NERVE BLOCKADE in HEADACHES
The scientific rationale

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Disclosure

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Almirall	×						
Amgen/Novartis	×	×					
Autonomic Technologies Inc.	×		×				
Coherex		×					
Janssen-Cilag	×						
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Lundbeck	×						
Man&Science		×					
Medtronic	×						
Pfizer		×					
Sandoz	×						
Sanofi	×						
St Jude Medical	×						
Teva	×	×					

Peripheral nerve blocks

Popular acute and prophylactic headache treatments

- paucity of evidence, no standard procedure

Diagnostic tool

Variety of headache disorders

- primary headache (e.g. migraine, cluster headache)
- secondary headaches (e.g. cervicogenic headache, MOH)
- cranial neuralgias (e.g. occipital neuralgia)

(Amide) anesthetic(s) +/- corticosteroid(s)*

> Occipital nerve block

*Injections of steroid(s) alone cannot be called nerve ‘blocks’ since they cause no anesthesia

Various nerves, including…

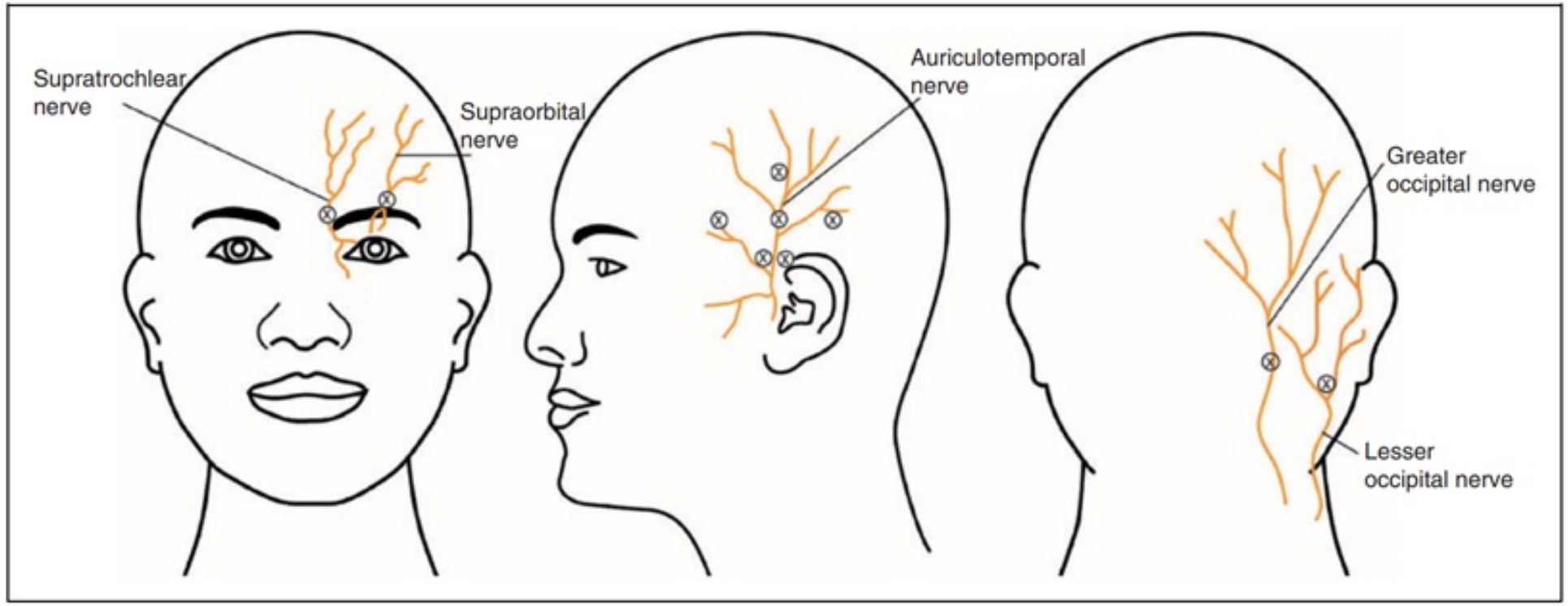


Figure 1. Sites of peripheral nerve blocks.

Cephalalgia 2019;39(12):1488-1499

MOA local anesthetics

Acute relief primary headache disorders

↓ Afferent tone (see TCC)

↓ activity at first synapse of nociceptive pathway

Long-term relief primary headache disorders

? ‘winding-down’ of central sensitization

? central descending pain modulation

Cervicogenic headache: C2-3 facet joint block,…

Peripheral neuropathic pain

Pain 2006; 122:126-129

MOA local steroids

MOA in primary headache disorders unknown

? Demyelination of nerve fibres, however “Locally applied corticosteroids in limited amounts have no long-term effects on the electrical and structural properties of peripheral nerves, but “The corticosteroid was found to suppress the transmission in C-fibres but not in A-beta fibres”

? Systemic effect (see further)

An inflammatory cause of pain is rarely evident (CeH)

Peripheral neuropathic pain: “Suppression of ectopic neural discharges from the injured nerve fibers”

Surg Neurol 1983;19(4):393-4
Acta Anaesthesiol Scand 1990;34(5):335-8
Acta Anaesthesiol Scand 1995;39(3):364-9
Reg Anesth 1997;22(1):59-65

OCCIPITAL NERVE TENDERNESS: A SIGN OF HEADACHE*

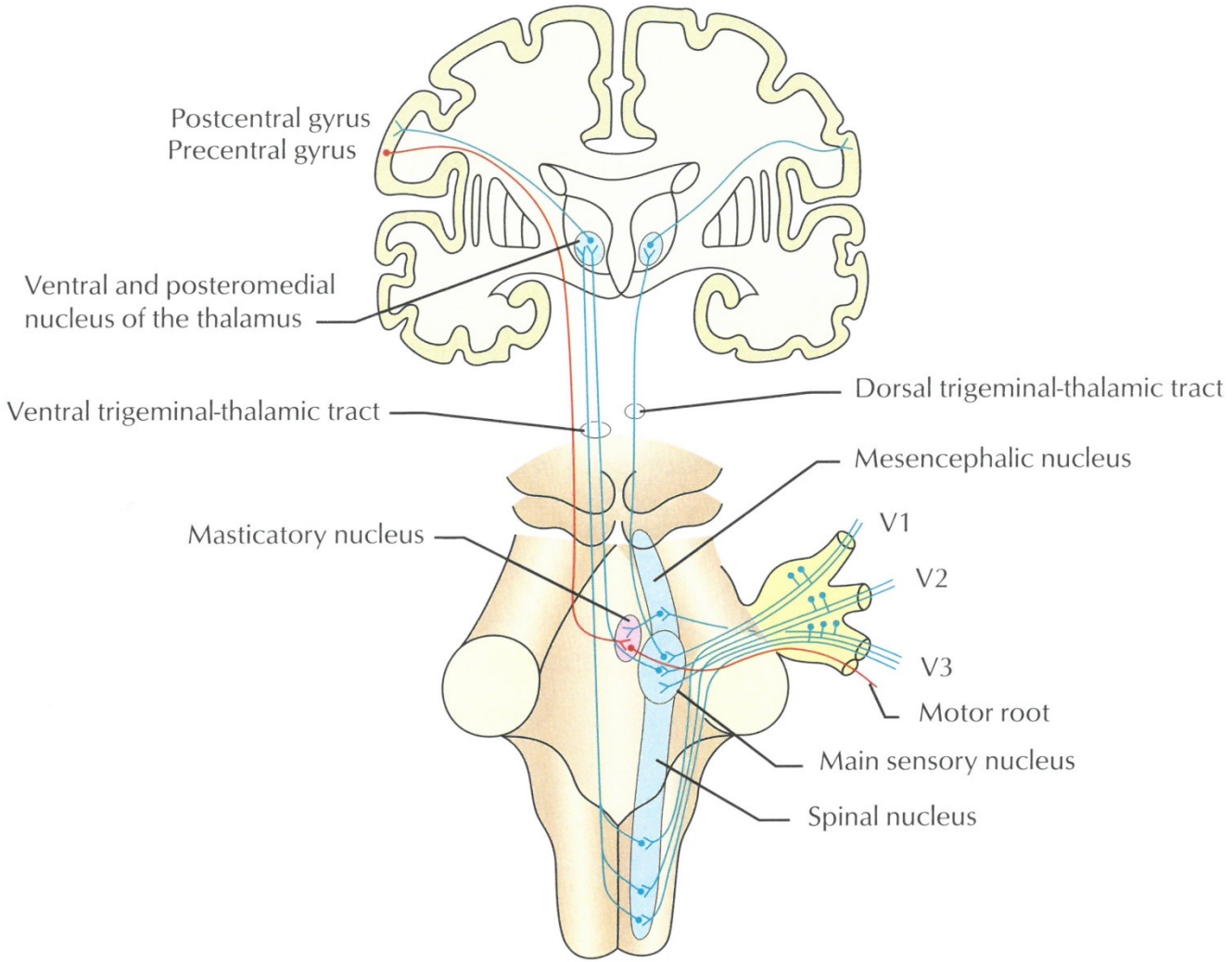
By HAROLD N. PERELSON, M.D.†
Birmingham, Alabama

"Tenderness of the occipital nerves was observed in over 300 patients who had widely varying clinical forms of headache"

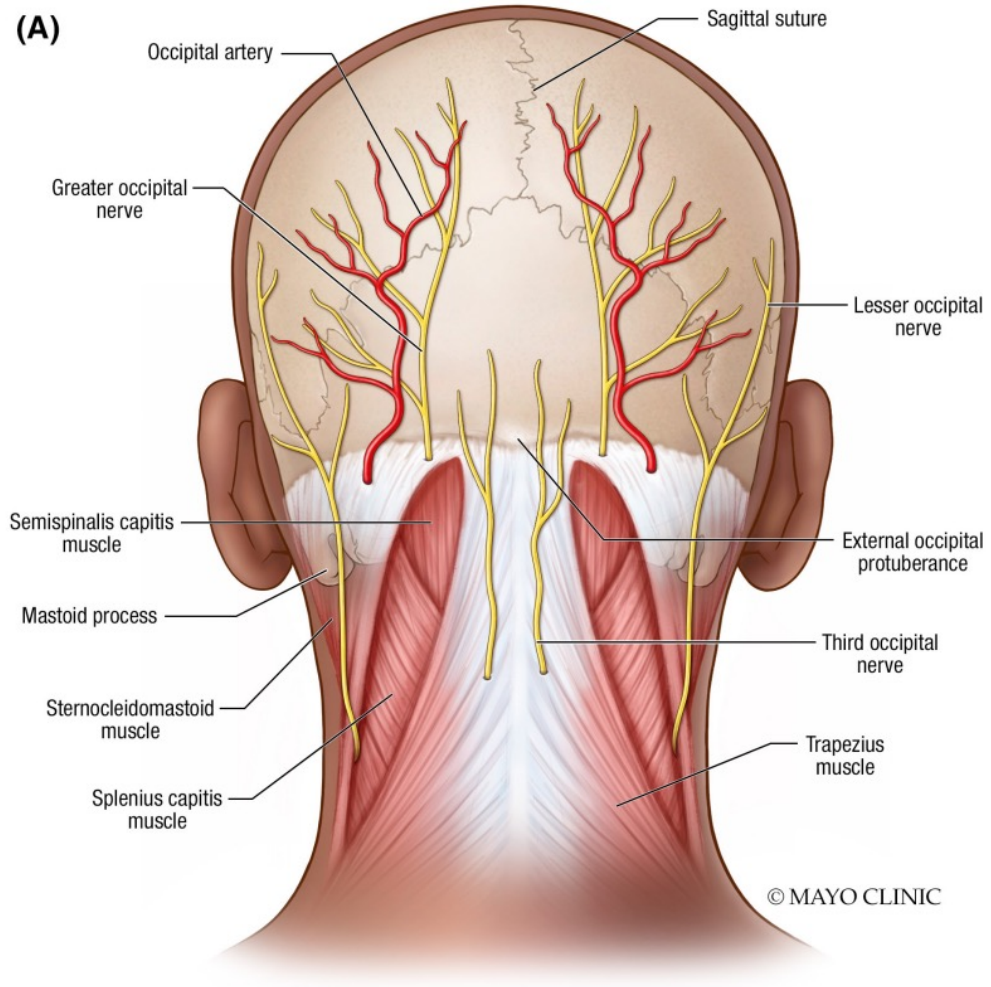
"An anatomical basis of this finding may be the relationship of the spinal nucleus of … the trigeminal nerve to the central termination of the greater and lesser occipital nerves in the substantia gelatinosa of the upper cervical cord"

South Med J 1947;40(8):653-6

Central pathways NV

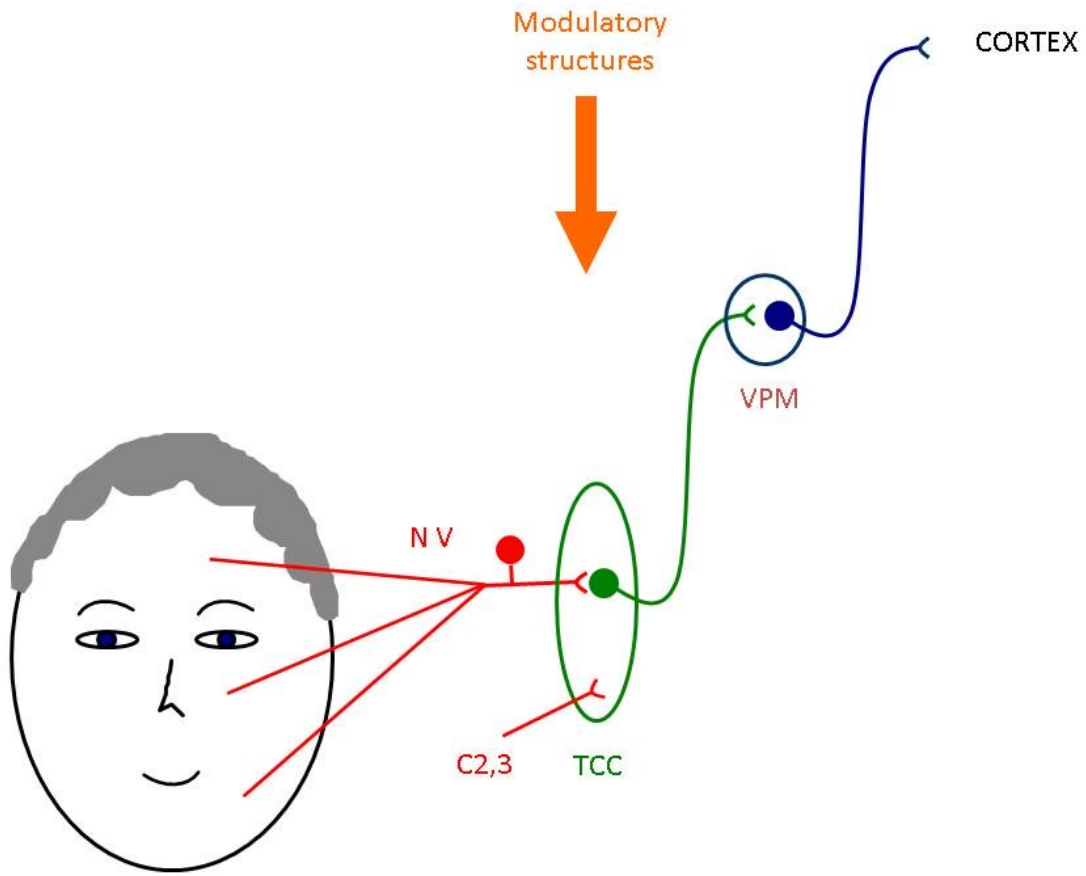


Occipital nerves

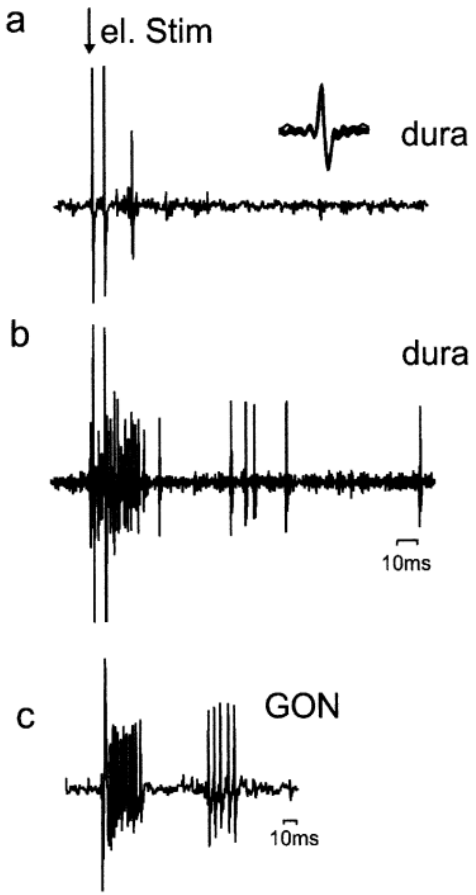


Headache 2022;62(9):1077-1092

Nociceptive convergence TCC



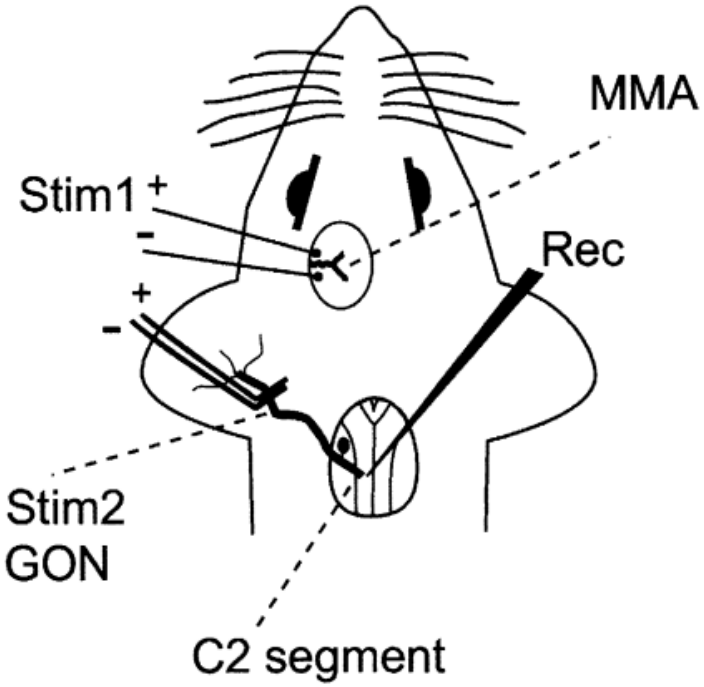
Trigeminocervical complex



Stimulation of dura mater elicited early latency response within the A-fibre range

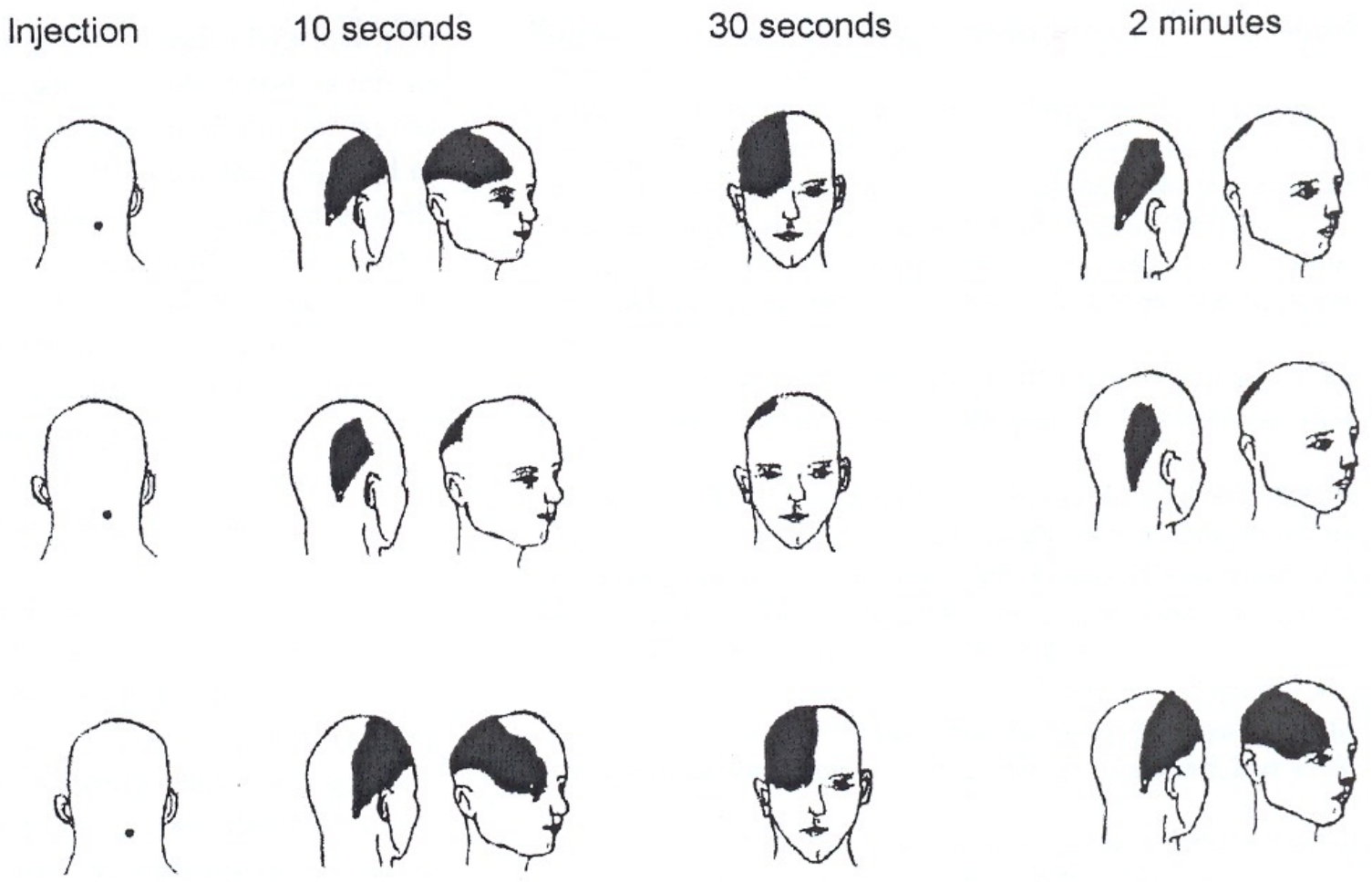
Increasing the stimulation parameters recruits further A-fibre as well as C-fibre latency responses

Stimulation of the GON shows A-fibre and C-fibre latency responses



Brain 2002;125(Pt 7):1496-509
Brain 2003;126(Pt 8):1801-13

Human experimental evidence



Cephalalgia 2001;21,: 107-109

Human experimental evidence

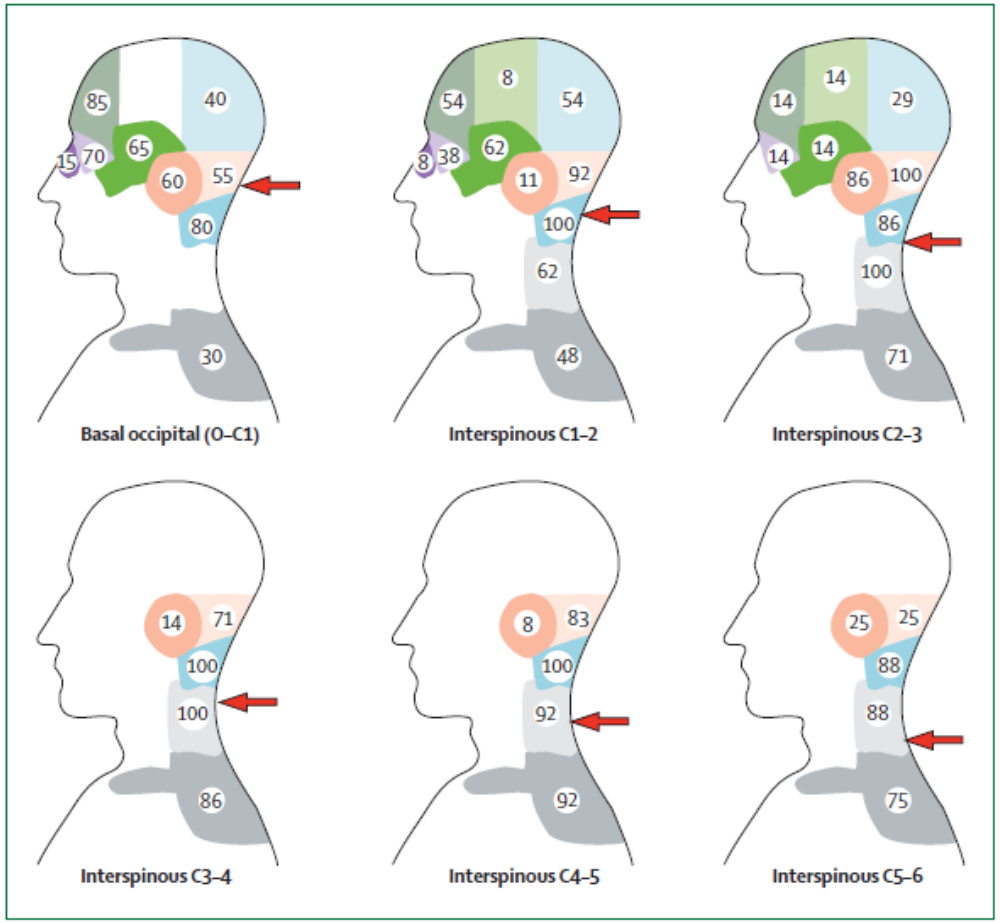


***Figure 2*: Referred pain patterns after noxious stimulation of basal occipital periosteum and interspinous muscles at C1–2, C2–3, C3–4, C4–5, and C5–6**

The more cephalad the site of stimulation, the more likely that pain is referred to distant regions of the head. The numbers indicate the percentage of individuals who reported pain in the area shown after stimulation at each segmental level. The arrows indicate the approximate site of stimulation. Adapted from Campbell and Parsons,

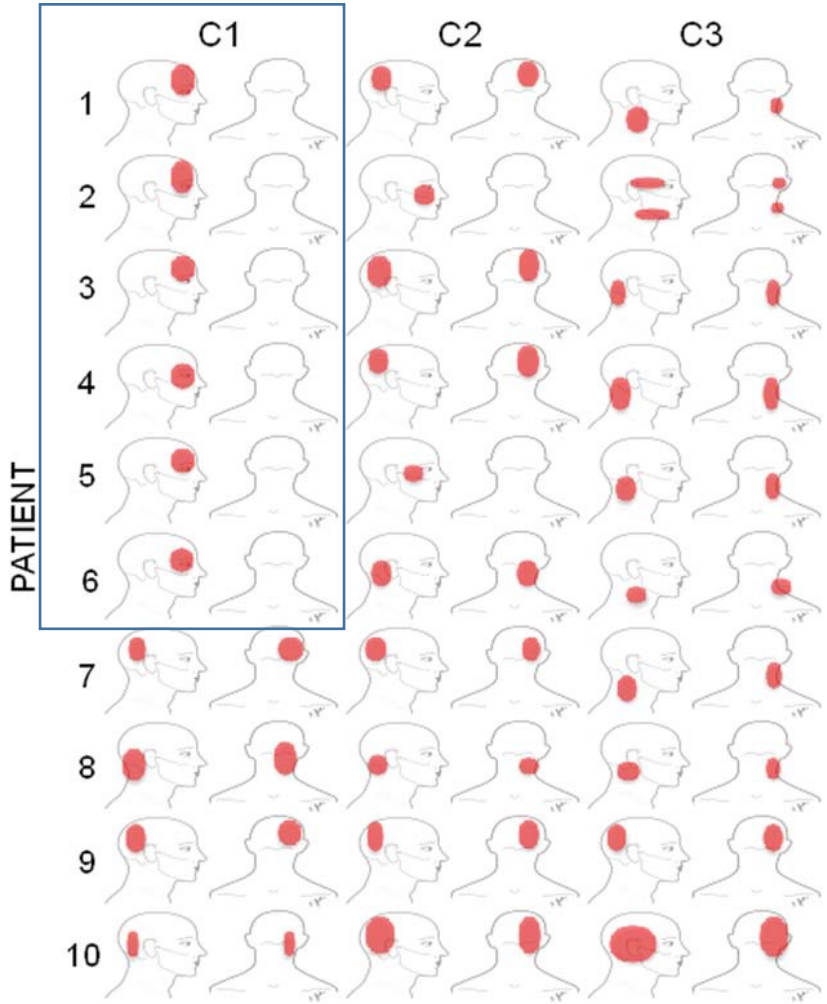
REFERRED HEAD PAIN AND ITS CONCOMITANTS*

REPORT OF PRELIMINARY EXPERIMENTAL INVESTIGATION WITH IMPLICATIONS FOR THE POST-TRAUMATIC "HEAD" SYNDROME

By Douglas G. Campbell, M.D., M.R.C.P. (Lond.)
and
Clare M. Parsons, M.S.
San Francisco

Lancet Neurol 2009; 8: 959–68
J Nerv Ment Dis 1944; 99: 544–51

Pain Referral Patterns of the C1 to C3 Nerves: Implications for Headache Disorders



"Stimulation at the C1 level evoked periorbital and frontal pain in 6 of 6 patients with migraine but evoked occipital or cervical pain in those without migraine."

Ann Neurol 2013;74(1):145-8

Pain 118 (2005) 92–96

PAIN

www.elsevier.com/locate/pain

Suboccipital injection with a mixture of rapid- and long-acting steroids in cluster headache: A double-blind placebo-controlled study

Anna Ambrosini[a,*], Michel Vandenheede[b], Paolo Rossi[c], Fulvio Aloj[d], Enzo Sauli[e], Francesco Pierelli[f,g], Jean Schoenen[h]

"The mechanisms by which steroid injections in the GON area may produce their effect are not known."

"The possibility that the steroid might act systemically and that the suboccipital injection site does not provide any advantage has not been ruled out."

"We are planning a double blind trial comparing suboccipital and intramuscular injections of the same mixture of long- and rapid-acting steroids used in the present study to verify this hypothesis."

Cushing Syndrome Induced by Serial Occipital Nerve Blocks Containing Corticosteroids

Patrick J. Lavin, MD; Robert Workman, MD

A patient with chronic daily headaches developed overt signs of Cushing syndrome during treatment with serial occipital nerve block injections. Investigation demonstrated an exogenous source of corticosteroids as the cause of the Cushing syndrome in this patient, thus, implicating the corticosteroid component of the occipital nerve blocks. To our knowledge, this is the first report of Cushing syndrome caused by occipital nerve blockade. Caution is warranted in employing even usual therapeutic doses of synthetic corticosteroids, particularly in long-acting or depot preparations.

Key words: Cushing syndrome, greater occipital nerve block, corticosteroids

(*Headache* 2001;41:902-904)

High-Volume Anesthetic Suboccipital Nerve Blocks for Treatment Refractory Chronic Cluster Headache With Long-Term Efficacy Data: An Observational Case Series Study

Todd D. Rozen, MD, FAAN

Table 1.—Patient Demographics and Treatment Response

Patient gender (M or F)	Years with CCH	Average attack frequency per day	Current smoking history (Y/N)	Number of HVSON total	Average duration of response in weeks	Complete resolution with blocks (Y/N)	Adverse event	Past tried CH preventive medication
1 F	14	2	Y	2	28 (long 44)	Y	None	V, G, SV, T
2 M	30	3	N	15	12	Y	None	V, L, SV, P, T, M, V, Me
3 M	14	5	Y	30	6	Y	Avascular Necrosis	V, G, T, L, C, O, Me, SV
4 M	3	3	Y	3	1.5	Y	None	V, T, SV, SO, G, C, L
5 M	2	2	Y	2	2	Y	None	V, T, SV, L
6 M	6	2	N	3	31 (long 44)	Y	None	Mg, L, SV, V
7 M	5	3	Y	2	0	N	None	T, V, SV, L, B, CC, C, G, O
8 M	6	2	Y	3	4	Y	None	V, T, SV, G, L
9 M	4	2	Y	17	4	Y	None	V, L, SV, T, C, OT, CC
10 M	4	4	y	10	4	y	None	V, G, T, L, C, B, Me, SV, OT, SO, CC

B = baclofen; C = clonidine; CC = clomiphene citrate; G = gabapentin; L = lithium; M = mirtazapine; Me = methylergonovine; Mg = methysergide; O = olanzapine; OT = onabotulinum toxin A; P = pregabalin; SO = sodium oxybate; SV = sodium valproate; T = topiramate; V = venlafaxine; v = verapamil.

Headache 2019;59(1):56-62

Headache and the greater occipital nerve

Michael Anthony

TABLE 1

CONTROL OBSERVATIONS IN PATIENTS WITH OCCIPITAL NEURALGIA (ON) AND 'MIGRAINE AND GON IRRITATION' (MON)

	ON	MON
Local anaesthetic during headache	50	50
Headache relieved	42	44
Local anaesthetic during headache freedom	20	20
Headache returned	20	20
	4–24 h	3 h to 3 days
Depomedrol intramuscular		
Headache returned	20	20
	6–24 h	5 h to 3 days

Clin Neurol Neurosurg 1992;94(4):297-301

Anthony M. Arrest of attacks of cluster headache by local steroid injections of the occipital nerve. In: Clifford Rose F, editor. Migraine: clinical and research advances. Basel: Karger, 1985:168–73

Conclusion

“Nerve blocks are generally well tolerated and may provide rapid pain relief that can last up to days or weeks”

“The upper cervical nerve roots are anatomically and functionally connected to trigeminal pathways with convergence in the trigeminocervical complex”

“Peripheral nerve blocks, especially occipital nerve blocks, are a viable treatment option for migraine and cluster headache”

“Technique varies but nerve blocks usually involve administration of local anesthetic with or without corticosteroid”

“Local anesthetics inhibit conduction in the sensory nerve fibers within mixed nerves, but headache relief often far outlasts the duration of action of local anesthesia”

“The precise mechanism underlying prolonged headache relief following nerve blocks is unknown, but may involve central pain modulation”

Headache 2022;62:1077–1092


The End