cen X, Xiong Y, Wang S, Tang Y, Liang X. Is There a Difference in Intra-Articular Injections of Corticosteroids, Hyaluronate, or Placebo for Temporomandibular Osteoarthritis? J Oral Maxillofac Surg 2017 Nov 8. pii: S0278-2391(17)31354-X. doi: 10.1016/j.joms.2017.10.028. [Epub ahead of print]

To assess the effectiveness of intra-articular injections of sodium hyaluronate (NaH) or corticosteroids (CS) for treatment of intracapsular temporomandibular disorders (TMD).

- **METHODS:** Single- or double-blinded randomized controlled trials (RCTs) on the effectiveness of NaH or CS injections, compared to each other or to placebo, for the treatment of intracapsular TMD due to osteoarthritis and/or internal joint derangement were analyzed in this systematic review and meta-analysis. Electronic searches of MEDLINE through the PubMed, Web of Science, and Cochrane Library databases were conducted on March 17, 2015, and an updated search was conducted on June 7, 2017. Three reviewers independently extracted the data and assessed the risk of bias of included studies.
- **RESULTS:** An initial search yielded 245 studies, and 5 additional studies were identified through cross referencing. A total of 22 studies were identified as relevant based on the abstracts, **but only 7 RCTs met the inclusion criteria**. Six of the included studies had unclear risk of bias, and one had high risk of bias. Four studies were eligible for meta-analysis. Pooled results showed no significant difference in short- or long-term pain improvement with NaH compared to CS. The number of responders to NaH was significantly more than placebo in one study, but not significantly higher than CS in another study.
- **CONCLUSION:** Although there was no significant difference between the effectiveness of NaH and CS intra-articular injections, there was some evidence that NaH was better than placebo. Further research is needed to determine the minimum effective dose and long-term side effects of both injections.

Evidence Grade C-B

Moldez MA, Camones VR, Ramos GE, Padilla M Enciso R Effectiveness of Intra-Articular Injections of Sodium Hyaluronate or Corticosteroids for Intracapsular Temporomandibular Disorders: A Systematic Review and Meta-Analysis. J Oral Facial Pain Headache. 2018 Winter;32(1):53–66. doi: 10.11607/ofph.1783. Epub 2017 Dec 15.

Platelet rich plasma / HA
TMD mixed Systematic review 2018

- Evidence grade D

Int J Oral Maxillofac Surg. 2018 Feb;47(2):188-198. doi: 10.1016/j.ijom.2017.09.014. Epub 2017 Oct 20.

Platelet-rich plasma for the therapeutic management of temporomandibular joint disorders: a systematic review.

Bousnaki M[1], Bakopoulou A[2], Koidis P[3].

Author information

Abstract

This systematic review aimed to investigate whether intra-articular injections of platelet-rich plasma (PRP) are beneficial for the treatment of degenerative temporomandibular disorders, such as temporomandibular joint osteoarthritis (TMJ-OA) and disc displacement with osteoarthritic lesions, when compared to other treatments, such as injections of hyaluronic acid (HA) or saline. An electronic search of the MEDLINE and Scopus databases was performed using combinations of the terms "temporomandibular" and "platelet rich plasma", to identify studies reported in English and published up until May 2017. A hand-search of relevant journals and the reference lists of selected articles was also performed. The initial screening identified 153 records, of which only six fulfilled the inclusion criteria and were included in this review. Of these studies, three compared PRP with HA, while three compared PRP with Ringer's lactate or saline. Four of the studies found PRP injections to be superior in terms of improvements in mandibular range of motion and pain intensity up to 12 months after treatment, while the remaining two studies found similar results for the different treatments. There is slight evidence for the potential benefits of intra-articular injections of PRP in patients with TMJ-OA. However, a standardized protocol for PRP preparation and application needs to be established.

KEYWORDS: intra-articular injections; platelet-rich plasma; temporomandibular disorders; temporomandibular joint osteoarthritis

TMD-LA PNBs

- Grade C-B evidence for intra articular corticosteroids
- Grade C-B evidence for intra articular Na hyaluronate may be better than Corticosteroid

BUT

- Poorly designed trials
- TMD DC rarely applied
- Outcomes limited
- Axis II rarely investigated

- Auriculotemporal blocks effective for acute Acute TMD CLWoR
- Auticulotemporal and masseteric blocks may be more effective than intra articular injections but more studies are required

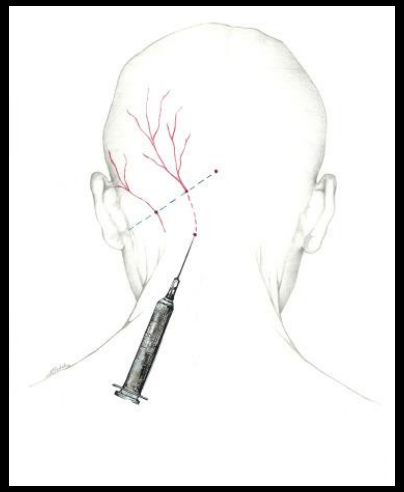
LA therapeutic Nerve bocks for OFP Region

- Trigeminal
  - Inferior alveolar
  - Lingual
  - Intra oral infiltration
  - Auriculotemporal
  - Infraorbital
- Temporomandibular
  - Muscular
  - Intracapsular
  - Extracapsular
- Cervical nerves
  - Occipital nerve block
- Sympathetic Stellate
- Sphenopalatine ganglion

Nerve blocks for OFP

Video https://www.youtube.com/watch?v=udDaNhPNwT8

LA Greater Occipital nerve block



LA ONB evidence For Headaches

- Level II-IV (Grade B-D) for ONB in Migraine and Cluster headache
- Level II (Grade B) Cervicogenic HA
  - The best available studies indicate that the C2–3 zygapophysial joints are the most common source of cervicogenic headache,16,19,39,40 accounting for about 70% of cases.

Neurología. 2017;32(5):316–330

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REVIEW

Consensus recommendations for anaesthetic peripheral nerve block☆

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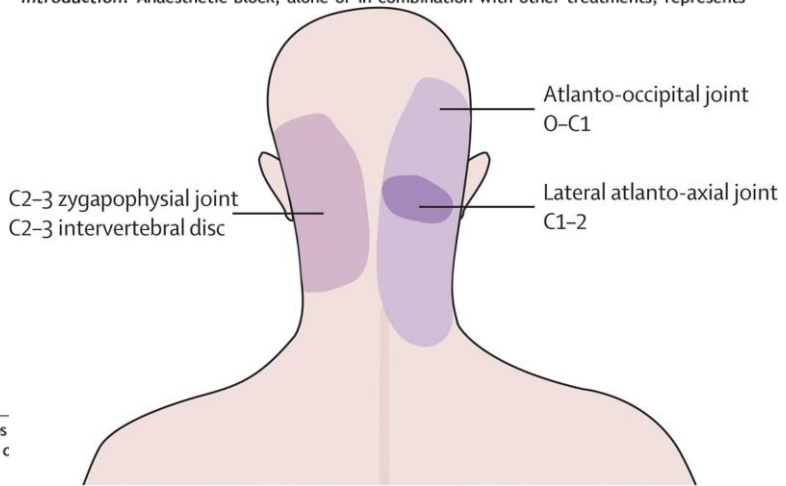
Received 21 April 2016; accepted 22 April 2016
Available online 29 April 2017

KEYWORDS
Anaesthesic block;
Cervicogenic headache;
Cluster headache;
Migraine;
Greater occipital nerve;
Pericranial neuralgia

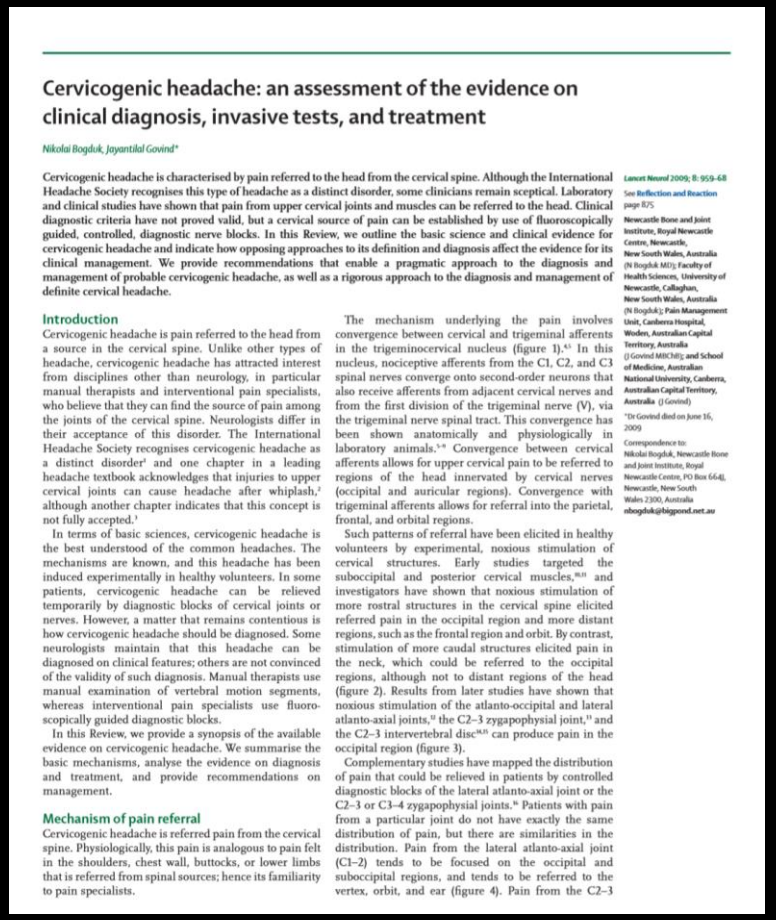
Abstract
Introduction: Anaesthetic block, alone or in combination with other treatments, represents



☆ Please cite this article as: Santos et al. Guía consenso sobre técnicas c

* Corresponding author.

LA ONB evidence
Headaches



Cervicogenic headache: an assessment of the evidence on clinical diagnosis, invasive tests, and treatment

*Nikolai Bogduk, Jayantilal Govind**

Cervicogenic headache is characterised by pain referred to the head from the cervical spine. Although the International Headache Society recognises this type of headache as a distinct disorder, some clinicians remain sceptical. Laboratory and clinical studies have shown that pain from upper cervical joints and muscles can be referred to the head. Clinical diagnostic criteria have not proved valid, but a cervical source of pain can be established by use of fluoroscopically guided, controlled, diagnostic nerve blocks. In this Review, we outline the basic science and clinical evidence for cervicogenic headache and indicate how opposing approaches to its definition and diagnosis affect the evidence for its clinical management. We provide recommendations that enable a pragmatic approach to the diagnosis and management of probable cervicogenic headache, as well as a rigorous approach to the diagnosis and management of definite cervical headache.

Lancet Neurol 2009; 8: 959–68
See Reflection and Reaction page 875

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*Dr Govind died on June 16, 2009

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Introduction

Cervicogenic headache is pain referred to the head from a source in the cervical spine. Unlike other types of headache, cervicogenic headache has attracted interest from disciplines other than neurology, in particular manual therapists and interventional pain specialists, who believe that they can find the source of pain among the joints of the cervical spine. Neurologists differ in their acceptance of this disorder. The International Headache Society recognises cervicogenic headache as a distinct disorder[1] and one chapter in a leading headache textbook acknowledges that injuries to upper cervical joints can cause headache after whiplash,[2] although another chapter indicates that this concept is not fully accepted.[3]

In terms of basic sciences, cervicogenic headache is the best understood of the common headaches. The mechanisms are known, and this headache has been induced experimentally in healthy volunteers. In some patients, cervicogenic headache can be relieved temporarily by diagnostic blocks of cervical joints or nerves. However, a matter that remains contentious is how cervicogenic headache should be diagnosed. Some neurologists maintain that this headache can be diagnosed on clinical features; others are not convinced of the validity of such diagnosis. Manual therapists use manual examination of vertebral motion segments, whereas interventional pain specialists use fluoroscopically guided diagnostic blocks.

In this Review, we provide a synopsis of the available evidence on cervicogenic headache. We summarise the basic mechanisms, analyse the evidence on diagnosis and treatment, and provide recommendations on management.

Mechanism of pain referral

Cervicogenic headache is referred pain from the cervical spine. Physiologically, this pain is analogous to pain felt in the shoulders, chest wall, buttocks, or lower limbs that is referred from spinal sources; hence its familiarity to pain specialists.

The mechanism underlying the pain involves convergence between cervical and trigeminal afferents in the trigeminocervical nucleus (figure 1).[4,5] In this nucleus, nociceptive afferents from the C1, C2, and C3 spinal nerves converge onto second-order neurons that also receive afferents from adjacent cervical nerves and from the first division of the trigeminal nerve (V), via the trigeminal nerve spinal tract. This convergence has been shown anatomically and physiologically in laboratory animals.[5–9] Convergence between cervical afferents allows for upper cervical pain to be referred to regions of the head innervated by cervical nerves (occipital and auricular regions). Convergence with trigeminal afferents allows for referral into the parietal, frontal, and orbital regions.

Such patterns of referral have been elicited in healthy volunteers by experimental, noxious stimulation of cervical structures. Early studies targeted the suboccipital and posterior cervical muscles,[10,11] and investigators have shown that noxious stimulation of more rostral structures in the cervical spine elicited referred pain in the occipital region and more distant regions, such as the frontal region and orbit. By contrast, stimulation of more caudal structures elicited pain in the neck, which could be referred to the occipital regions, although not to distant regions of the head (figure 2). Results from later studies have shown that noxious stimulation of the atlanto-occipital and lateral atlanto-axial joints,[12] the C2–3 zygapophysial joint,[13] and the C2–3 intervertebral disc[14,15] can produce pain in the occipital region (figure 3).

Complementary studies have mapped the distribution of pain that could be relieved in patients by controlled diagnostic blocks of the lateral atlanto-axial joint or the C2–3 or C3–4 zygapophysial joints.[16] Patients with pain from a particular joint do not have exactly the same distribution of pain, but there are similarities in the distribution. Pain from the lateral atlanto-axial joint (C1–2) tends to be focused on the occipital and suboccipital regions, and tends to be referred to the vertex, orbit, and ear (figure 4). Pain from the C2–3

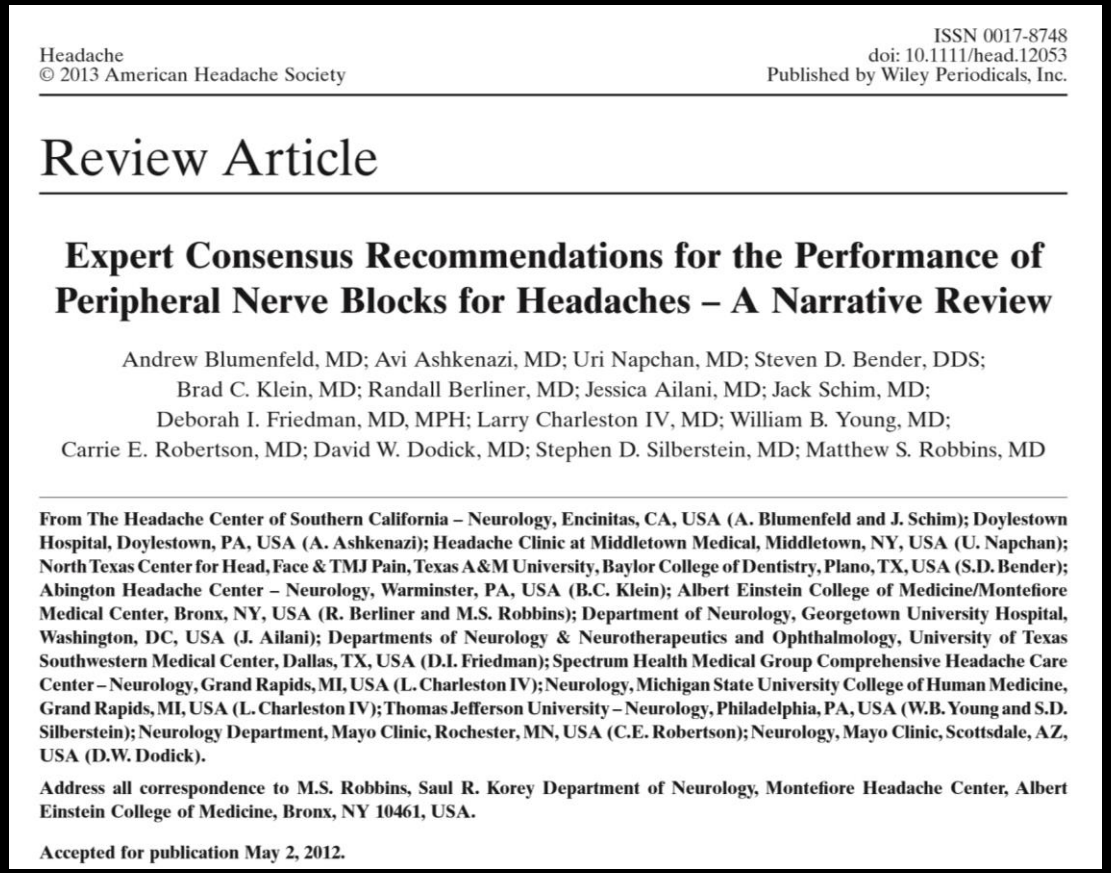
- PNBs described include;
  - Greater occipital
  - Lesser occipital
  - Supratrochlear
  - Supraorbital
  - Auriculotemporal injections.
- Possible contraindications may be
  - Pregnancy
  - the elderly
  - anaesthetic allergy
  - prior vasovagal attacks
  - an open skull defect, antiplatelet/anticoagulant use
  - and cosmetic concerns.

Blumenfeld A, Ashkenazi A, Napchan U, Bender SD, Klein BC, Berliner R, Ailani J, Schim J, Friedman DI, Charleston L 4th, Young WB, Robertson CE, Dodick DW, Silberstein SD, Robbins MS **Expert consensus recommendations for the performance of peripheral nerve blocks for headaches--a narrative review.** Headache. 2013 Mar;53(3):437-46. doi: 10.1111/head.12053. Epub 2013 Feb 13

LA + Corticosteroid ONBs for Cranial neuralgias

Dach F, Éckeli ÁL, Ferreira Kdos S, Speciali JG. Nerve block for the treatment of headaches and cranial neuralgias - a practical approach. Headache. 2015 Feb;55 Suppl 1:59-71.

- BACKGROUND: Several studies have presented evidence that blocking peripheral nerves is effective for the treatment of some headaches and cranial neuralgias, resulting in reduction of the frequency, intensity, and duration of pain.
- OBJECTIVES: In this article we describe the role of nerve block in the treatment of headaches and cranial neuralgias, and the experience of a tertiary headache center regarding this issue. We also report the anatomical landmarks, techniques, materials used, contraindications, and side effects of peripheral nerve block, as well as the mechanisms of action of lidocaine and dexamethasone.
- CONCLUSIONS: The nerve block can be used in
  - primary (migraine, cluster headache, and nummular headache)
  - secondary headaches (cervicogenic headache and headache attributed to craniotomy)
  - as well in **cranial neuralgias (trigeminal neuropathies, glossopharyngeal and occipital neuralgias).**
- In some of them this procedure is necessary for both diagnosis and treatment, while in others it is an adjuvant treatment.
- The block of the greater occipital nerve with an **anesthetic and corticosteroid compound** has proved to be effective in the treatment of cluster headache.



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Review Article

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

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

From The Headache Center of Southern California – Neurology, Encinitas, CA, USA (A. Blumenfeld and J. Schim); Doylestown Hospital, Doylestown, PA, USA (A. Ashkenazi); Headache Clinic at Middletown Medical, Middletown, NY, USA (U. Napchan); North Texas Center for Head, Face & TMJ Pain, Texas A&M University, Baylor College of Dentistry, Plano, TX, USA (S.D. Bender); Abington Headache Center – Neurology, Warminster, PA, USA (B.C. Klein); Albert Einstein College of Medicine/Montefiore Medical Center, Bronx, NY, USA (R. Berliner and M.S. Robbins); Department of Neurology, Georgetown University Hospital, Washington, DC, USA (J. Ailani); Departments of Neurology & Neurotherapeutics and Ophthalmology, University of Texas Southwestern Medical Center, Dallas, TX, USA (D.I. Friedman); Spectrum Health Medical Group Comprehensive Headache Care Center – Neurology, Grand Rapids, MI, USA (L. Charleston IV); Neurology, Michigan State University College of Human Medicine, Grand Rapids, MI, USA (L. Charleston IV); Thomas Jefferson University – Neurology, Philadelphia, PA, USA (W.B. Young and S.D. Silberstein); Neurology Department, Mayo Clinic, Rochester, MN, USA (C.E. Robertson); Neurology, Mayo Clinic, Scottsdale, AZ, USA (D.W. Dodick).

Address all correspondence to M.S. Robbins, Saul R. Korey Department of Neurology, Montefiore Headache Center, Albert Einstein College of Medicine, Bronx, NY 10461, USA.

Accepted for publication May 2, 2012.

Very limited evidence for cranial neuralgias trigeminal neuropathies and occipital neuralgia
Grade C

LA + Corticosteroid ONB for Cranial neuralgias

Occipital nerve block (ONB) has been used in several primary headache syndromes with good results. Information on its effects in facial pain is sparse.

- In this chart review, the efficacy of ONB using **lidocaine and dexamethasone was evaluated in**
  - **20 patients with craniofacial pain syndromes comprising**
    - **8 patients with trigeminal neuralgia**
    - **6 with trigeminal neuropathic pain**
    - **5 with persistent idiopathic facial pain**
    - **1 with occipital neuralgia**.
- Response was defined as an at **least 50% reduction of original pain.**
  - Mean response rate was 55%
  - greatest efficacy in trigeminal neuralgia (75%)
  - occipital neuralgia (100%)
  - less efficacy in trigeminal neuropathic pain (50%)
  - persistent idiopathic facial pain (20%).
- The effects **lasted for an average of 27 days with sustained benefits for 69, 77 and 107 days in three patients**.
- Side effects were reported in 50%, albeit transient and mild in nature. ONBs are effective in trigeminal pain involving the second and third branch and seem to be most effective in craniofacial neuralgias.
- They should be considered in facial pain before more invasive approaches, such as thermocoagulation or vascular decompression, are performed, given that side effects are mild and the procedure is minimally invasive.

J Headache Pain (2012) 13:199–213
DOI 10.1007/s10194-012-0417-x

ORIGINAL

Occipital nerve block is effective in craniofacial neuralgias but not in idiopathic persistent facial pain

T. P. Jürgens · P. Müller · H. Seedorf · J. Regelsberger · A. May

Received: 24 October 2011 / Accepted: 18 January 2012 / Published onl

Abstract Occipital nerve block (ONB) has been used in several primary headache syndromes with good results. Information on its effects in facial pain is sparse. In this chart review, the efficacy of ONB using lidocaine and dexamethasone was evaluated in 20 patients with craniofacial pain syndromes comprising 8 patients with trigeminal neuralgia, 6 with trigeminal neuropathic pain, 5 with persistent idiopathic facial pain and 1 with occipital neuralgia. Response was defined as an at least 50% reduction of original pain. Mean response rate was 55%, greatest efficacy in trigeminal neuralgia (75%), occipital neuralgia (100%), less efficacy in trigeminal neuropathic pain (50%), persistent idiopathic facial pain (20%). The effects lasted for an average of 27 days with sustained benefits for 69, 77 and 107 days in three patients. Side effects were reported in 50%, albeit transient and mild in nature. ONBs are effective in trigeminal pain involving the second and third branch and seem to be most effective in craniofacial neuralgias. They should be considered in facial pain before more invasive approaches, such as thermocoagulation or vascular decompression, are performed, given that side effects are mild and the procedure is invasive.

Keywords Trigeminal neuralgia · Facial pain
Trigeminal neuropathic pain · Occipital nerve b
Occipital · Neuralgia

Very limited evidence for cranial neuralgias or PIFP Grade C

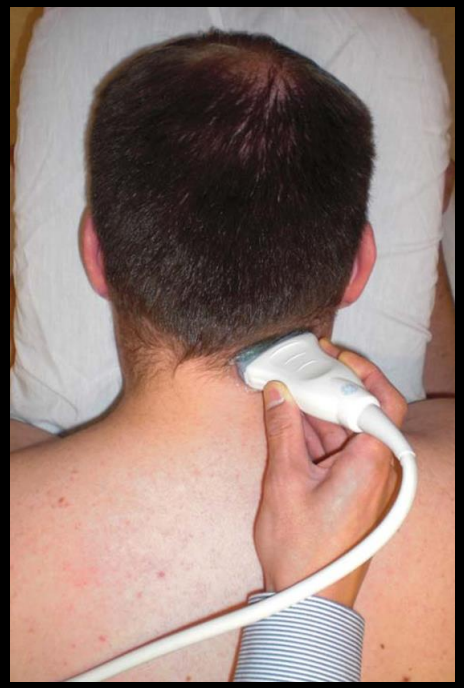
LA ONBs for OFP

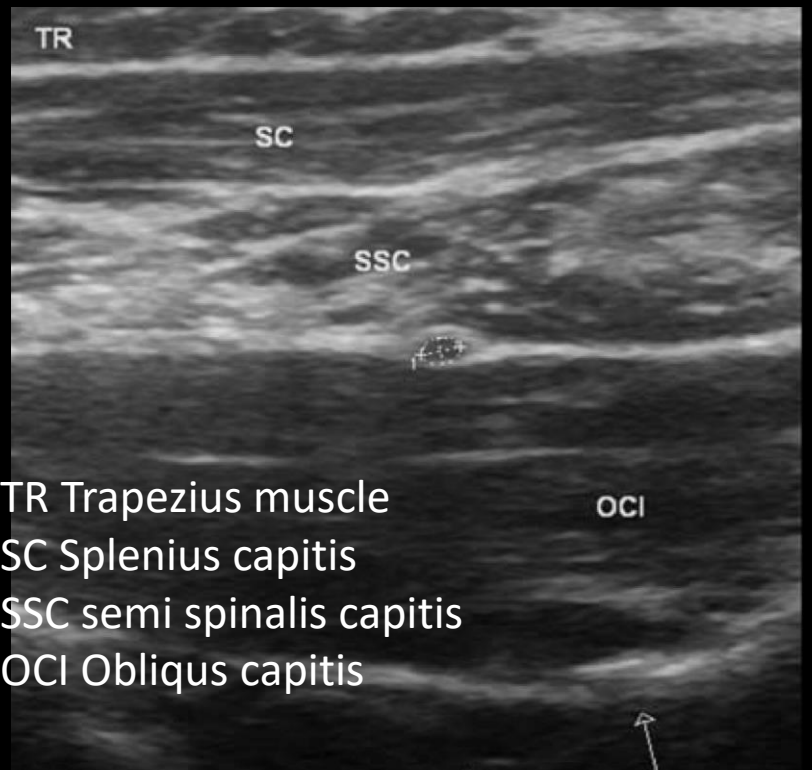
Our experience

Evidence GRADE B-D for is NOT recommended for cervicogenic headaches

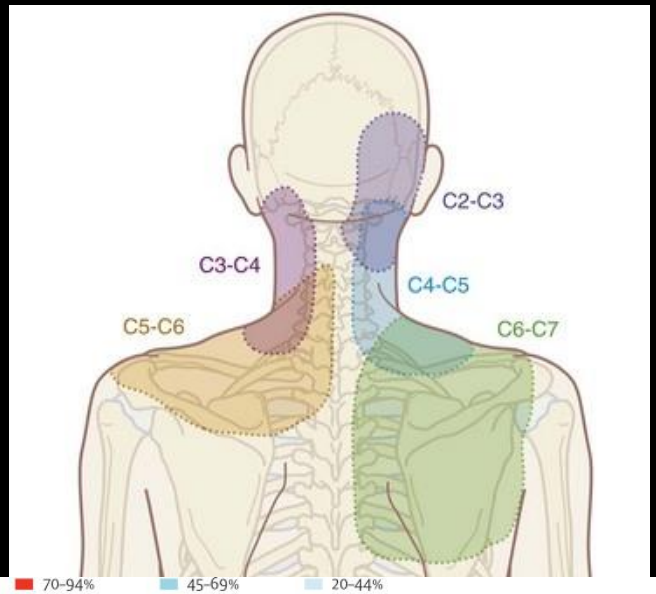
Effective for Migraine and Cluster headaches

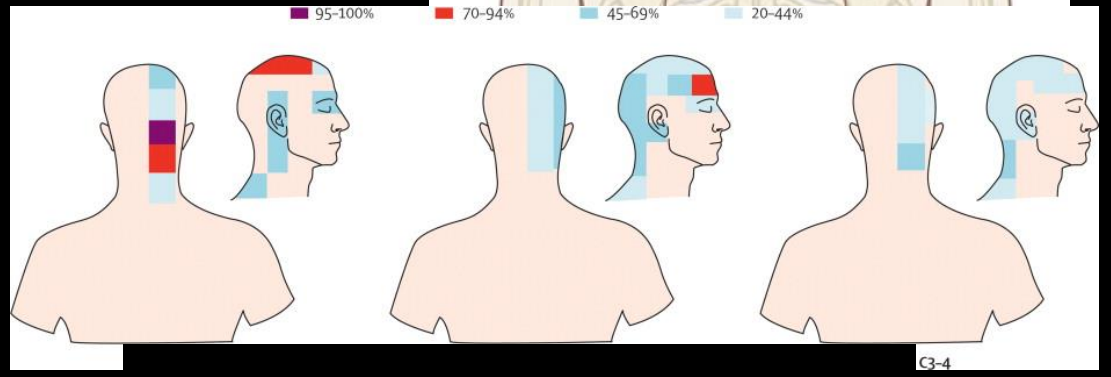
Limited evidence for other OFP conditions





TR Trapezius muscle
SC Splenius capitis
SSC semi spinalis capitis
OCI Obliqus capitis





US GUIDED ON BLOCK - 7pts

SUNCT/SUNA 0/2

Occipital Neuralgia 2/2

Occipital Nerve Entrapment 1/1*

Migraine (Occipital) 2/2

LA therapeutic Nerve bocks for OFP Region

- Trigeminal
  - Inferior alveolar
  - Lingual
  - Intra oral infiltration
  - Auriculotemporal
  - Infraorbital
- Temporomandibular
  - Muscular
  - Intracapsular
  - Extracapsular
- Cervical nerves
  - Occipital nerve block
- Sympathetic Stellate
- Sphenopalatine ganglion

Sympathetic system and chronic pain

The stellate ganglion is located on the transverse process of the C7 vertebra, just below the subclavian artery. It is composed of inferior cervical sympathetic ganglion and the first thoracic sympathetic ganglion.

Therefore, the sympathetic nerves A receptors that innervate the head, neck, and upper extremity pass through the stellate ganglion

Changes in the sympathetic nervous system associated with chronic pain

The mechanism of sympathetic involvement is still poorly understood and debated. The diagnostic criteria of complex regional pain syndrome (CRPS) include sympathetically-mediated changes.

Sympathetic blocks can be used in the treatment of pain conditions, in conjunction with a multidisciplinary approach including the physical and psychological therapies. The evidence base remains weak for many treatments.

Selective Sympathetic Blockade
Rationale

- Sympathetic efferent activity is a suspected pathogenic component in a number of conditions.
  - hyperhidrosis, the participation of sympathetic fibres is well documented.
  - sudden sensory-neural hearing loss
  - peripheral vascular disease
  - dysrhythmia from long-QT syndrome
  - central pain, pain after plexus injury,
  - trigeminal or postherpetic neuralgia,
  - large category of poorly defined pain states that are grouped under the terms reflex sympathetic dystrophy or causalgia, a sympathetic contribution is suspected because blood flow and trophic changes are evident, but the pathophysiology is largely obscure.

Sympathetic Stellate block for OFP

- Possible indications
  - Post herpetic neuralgia
  - Postoperative pain
  - Atypical facial pain
  - Orofacial neuralgia

Evidence Grade C

Review Article
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Therapeutic potential of stellate ganglion block in orofacial pain: a mini review

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Orofacial pain is a common complaint of patients that causes distress and compromises the quality of life. It has many etiologies including trauma, interventional procedures, nerve injury, varicella-zoster (shingles), tumor, and vascular and idiopathic factors. It has been demonstrated that the sympathetic nervous system is usually involved in various orofacial pain disorders such as postherpetic neuralgia, complex regional pain syndromes, and atypical facial pain. The stellate sympathetic ganglion innervates the head, neck, and upper extremity. In this review article, the effect of stellate ganglion block and its mechanism of action in orofacial pain disorders are discussed.

Keywords: Head; Orofacial; Pain; Stellate ganglion block; Sympathetic Nervous System.

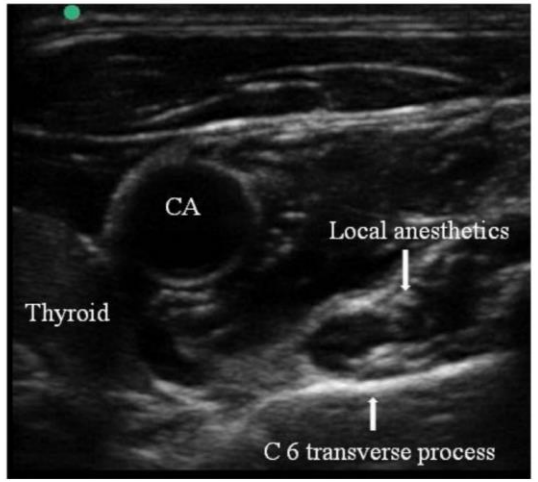


Fig. 1. Stellate ganglion block using ultrasound-guided technique. Local anesthetic was injected at the C6 transverse process. CA: carotid artery.

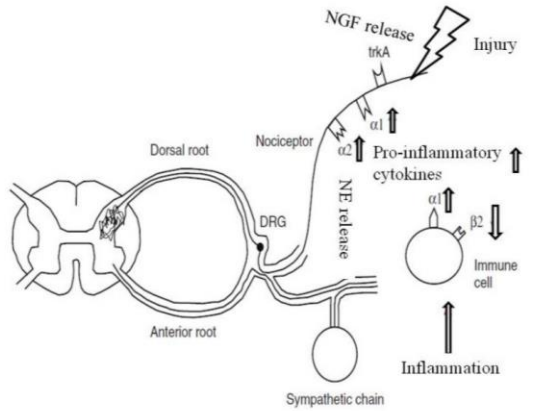


Fig. 2. The sympathetic nervous system (SNS) and pain. Inflammation activates immune dendritic cells. β-2 receptors are downregulated and α-1 receptors are up-regulated on these immune cells. Following nerve injury, functional adrenoreceptors are expressed on peripheral nociceptors. Activation of the SNS increases the level of norepinephrine (NE), which activates α-adrenoreceptors on the afferent fibers, and releases nerve growth factor (NGF). NGF sensitizes peripheral nociceptors through trk A receptors.

sympathetic ganglion. Therefore, the sympathetic nerves

Stellate ganglion blocks for reflex sympathetic dystrophy of the face

Evidence Grade C

The Laryngoscope
Lippincott–Raven Publishers, Philadelphia

Reflex Sympathetic Dystrophy of the Face: Current Treatment Recommendations

Richard L. Arden, MD; Samer J. Bahu, MD; Marcos A. Zuazu, MD; Ramon Berguer, MD, PhD

Reflex sympathetic dystrophy (RSD) of the face is an infrequently reported clinical pain syndrome characterized by dysesthesia, hyperalgia, hyperpathia, and allodynia. Treatment strategies, extrapolated from RSD and causalgia of the extremities, remain variable and poorly defined. Sympathetic blockade is generally the diagnostic and therapeutic treatment of choice; however, the frequency, timing, and duration of injections; need for neurolytic blocks; and role of sympathectomy are not well understood. The objectives of this report are to highlight the clinical behavior of facial RSD and contrast its essential differences from extremity RSD in response to standard treatment regimes. The case studies of two patients with this syndrome, following vascular surgery in the neck, are retrospectively reviewed with existent reported cases. Age, gender, etiology, symptoms, onset, triggers, and examination findings; timing, duration, and method of treatment; and outcome are summarized, forming the database for this study. Findings demonstrate an infrequent association of vasomotor and sudomotor changes with facial RSD, and lack of progression to a dystrophic or an atrophic stage, in contrast to extremity RSD. Furthermore, treatment response to sympathetic blockade is durable and less critically dependent on timing. The authors conclude that facial RSD has a favorable prognosis and should be managed conservatively with nonneurolytic stellate ganglion blocks, even when initiated as a delayed and repetitive injection series.

***Laryngoscope*, 108:437–442 1998**

INTRODUCTION

Sympathetically mediated pain syndromes include causalgia and reflex sympathetic dystrophy (RSD), which fundamentally differ in their precipitating event, histopathologic correlate, and potential for clinical progression. Initially described by Mitchell et al.[1] in 1864, causalgia is a syndrome of sustained, burning pain following partial, incomplete nerve damage, typically following a high-velocity missile injury to a major peripheral nerve. The level of injury is characteristically confined to nerve lesions above the elbow and knee (most commonly median and sciatic nerves) and accounts for 2% to 5% of peripheral nerve injury cases.[2] The more severe and proximate the neural lesion to the spinal ganglia, the greater the degree of causalgic response. The burning pain (dysesthesia) commonly appears immediately or soon after the injury and is spontaneous, continuous, and felt superficially in the hand or foot. For most patients (75%) the pain gradually subsides within 1 year, but during recovery they often experience lowered pain thresholds (hyperesthesia), elevated thresholds to touch, and overreactions/aftersensations to stimuli (hyperpathia). Exacerbating factors have been associated with dependent posturing, mechanical or thermal stimuli (allodynia), muscular activity, and disturbances in the sensory neuronal pool (i.e., auditory, visual, somatosensory, emotional stress). Treatment responses to neuronal blockade, truncectomy, or rhizotomy have been poor or unsuccessful in most cases, in contrast to sympathetic block (or sympathectomy), which has provided significant temporary (occasionally permanent) pain relief.

Reflex sympathetic dystrophy is a term first used by Evans in 1947 to describe a pain syndrome following various types of mild injuries in the absence of demonstrable nerve damage.[3] Unlike the rapid and violent neural deformation associated with causalgia, precipitating events in RSD have included fractures (>50%), lacerations, infections, operations, angina/myocardial infarction, peripheral vascular disease, degenerative joint disease, and injuries to muscles, ligaments, or soft tissue. In 10% to 26% of cases, no precipitating factor can be found.[4] Similar to causalgia, RSD pain possesses the components of dysesthesia, hyperesthesia, and hyperpathia, which seem to follow the topography of the sympathetically innervated vascular system rather than a true radicular or dermatomal pattern. In contrast to

From the Departments of Otolaryngology—Head and Neck Surgery

TABLE II.
Treatment and Outcome Summary.

Case #	Report (year)	Treatment Initiated	Method	Outcome
1	Bingham[5] (1947)	13 mo after injury	Single (R) SG block, procaine/alcohol	Recurrence facial/pain tenderness at 3 w
		14 mo after injury	Cervical sympathectomy	Pain-free at 3 mo follow-up
2	Bingham[5] (1947)	11 mo after injury	Single (L) SG block, procaine/alcohol	Recurrence mild pain/hyperesthesia at 2 mo, severe at 9 months
		20 mo after injury	Cervical sympathectomy	Symptom resolution; no follow-up
3	Hanowell and Kennedy[6] (1979)	7 mo after surgery	Diagnostic (L) SG block, bupivicaine Alternate day, 5 block series	60% improvement at 2 d Pain-free at 3 mo follow-up
4	Khoury et al.[7](1980)	7 y after surgery	Diagnostic (L) SG block, bupivicaine	Pain relief for 6 h
			20 block series	75% improvement after last injection
5	Jaeger et al.[8](1986)	1 y after extraction	Diagnostic (L) SG block (local anesthetic unspecified)	Relief beyond anesthetic duration
			15 block series	Pain-free at 15-mo follow-up
6	Jaeger et al.[8] (1986)	3 y after surgery	Diagnostic bilateral SG blocks (local anesthetic unspecified)	Near-complete facial pain relief
			Bilateral morphine sulfate SG blocks (number unspecified)	66% improvement facial pain; persistent dysesthetic scar pain
7	Veldman and Jacobs[9] (1994)	1 y after surgery	*N*-acetylcysteine, 600 mg tid	Partial decrease facial pain; decreased size red, swollen, warm areas
8	Saxen et al. (1995)	10 y after extraction	Diagnostic (L) SG block, bupivicaine therapeutic (L) SG block	Pain relief for 24 h
			Clonidine, 0.1 mg bid	Not specified
			Responded well; follow-up not specified	
9	Arden et al. (1998)	6 w after surgery	Diagnostic (R) SG block, bupivicaine	Relief beyond anesthetic duration
			Weekly, 6 (R) SG block series × 1.5 (R) SG block, phenol	40–50% improvement facial pain
			3 weekly, (L) SG blocks	No change from baseline
			5 monthly, (L) SG blocks	60% improvement in pain
				70% improvement at 6 mo, 80%–85% improvement at 8 mo
10	Arden et al. (1998)	1 mo after surgery	Diagnostic (R) SG block, bupivicaine	Relief beyond anesthetic duration
			Weekly, 5 (R) SG blocks × 1.5 mo	50%–70% reduction in facial pain

Stellate Block for OFP

Evidence Grade C

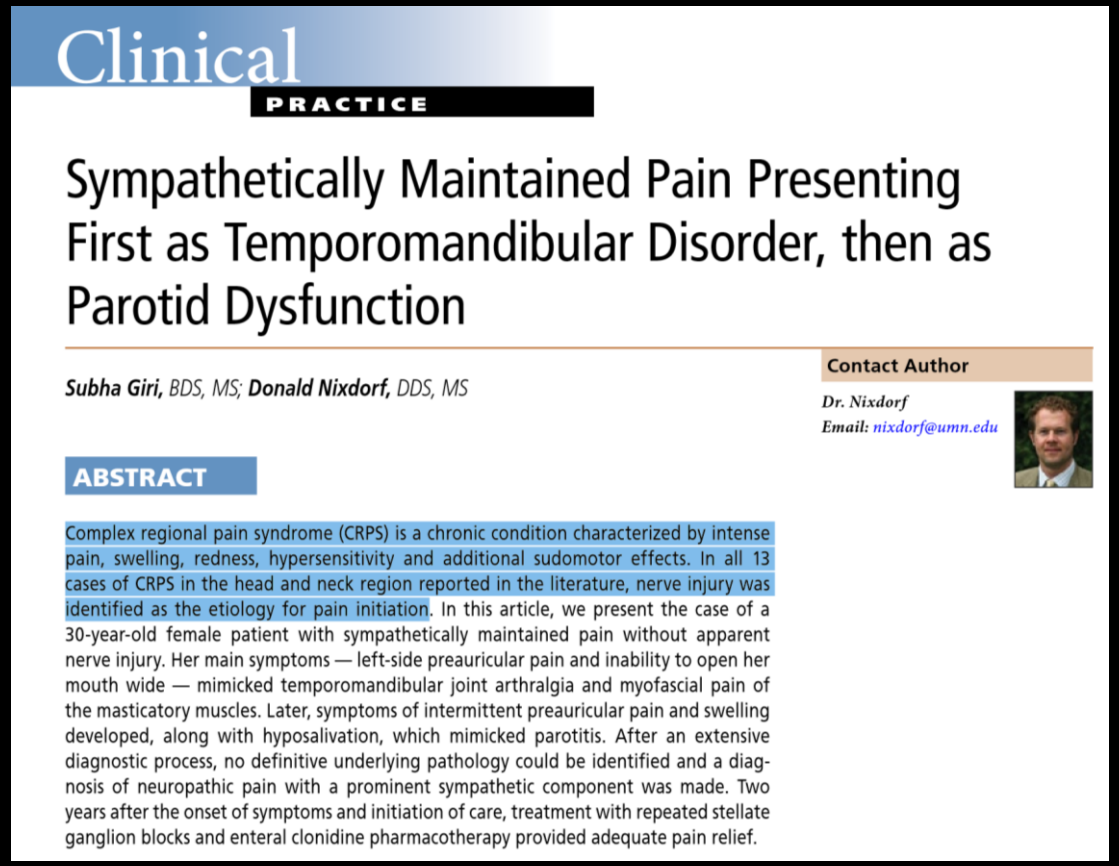
- Kojitani et al. reported that SGB added to amitriptyline medication successfully alleviated neuropathic pain after simple tooth extraction [5].
- Matsuura et al. performed SGB 2 times a week in 35 patients with postoperative ocular pain that was resistant to anti-inflammatory drugs [22].
- It was found that SGB, performed an average of 5.9 times, was effective for 96.6% of patients with nociceptive pain [22].
- In a report by Lynch et al., SGB was performed in 14 patients with orofacial neuropathic pain. They observed that five patients noted 50-100% improvement in pain severity 12 months after SGB [19].
- Recently, it was suggested that a trial of SGB in the early stages of various orofacial pain disorders could result in greater reduction in pain severity [21,30,31].
- It was also suggested that SGB could prevent facial nerve damage caused by herpes zoster and postherpetic neuralgia that did not respond to medication including acyclovir, steroids, and antidepressants [31].
- Evidence Grade C

Walega DR, Smith C, Epstein JB. Bilateral stellate ganglion blockade for recalcitrant oral **pain** from Burning Mouth Syndrome: a case report. J Oral Facial **Pain** Headache. 2014 Spring;28(2):171-5. doi: 10.11607/ofph.1165.

5 Kohjitani A, Miyawaki T, Kasuya K, Shimada M. Sympathetic activity-mediated neuropathic facial pain following simple tooth extraction: A case report. Cranio 2002; 20: 135-8 22 Matsuura M, Ando F, Sahashi K, Torii Y, Hirose H. The effect of stellate ganglion block on prolonged postoperative ocular pain. Nippon Ganka Gakkai Zasshi 2003; 107: 607-12. 19 Lynch ME, Elgeneidy AK. The role of sympathetic activity in neuropathic orofacial pain. J Orofac Pain 1996; 10: 297-305 21 Salvaggio I, Adducci E, Dell'Aquila L, Rinaldi S, Marini M, Zappia L, et al. Facial pain: a possible therapy with stellate ganglion block. Pain Med 2008; 9: 958-62 30 Makharita MY, Amr YM, El-Bayoumy Y. Effect of early stellate ganglion blockade for facial pain from acute herpes zoster and incidence of postherpetic neuralgia. Pain Physician 2012; 15: 467-74. 31. Gogia AR, Chandra KN. Stellate ganglion block can relieve symptoms and pain and prevent facial nerve damage. Saudi J Anaesth 2015; 9: 204-6.

Sympathetic maintained OFP pain

- Complex regional pain syndrome (CRPS) is a chronic condition characterized by intense pain, swelling, redness, hypersensitivity and additional sudomotor effects.
- In all 13 cases of CRPS in the head and neck region reported in the literature, nerve injury was identified as the aetiology for pain initiation
- **Stellate Ganglion Block was diagnostic and proved to have some therapeutic effect in some patients**
- Evidence Level C



Clinical PRACTICE

Sympathetically Maintained Pain Presenting First as Temporomandibular Disorder, then as Parotid Dysfunction

Subha Giri, BDS, MS; Donald Nixdorf, DDS, MS

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ABSTRACT

Complex regional pain syndrome (CRPS) is a chronic condition characterized by intense pain, swelling, redness, hypersensitivity and additional sudomotor effects. In all 13 cases of CRPS in the head and neck region reported in the literature, nerve injury was identified as the etiology for pain initiation. In this article, we present the case of a 30-year-old female patient with sympathetically maintained pain without apparent nerve injury. Her main symptoms — left-side preauricular pain and inability to open her mouth wide — mimicked temporomandibular joint arthralgia and myofascial pain of the masticatory muscles. Later, symptoms of intermittent preauricular pain and swelling developed, along with hyposalivation, which mimicked parotitis. After an extensive diagnostic process, no definitive underlying pathology could be identified and a diagnosis of neuropathic pain with a prominent sympathetic component was made. Two years after the onset of symptoms and initiation of care, treatment with repeated stellate ganglion blocks and enteral clonidine pharmacotherapy provided adequate pain relief.

LA therapeutic Nerve bocks for OFP Region

- Trigeminal
  - Inferior alveolar
  - Lingual
  - Intra oral infiltration
  - Auriculotemporal
  - Infraorbital
- Temporomandibular
  - Muscular
  - Intracapsular
  - Extracapsular
- Cervical nerves
  - Occipital nerve block
- Sympathetic Stellate
- Sphenopalatine ganglion

Sphenopalatine Ganglion

Neuroanatomy

- The sphenopalatine ganglion
- also known as pteryopalatine ganglion, Meckel's ganglion, Sluter's ganglion and nasal ganglion—is the largest of the four parasympathetic ganglia associated with the trigeminal nerve and consists of the largest collection of neurons in the head outside of the brain and is the only ganglion exposed to the environment via the nasal mucosa.
- It is found in the pteryopalatine fossa behind the middle turbinate of the nose and is noted to be triangular in shape. The ganglion is located just below the maxillary nerve as the maxillary nerve crosses the fossa.
- The sphenopalatine ganglion receives three nerve roots:
  - the sensory root from the sphenopalatine branches of the maxillary nerve,
  - the motor root derived from the nervus intermedius which is a part of the facial nerve through the greater petrosal nerve
  - the sympathetic root, which consists of sympathetic postganglionic (efferent) fibers from the superior cervical ganglion
  - And Post synaptic parasympathetic fibres

Possible indications for NB

- Trigeminal neuralgia[1][2]
  Sphenopalatine neuralgia
  Migraine headaches
  Cluster headaches
  Atypical facial pain[3]
  Cancer pain of the head and neck
  Tongue and mouth pain
  Temporomandibular joint (TMJ) pain[2]
  Sluder's neuralgia[4]
  Paroxysmal hemicrania[5]

- Other possible therapeutic uses reported in literature include:

- Herpes Zoster[6]
  Postherpetic neuralgia[5]
  Vasomotor rhinitis
  Complex regional pain syndrome (CRPS) [7][8][9]
  Reflex Sympathetic Dystrophy (RSD)
  Low back pain[10]
  Post-traumatic headache[11]

SP Ganglia NB Headaches

Evidence Grade B

Curr Pain Headache Rep (2017) 21: 27
DOI 10.1007/s11916-017-0626-8

ANESTHETIC TECHNIQUES IN PAIN MANAGEMENT (D WANG, SECTION EDITOR)

Sphenopalatine Ganglion Block in the Management of Chronic Headaches

Jeffery Mojica[1] · Bi Mo[1] · Andrew Ng[1]

Published online: 21 April 2017

Abstract
Purpose of Review: Sphenopalatine ganglion (SPG) block has

blockade as an effective treatment for chronic headaches related
to activation of the sphenopalatine ganglion.

Current Pain and Headache Reports
June 2017, 21:27 | Cite as

Sphenopalatine Ganglion Block in the Management of Chronic Headaches

Authors | Authors and affiliations

Jeffery Mojica, Bi Mo, Andrew Ng

Abstract
PURPOSE OF REVIEW: Sphenopalatine ganglion (SPG) block has been used by clinicians in the treatment of a variety of headache disorders, facial pain syndromes, and other facial neuralgias. The sensory and autonomic fibers that travel through the SPG provided the scientific rationale for symptoms associated with these head and neck syndromes. Yet, despite the elucidation of this pathogenic target, the optimal method to block its pain-producing properties has not been determined. Clinicians have developed various invasive and non-invasive techniques, each of which has shown variable rates of success. We examined the available studies of sphenopalatine ganglion blockade and its efficacy in the treatment of cluster headaches, migraines, and other trigeminal autonomic cephalalgias.
RECENT FINDINGS: Studies have demonstrated that SPG blockade and neurostimulation can provide pain relief in patients with cluster headaches, migraines, and other trigeminal autonomic cephalalgias. Patients with these conditions showed varying levels and duration of pain relief from SPG blockade. The efficacy of SPG blockade could be related to the different techniques targeting the SPG and choice of therapeutic agents. Based on current studies, SPG blockade is a safe and effective treatment for chronic headaches such as cluster headaches, migraines, and other trigeminal autonomic cephalalgias. Future studies are warranted to define the optimal image-guided technique and choice of pharmacologic agents for SPG blockade as an effective treatment for chronic headaches related to activation of the sphenopalatine ganglion.

This article is part of the Topical Collection on *Anesthetic Techniques in Pain Management*

from post-ganglionic sympathetic fibers, whose cell bodies are located within the superior cervical sympathetic ganglion. These post-ganglionic fibers eventually travel through the

INFORMATION FOR HEALTH CARE PROFESSIONALS

AMERICAN HEADACHE SOCIETY

Peripheral Nerve Blocks for Headaches

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Andrew Blumenfeld, MD
The Headache Center of Southern California, Encinitas, CA

Background

Peripheral nerve blocks (PNBs) have been employed in the treatment of a
disorders for many years. Injections to peripheral trigeminal and cervical
provide prompt and definitive relief of acute head pain for days, weeks, or eve
few contraindications to PNBs; they are safe, well-tolerated, and drug inte
concern, rendering this therapy very useful for both patients and practitioners.

Mechanism of Action

PNBs involve injections of local anesthetic agents around peripheral ner
typically provide pain relief that far outlasts their anesthetic effect. The prolo
PNB may be due to effects on central pain modulation. This hypothe
observations that associated symptoms such as photophobia may be reduc
cutaneous allodynia may also be reduced in dermatomes far beyond the distri
nerve. In addition, a single greater occipital nerve injection (a C2 nerve
effective in aborting an attack period in cluster headache, which is essentially a
cephalalgia, demonstrating that the effect of a PNB is far more complex than s
local nerve branch.

Indications

PNBs may treat a variety of headache disorders and have varying indications

Cephalalgia
An International Journal of Headache
International Headache S

Review Article

Sphenopalatine ganglion stimulation in cluster headache and other types of headache

Miguel JA Láinez[1,2] and Ana Suller Marti[1]

Cephalalgia
2016, Vol. 36(12) 1149–1155

DOI: 10.1177/0333102416644
cep.sagepub.com
SAGE

Abstract
Objectives: The cluster headache is the most excruciatingly painful primary headache. In some patients, neither
ventive treatment nor acute treatment is effective or treatment is poorly tolerated. The sphenopalatine ganglion
has an important role in the pathophysiology of cluster headache and, for this reason, SPG stimulation has been us
treat cluster headache.
Methods: We have reviewed the published literature on the role of the SPG in cluster headache and the use of diff
treatments targeting the SPG.
Results: Multiple procedures have been used over the SPG to treat pain and trigemino-autonomic symptoms in pa
with refractory cluster headache. After obtaining good results in a small number of patients, a miniaturized stimu
was developed. Stimulation of the SPG with this device proved to be efficacious in acute and preventive treatmen
clinical trial involving patients with chronic refractory cluster headache. Implantation of the device is minimally inv
maxillary area. In patients who
ective and the side-effects decre
afe and effective treatment for ch
e and this treatment could be a
t its potential use in other for

Neurol Neurochir Pol. 2015;49(6):389-94. doi: 10.1016/j.pjnns.2015.08.010. Epub 2015 Sep 19.

The effectiveness of neurolytic block of sphenopalatine ganglion using zygomatic approach for the management of trigeminal neuropathy.

Malec-Milewska M[1], Horosz B[2], Kosson D[2], Sekowska A[2], Kucia H[2].

Author information

Abstract
This study was performed to present the outcomes of trigeminal neuropathy management with the application of neurolytic block of sphenopalatine ganglion. This type of procedure is used in cases where pain is not well controlled with medical treatment. Twenty patients were treated with sphenopalatine ganglion neurolysis after their response to pharmacological management was not satisfactory. Significant pain relief was experienced by all but one patient and they were able to reduce or stop their pain medication. The time of pain relief was between a few months and 9 years during the study period. Number of procedures implemented varied as some of the patients have been under the care of our Pain Clinic for as long as 18 years, satisfied with this type of management and willing to have

LA SPG NB Systematic Review

Ho *et al. The Journal of Headache and Pain* (2017) 18:118
DOI 10.1186/s10194-017-0826-y

The Journal of Headache and Pain

REVIEW ARTICLE **Open Access**

Sphenopalatine ganglion: block, radiofrequency ablation and neurostimulation - a systematic review

Kwo Wei David Ho[1*], Rene Przkora[2] and Sanjeev Kumar[2]

- Sphenopalatine ganglion block
- **Sixty articles were included for sphenopalatine ganglion block**.
- 11 were small randomized controlled studies, and 1 was retrospective case control study.
- The rest of the literature included case reports and case series. The type of blocking agent varied across studies, but they could be broadly put into three categories:
  - Cocaine
  - voltage-gated sodium channel blocker (local anesthetics)
  - a combination of voltage-gated sodium channel blocker and steroids.
  - **Voltage-gated sodium channel blocker is the most commonly used agent**

Table 1 Summary of evidence level and grade of recommendation for SPG block, radiofrequency ablation and neurostimulation

Medical condition	Application/ Medication used in controlled studies	Number of controlled studies	Highest level of evidence	Grade of recommendation
SPG block				
Cluster headache	Cotton swab/cocaine or lidocaine	1	2b	B
Second-division trigeminal neuralgia	Lidocaine spray	1	2b	B
Reducing the needs of analgesics after endoscopic sinus surgery	Needle injection, transnasal and palatal approach/lidocaine, bupivacaine, l evobupivacaine, tetracaine	6	1b	B
Reducing the pain associated with nasal packing removal after nasal operation	Needle injection, infrazygomatic approach/lidocaine	1	3b	B
Migraine	Tx360 device/ bupivicane	1	2b	B
Postdural puncture headache, sphenopalatine maxillary neuralgia, facial neuralgia, sympathetic neuralgia, post-traumatic atypical facial pain, atypical odontalgia, pain from midline granuloma, herpetic keratitis, hemifacial headache,paroxysmal hemicrania, nasal pain, hemicrania continua, trigeminal neuropathy, cancer pain, seizures associated nasal pathology, arthritic pain and muscle spasm, intercostal neuritis, persistent hiccups, ureteral colic, dysmenorrhea, peripheral painful vascular spasm, complex regional pain syndrome and hypertension	Various protocols	0	4	C
Myofascial pain	Cotton-tipped applicator, nasal spray/lidocaine	2	2b	Not recommended
SPG radiofrequency ablation				
Cluster headache	Infrazygomatic approach /80 °C, 60s ×2	0 (1 cohort study)	2b	B
Sluder's neuralgia, posttraumatic headache, chronic head and face pain, atypical trigeminal neuralgia, atypical facial pain, chronic facial pain secondary to cavernous sinus meningioma, trigeminal neuralgia, SPG neuralgia due to herpes zoster	Various protocols	0	4	C
SPG neurostimulation				
Cluster headache	Customized to each patient, mean frequency 120.4 ± 15.5 Hz, pulse width 389.7 ± 75.4 μs, intensity 1.6 ± 0.8 mA	1	1b	B
Idiopathic facial pain, migraine	Various protocols	0	4	C

Evidence Grade C

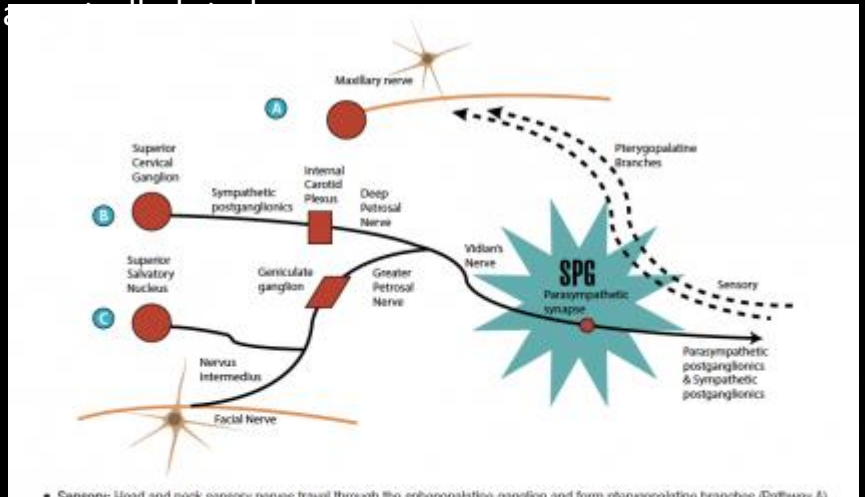
LA SPG NB for TN

Evidence Grade B

- Trigeminal neuralgia Four articles on SPG block for trigeminal neuralgia through our literature search.
  - One was a randomized-controlled study (level 2b), two were case series and one case report (level 4, see Table 4).
  - Kanai et al. performed a randomized-controlled study with 25 participants with refractory second-division trigeminal neuralgia [11]. In this study, twenty-five patients with second-division trigeminal neuralgia were randomized to receive two sprays (0.2 ml) of either **lidocaine 8% or saline placebo** in the affected nostril using a metered-dose spray. The paroxysmal pain triggered by touching or moving face was assessed.
  - **Intranasal lidocaine 8% spray significantly decreased the paroxysmal pain for an average of 4.3 h.**
  - The side effects were limited to local irritation with burning, stinging or numbness of the nose and eye, and bitter taste and numbness of the throat. One case series [12] and one case report [13] reported immediate pain relief from nerve blocks with lidocaine and bupivacaine.
  - One case series used a combination of **dexamethasone and ropivacaine** with the Tx360 applicator, which resulted in short-term pain relief [14].
  - Multiple blocks over time seemed to provide longer pain relief but it was restricted to isolated cases.
  - In summary, **the overall grade of recommendation is B for SPG block on trigeminal neuralgia**. The **strongest evidence lies in treating with 8% lidocaine nasal spray in the affected nostril**. The analgesia is effective but temporary (4.3 h). It is well-tolerated with side effects limited to local irritations.

Table 4 Studies of SPG block for trigeminal neuralgia

Trigeminal neuralgia								
Author	Year	Medical problems	Approach	Imaging	Medication	Number of cases	Study design	Outcome
Peterson et al. [12]	1995	Trigeminal neuralgia	Cotton tip applicator	None	4% lidocaine	2	Case series	Pain free
Manahan et al. [13]	1996	Trigeminal neuralgia	NA	None	Bupivacaine	1	Case report	Pain free
Kanai et al. [11]	2006	Second division trigeminal neuralgia	Nasal spray	None	Lidocaine	25	Randomized control	Significantly decreased pain with intranasal lidocaine spray
Candido et al. [14]	2013	Trigeminal neuralgia, chronic migraine headache, post-herpetic neuralgia	Tx360 Nasal applicator, transnasal	None	0.5% ropivacaine and 2 mg dexamethasone	3	Case series	Satisfactory



LA SPG NB
for Orofacial Postherpetic neuralgia (PHN)

A total of three case reports and series were found through our search process (**level 4 evidence, Grade C**). All three articles reported successful treatment of postherpetic neuralgia with SPG block using local anesthetics.

One study reported successful treatment of postherpetic neuralgia involving the ophthalmic division of the trigeminal nerve, by SPG block under direct visualization through nasal endoscopy.

Another article reported success in treating sinus arrest in postherpetic neuralgia by SPG block through trans-nasal approach utilizing cotton tipped applicators, and one study reported successful treatment of herpes zoster within a heterogeneous case series

Evidence Grade C.

Table 8 Studies of SPG block on postherpetic neuralgia

Postherpetic neuralgia								
Author	Year	Medical problems	Approach	Imaging	Medication	Number of cases	Study design	Outcome
Prasanna et al. [26]	1993	Postherpetic neuralgia involving the ophthalmic division of the trigeminal nerve	Combination of stellate ganglion and sphenopalatine ganglion block, cotton tip applicator	None	Lidocaine and bupivacaine	1	Case report	Pain free
Saberski et al. [27]	1999	Sinus arrest in postherpetic neuralgia	Cotton tipped applicator, transnasal approach	None	20% lidocaine	1	Case report	No paroxysmal pain or sinus pauses immediately after block
Amster et al. [28]	1948	Herpes zoster	Cotton tipped applicator, transnasal approach	None	Nupercaine, pontocaine, monocaine	3	Case series	Relief of pain and spasm in 90% of cases

LA SPG NB for Other OFP

- The largest case series was provided by Rodman et al. documenting 147 patients with various types of nasal pain and headache. **He reported that 81.3% of the patients had pain relief after receiving SPG block with a mixture of bupivacaine and triamcinolone**.
- The overall **grade of recommendation is C for other types of head and facial pain**, including;
  - Sluder's neuralgia
  - sphenopalatine maxillary neuralgia
  - facial neuralgia
  - sympathetic neuralgi
  - post-traumatic atypical facial pain
  - atypical odontalgia
  - pain from midline granuloma
  - herpetic keratitis
  - hemifacial headache, paroxysmal hemicrania, nasal pain, hemicrania continua and trigeminal neuropathy

Evidence Grade D-C

Table 11 Studies of SPG blocks for other pain syndromes of the head and face *(Continued)*

Pain syndromes of the head and face								
Author	Year	Medical problems	Approach	Imaging	Medication	Number of cases	Study design	Outcome
Androulakis et al. [70]	2016	Hemicrania continua	Tx360 device	None	Repetitive 0.5% bupivacaine	1	Case report	Significant improvement in headache by 14 week
Malec-Milewska et al. [71]	2015	Trigeminal neuropathy	Zygomatic approach	Fluoroscopy	65% ethanol with lidocaine	20	Case series	Significant pain relief
Schaffer [34]	2015	Acute anterior or global headache	Tx360 device	None	0.5% bupivacaine	93	Randomized placebo-controlled	No statistically significant difference
Sussman et al. [72]	2016	Chronic posttraumatic headache after sport-	Cotton-tip applicator	None	2% lidocaine and 0.5% bupivacaine	1	Case report	Symptom free at 6-month follow-up

Table 11 Studies of SPG blocks for other pain syndromes of the head and face

Pain syndromes of the head and face								
Author	Year	Medical problems	Approach	Imaging	Medication	Number of cases	Study design	Outcome
Ruskin et al. [62]	1925	SP maxillary neuralgia, SP facial neuralgia, SP sympathetic neuralgia, SPG cell neuralgia	Needle injection.	None	20% Cocaine, 10% silver nitrate, 70% alcohol	7	Case series	Improvements or complete relief
Stechison et al. [63]	1994	Post-traumatic atypical facial pain syndrome	Needle injection. Transfacial transpterygomaxillary access to foramen rotundum SPG and maxillary nerve	CT	First stage: 0.5% bupivacaine, Second stage: 98% ethyl alcohol and 0.5% bupivacaine in 2:1 ratio	5	Case series	3 had alcohol neurotomy and pain free at 5, 8 and 12 months. 2 responded poorly to first stage blockade and did not have alcohol neurotomy.
Peterson et al. [12]	1995	Atypical odontalgia	Cotton tip, self-application	None	4% lidocaine	1	Case report	Pain free
Saade et al. [64]	1996	Pain from midline granuloma	Self-administered SPG block	None	Lidocaine	1	Case report	Significant pain relief
Puig et al. [65]	1998	Sluder's neuralgia	Cotton tip applicator and transnasal needle	None	88% phenol	8	Case series	90% decrease in head and face pain for 9.5-month duration
Windsor et al. [66]	2004	Herpetic keratitis	Transnasal cotton tip applicator	None	Tetracaine, adrenalin and 10% cocaine]	1	Case report	Effect of block lasts for a month. Requires months blocks
Obah et al. [67]	2006	Hemifacial and headache	Transnasal	None	4% lidocaine	1	Case report	80% reduction in pain intensity
Cohen et al. [33]	2009	Postdural puncture headache	Cotton tip applicator	None	Lignocaine	13	Case series	11 out of 13 had immediate relief of headache
Morelli et al. [68]	2010	Paroxysmal hemicrania resistant to multiple therapies	Endoscopic needle injection into the nasal mucous membrane immediately behind and over the inferior portion of the sphenopalatine foramen and into the fossa	None	Triamcinolone acetonide, 1% bupivacaine, 2% mepivacaine with adrenalin	1	Case report	Reduction in frequency and intensity of pain
Rodman et al. [35]	2012	Nasal pain or headache	Endoscopic needle injection	None	0.5% bupivacaine and triamcinolone acetonide	147	Case series	81.3% of patients have improvement
Grant et al. [69]	2014	Tension headache in pregnant woman	Cotton tip applicator	None	4% lidocaine	1	Case report	BID block for a total of 7 blocks, pain free after
Kastler et al. [55]	2014	Cluster headache (14), persistent idiopathic facial pain (10), and other types of facial pain (18)	Infrazygomatic approach	CT	Absolute alcohol	28	Case series	85.7% of patient with persistent idiopathic facial pain and 40% of other types of facial pain had 50% pain relief at 1 month

Traditional Techniques SPG LA block

- Trans Buccal

- Trans Greater palatine foramen
  - Initial palpation posterior palate
  - Infiltration
  - 26 Gauge needle bent at 45 degrees
  - Slowly elevate up GP canal for 2/3rd needle
  - 2% Lidocaine with Epi
  - Often get marked palor of the face in LA regions, occular signs and altered sensation may arise temporarily

Transnasal

New technique Tx360 (2 injections per week over 4 weeks)

Old using cotton tip or catheter

Pain Physician 2013; 16:E769-E778 • ISSN 2150-1149

Case Series

A Novel Revision to the Classical Transnasal Topical Sphenopalatine Ganglion Block for the Treatment of Headache and Facial Pain

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Address Correspondence: Kenneth D. Candido, MD Chairman and Professor

Background: The sphenopalatine ganglion (SPG) is located with some degree of variability near the tail or posterior aspect of the middle nasal turbinate. The SPG has been implicated as a strategic target in the treatment of various headache and facial pain conditions, some of which are featured in this manuscript. Interventions for blocking the SPG range from minimally to highly invasive procedures often associated with great cost and unfavorable risk profiles.

Objective: The purpose of this pilot study v device, the Tx360® nasal applicator, incorpo blocks. This study features the technical aspe experience observed in a small series of head

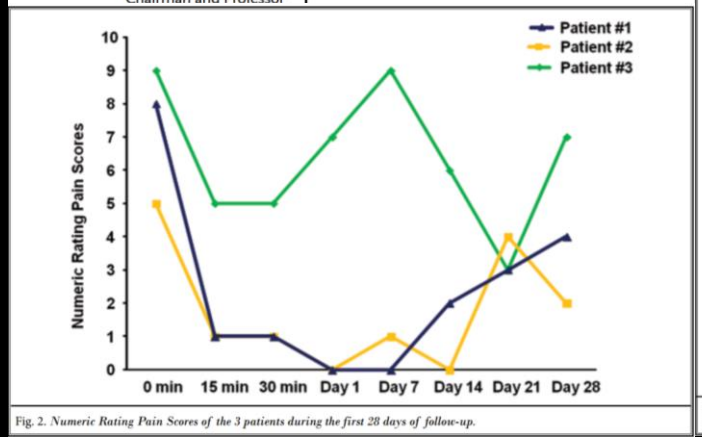

Fig. 2. *Numeric Rating Pain Scores of the 3 patients during the first 28 days of follow-up.*

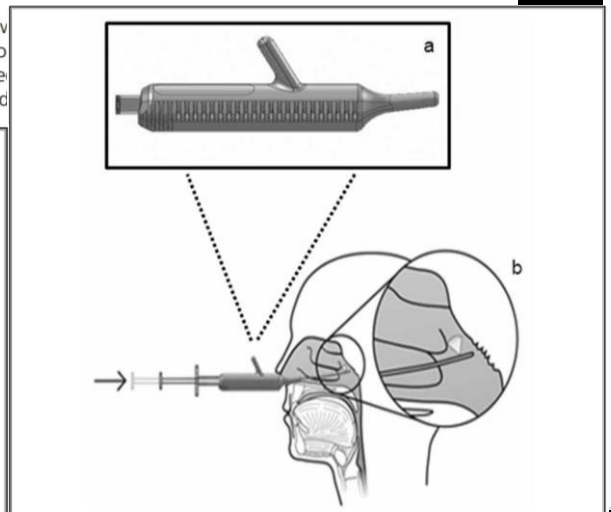

Fig. 1. *Schematic use of the Tx360® device (a) and expanded view of the nasal cavity depicting the boundary between the nasal cavity and the SPG (b).*

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BJA

Intranasal lidocaine 8% spray for second-division trigeminal neuralgia

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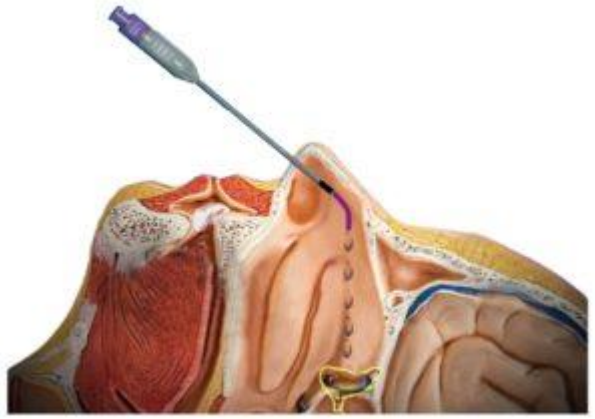
Background. Trigeminal nerve block has been widely used for trigeminal neuralgia. This may induce paraesthesia. The second division of the trigeminal nerve passes through the sphenopalatine ganglion, which is located posterior to the middle turbinate and is covered by a mucous membrane. We examined the effectiveness of intranasal lidocaine 8% spray on paroxysmal pain in second-division trigeminal neuralgia.

Methods. Twenty-five patients with second-divisi receive two sprays (0.2 ml) of either lidocaine 8% o metered-dose spray. After a 7 day period, patients treatment. The paroxysmal pain triggered by touchi visual analogue scale (VAS) before and 15 min after t grade pain outcome, and were asked to note whe therapy it recurred.

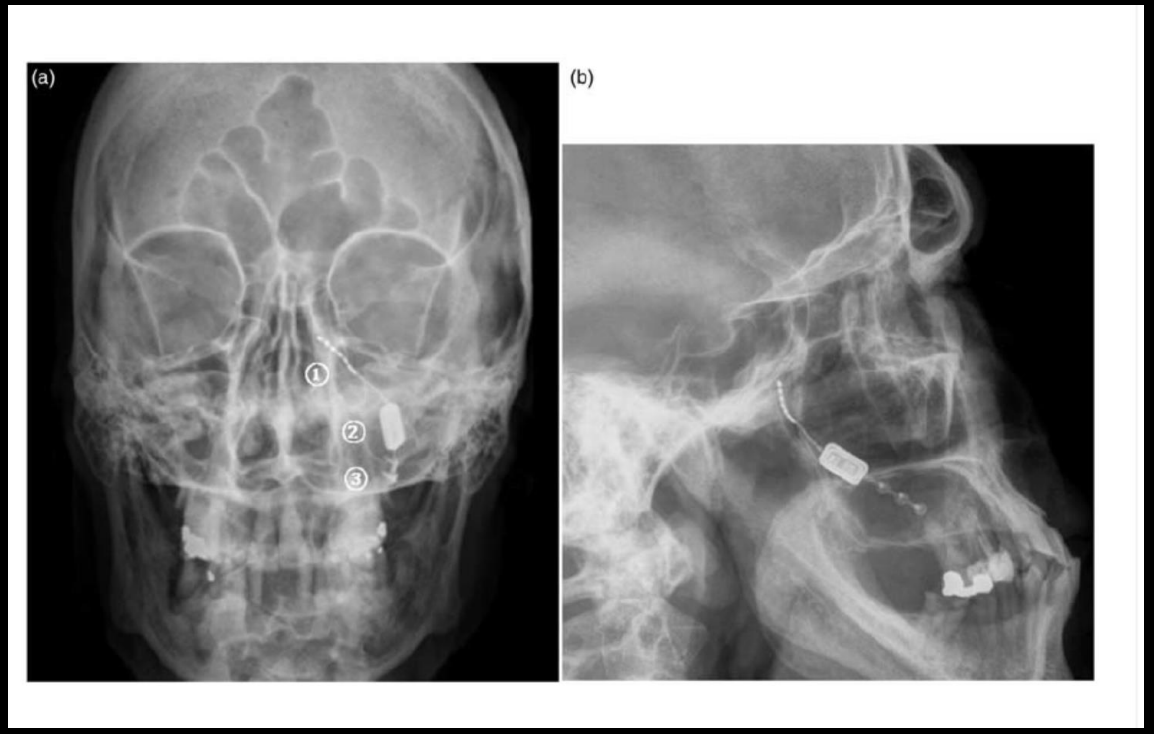
Results. Intranasal lidocaine 8% spray significantly d postspray: 1.5 (1.9) cm, mean (SD)], whereas the plac Moreover, pain was described as moderate or bette the placebo group. The effect of treatment persist

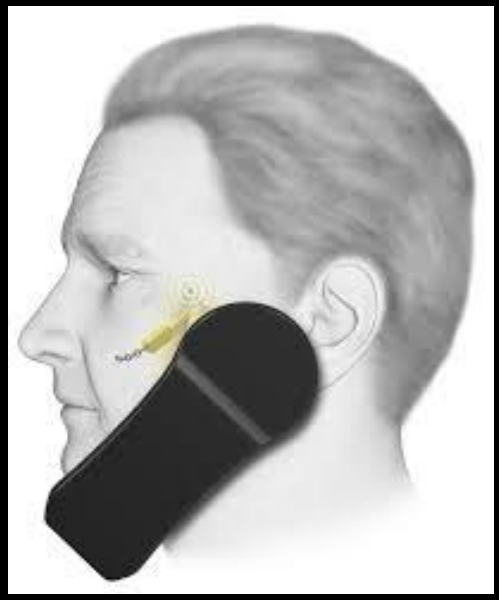
Conclusions. Intranasal lidocaine 8% administered but temporary analgesia without serious adverse trigeminal neuralgia.



Br J Anaesth 2006; **97**: 559–63

SPG stimulation for cluster headaches





No predictive value of LA SPG NBs for outcomes of SPG neuro ablative techniques OR SPG stimulation

Open Access Full Text Article

REVIEW

Managing cluster headache with sphenopalatine ganglion stimulation: a review

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

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Abstract: Cluster headache (CH) is a primary headache and considered as one of the worst pains known to man. The sphenopalatine ganglion (SPG) plays a pivotal role in cranial autonomic symptoms associated with pain. Lesioning procedures involving the SPG and experimental acute SPG stimulation have shown some degree of efficacy with regard to CH. A neuromodulation device, chronically implanted in the pterygopalatine fossa, has been specifically designed for acute on-demand SPG stimulation. In a pilot placebo-controlled study in 28 patients suffering from refractory chronic CH, alleviation of pain was achieved in 67.1% of full stimulation-treated attacks compared to 7% of sham stimulation-treated attacks ($p<0.0001$). Long-term results (24 months; 33 patients) confirmed the efficacy of SPG stimulation as an abortive treatment for CH attacks. Moreover, 35% of the patients observed a >50% reduction in attack frequency, suggesting that repeated use of SPG stimulation might act as a CH-preventive treatment. Globally, 61% of the patients were acute responders, frequency responders, or both, and 39% did not respond to SPG stimulation. The safety of SPG microstimulator implantation procedure was evaluated in a cohort of 99 patients; facial sensory disturbances were observed in 67% of the patients (46% of them being transient), transient allodynia in 3%, and infection in 5%. SPG stimulation appears as a promising innovative, efficient, and safe therapeutic solution for patients suffering from severe CH. It has shown its efficacy in aborting CH attacks compared to placebo stimulation, suggesting that it is particularly adapted for CH patients who are not sufficiently improved by abortive treatments such as sumatriptan and oxygen. However, further studies comparing SPG stimulation with standard abortive and/or preventive CH treatments will be necessary to define more precisely its place within the management of severe chronic and/or episodic CH.

Keywords: cluster headache, primary headache, sphenopalatine ganglion, stimulation, neuromodulation

Summary evidence LA PNBs

- TN
  - **LA injections TN** **(repeated ?)** **GRADE C** **? potential**
  - Pre Radiofrequency LA PNBs for TN may enhance pain relief GRADE D
- **Diagnostic LA PNB may be useful in phenotyping patients with BMS** **GRADE B** **? potential**
- **Intraoral LA PNB may assist in pre BtX selection for PDAP or PPTTN BMS** **GRADE C** **? potential**
- Cranial neuralgias **? Role of LA ONB in other OFP conditions?**
  - LA plus corticosteroids ONB GRADE D ? potential
- Headaches
  - LA plus corticosteroids ONB Level II-IV for ONB in Migraine and Cluster headache GRADE B
  - LA plus corticosteroids ONB Level II Cervicogenic HA GRADE B
- TMD
  - LA PNBs for TMD no prognostic evidence for RX
  - LA PNBs for TMD **Masseteric NB**>trigger point > oral appliance GRADE C
  - **PNBs intra articular with corticosteroids and hyaluronate may be effective for TMD joint pain** **GRADE C-B**
  - LA PNBs for TMD **Auriculotempora**l VS intraarticular GRADE D
- Stellate ganglia for OFP CRPS GRADE C ? potential
- **Sphenopalatine Ganglia for OFP** **GRADE B for TN, GRADE C for PHN** GRADE C- D for other OFP conditions

Summary Therapeutic PNBs for OFP

There is moderate evidence for therapeutic BTX PNBs for headaches and Joint pain and PHN (outside the Trigeminal region)

There is limited evidence for LA therapeutic PNBs in the management of orofacial pain

The role of neural blockade as a **therapeutic tool** in painful conditions may be compromised due to several characteristic of chronic pain including;

- social, emotional, financial, and legal factors effecting the patient
- the pathophysiology of clinical pain
- the site of nociception
- the pathway of afferent neural signals.

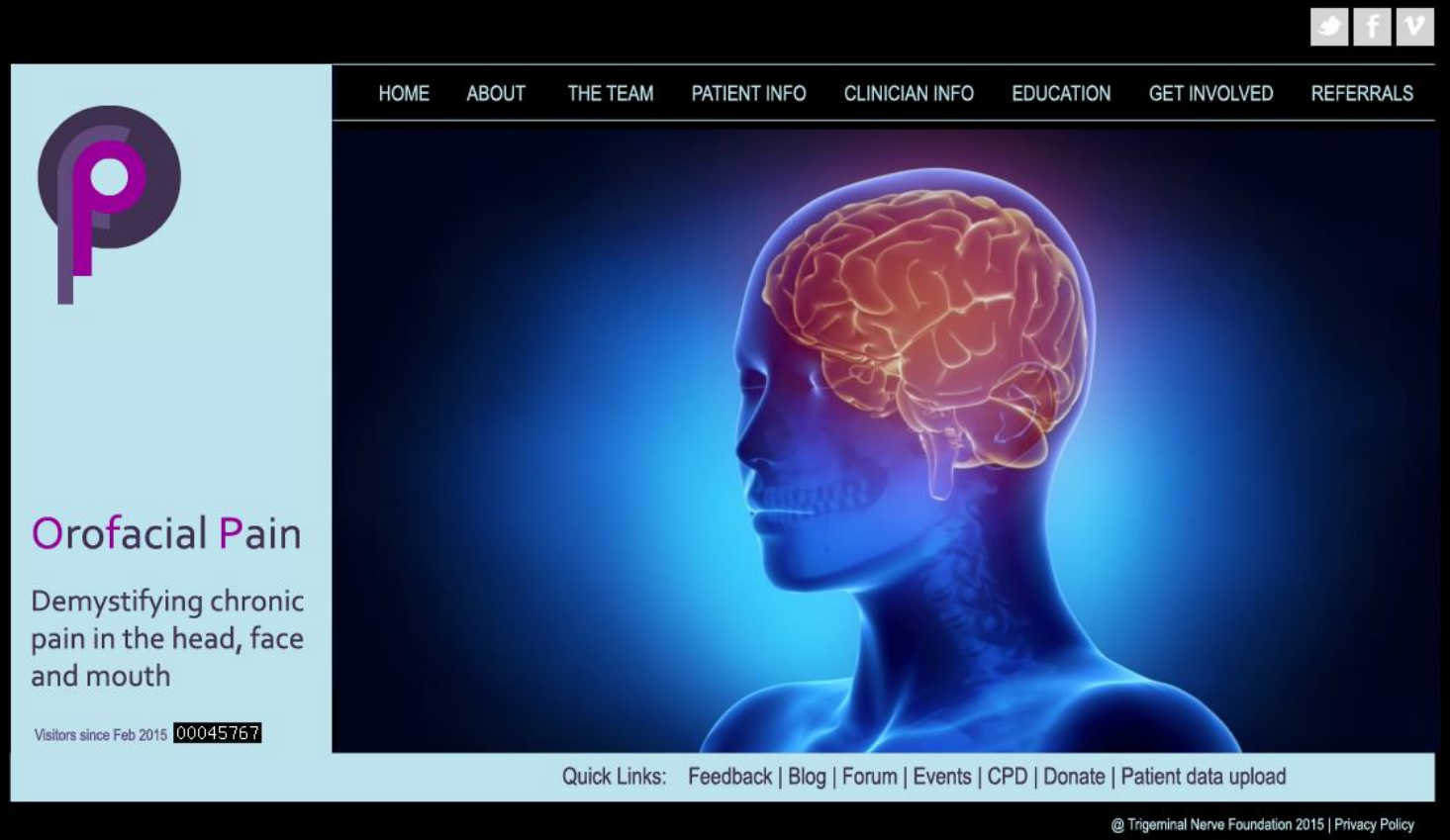
Exciting prospect for future Clinical studies of PNBs in OFP treatment

We must improve in study quality.

Important considerations include;

- Standard protocols using standard definitions by AAOP for implementation.
- **CLEAR DIAGNOSTIC CRITERIA**
- **ICD CodING for interventions**
- Axis 1 and Axis II variables- **Placebo response**
- Patient centred, clinician and scientific **OUTCOME MEASURES (COMET)**

Thank you



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