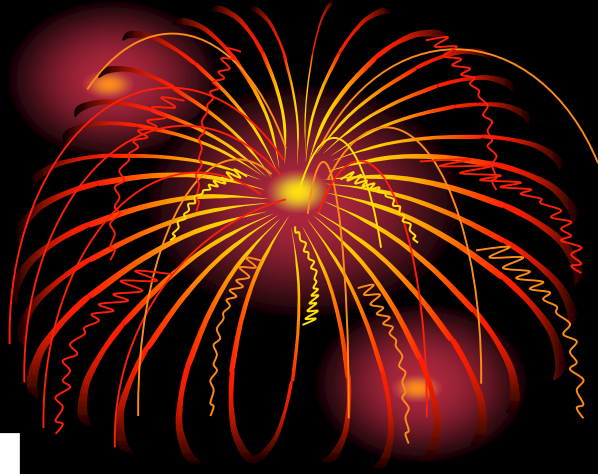

THE MISSED DENTAL INJECTION
AN ANATOMICAL REVIEW©

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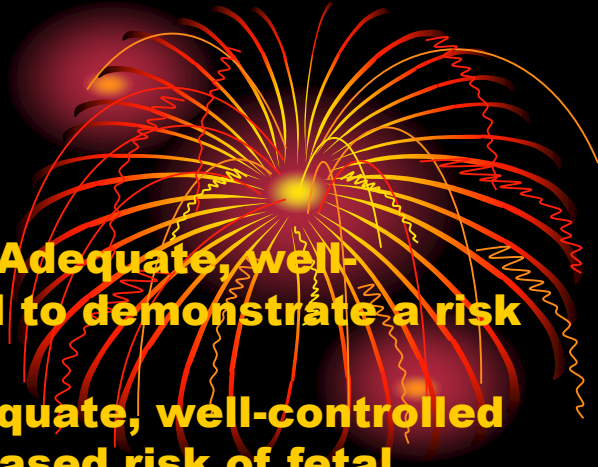
Review of common Local Anesthetics

- Short Duration
- Moderate Duration
- Long Duration
- “Permanent”

Local Anesthetic	Trade Names	Max dose in Adult	Max dose in child (est 15kg/33lbs)	Duration of action	PRC	Metabisulfite	drug interactions
Lidocaine 2% w/epi	Xylocaine,Octocaine Lingospan, Alphacaine	7mg/kg 500mg max 13 cartridges	4-7mg/kg 105mg max 2.9 cartridges	60-190 minutes	B	yes	Increased BP, Beta blockers tricyclic antidepressants halothane,cocaine
Mepivacaine 3% plain	Carbocaine,Polocaine, Scandonest,Isocaine	6.6mg/kg 400mg max 7 cartridges	same as adult 1.8 cartridges	25-160 minutes	C	no	none known
Mepivacaine 2% w/ levonordefrin	same as above with Neo-Cobefrin	6.6mg/kg 400mg max 11 cartridges	same as adult	50-185 minutes	C	yes	same as epi no tricyclics at all
Prilocaine 4% plain	Citanest	8mg/kg 400mg max 8 cartridges	same as adult	20-190 minutes	B	no	Methemoglobinemia
Prilocaine 4% w/epi 1:200,000	Citanest Forte	8mg/kg 400mg max 8 cartridges	same as adult	40-220 minutes	B	yes	Same as Epi Methemoglobinemia
Articaine 4% w/epi 1:200,000 1:100,000	Septocaine, Septanest N Septanest SP Ultracaine forte	7mg/kg 500mg max 7 cartridges	5mg/kg 3 cartridges	60-230 minutes	C	yes	Same as Epi Methemoglobinemia
Bupivacaine 0.5% w/epi 1:100,000	Marcaine	2mg/kg 200mg max 10 cartridges	same as adult not generally rec	40-440minutes	C	yes	Same as Epi
Etidocaine 1.5% w/epi 1:200,000	Duranest	8mg/kg 400mg max	NA	40-440	B	yes	Same as Epi



FDA Use-in-Pregnancy Ratings

A CONTROLLED STUDIES SHOW NO RISK. Adequate, well-controlled studies in pregnant women have failed to demonstrate a risk to the fetus in any trimester of pregnancy.

B NO EVIDENCE OF RISK IN HUMANS. Adequate, well-controlled studies in pregnant women have not shown increased risk of fetal abnormalities despite adverse findings in animals, or, in the absence of adequate human studies, animal studies show no fetal risk. The chance of fetal harm is remote, but remains a possibility.

C RISK CANNOT BE RULED OUT. Adequate, well-controlled human studies are lacking, and animal studies have shown a risk to the fetus or are lacking as well. There is a chance of fetal harm if the drug is administered during pregnancy; but the potential benefits may outweigh the potential risks.

D POSITIVE EVIDENCE OF RISK. Studies in humans, or investigational or post-marketing data, have demonstrated fetal risk. Nevertheless, potential benefits from the use of the drug may outweigh the potential risk. For example, the drug may be acceptable if needed in a life-threatening situation or serious disease for which safer drugs cannot be used or are ineffective.

X CONTRAINDICATED IN PREGNANCY. Studies in animals or humans, or investigational or post-marketing reports, have demonstrated positive evidence of fetal abnormalities or risks which clearly outweighs any possible benefit to the patient.

Local anesthetic choice for various procedures

- **Routine operative (less than 1 hour, non bloody) – LA with NO vasoconstrictor, such as carbocaine or prilocaine plain**
- **Complex operative, C&B (more than 1 hour, and bloody) – LA with vasoconstrictor, such as 2% lidocaine w/ 1:100,000epi**

Local anesthetic choice for various procedures

- **Long procedures or procedures with post operative pain – Long duration LA w/ vasoconstrictor, such as 0.5% marcaine w/ epi**

“permanent” nerve block local anesthetics

- Denatured alcohol
- Glycerin
- Botox - botulinum toxin A
- Myobloc – botulinum toxin B

- All these agents generally provide 4-12 months of parathesia

Local anesthetic adjuncts

- **Noven's DentiPatch**
- **Intra Osseous injection Stabident, X-tip, & Hypo systems**
- **TENS system (transcutaneous electrical nerve stimulator)**
- **Palatal anesthesia device (Salvin)**
- **MadaJet XL *Dental***

Local anesthetic adjuncts

- Pressure controlled injection devices – the “Wand”, (Milestone); “Comfort Control Syringe”, (Midwest)
- PDL injectors – “N-Tralig” syringe
- Hypnosis
- Pre-op sedatives – nitrous oxide, Valium, Xanax, butabarbital

Local anesthesia adjuncts

- Active motion of the needle or soft tissue
- Wide area stimulation with pressure prior to injection, works by the gate control theory of pain and allows space for the fluid to expand
- 30 gauge needle for most blocks

Keys to a painless injection and a happy patient!

- Go Slow! One drop per second (and slower if the patient can feel it)
- Warm the carpules
- Inject local ahead of the needle advancing
- Avoid “sawing” the needle

Special use of Local anesthesia injections

- For diagnostic injections to find source of pain
- For control of trigger points in various neuralgias, both diagnostic and therapeutic
- Relief of pain and breaking of adhesions and releasing closed lock internal derangements in the TMJ

Special use of Local anesthesia injections

- **Extra – oral mandibular blocks for severe trismus secondary to dental infections or trauma**

Maxillary Blocks V2

- PSA-posterior superior alveolar
- MSA-middle superior alveolar
- ASA-anterior superior alveolar

Maxillary infiltration

- Anesthesia injected generally at the approximate apex/depth of vestibule
- Generally one tooth on either side of the tooth being worked on
- Provides hemostasis with LA/epi injection into gingiva

High division Maxillary blocks – complete V2

- Infraorbital – intraoral
- Infraorbital – extraoral
- Pterygo-palatine fossa – from Greater palatine foramen
- Pterygo-palatine fossa – from lateral approach through the Pterygo-maxillary fissure (a deep PSA) easier with 27ga

Common reasons for failed blocks - Maxilla

- Bone very thick – as in bruxers, clenchers, and exostosis/tori formation, and anterior teeth
- Palatal innervation
- Infection and inflammation
- Contra-lateral or co-innervation

Allergic reactions

- True reactions extremely rare to amide local anesthetics
- Most responses are Vaso-Vagal syncope, I.E. – fainting
- Recommend skin testing
- Consider cardiac 2% lidocaine
- Consider Benadryl for injection

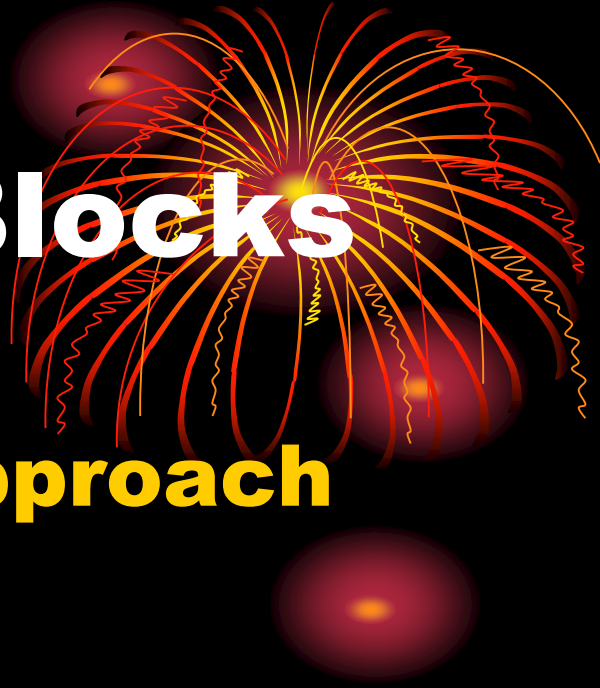
Practical use of the V2 block

- Video demonstration
- 3D conebeam case OKC Rt Maxilla

Questions?

Lunch!

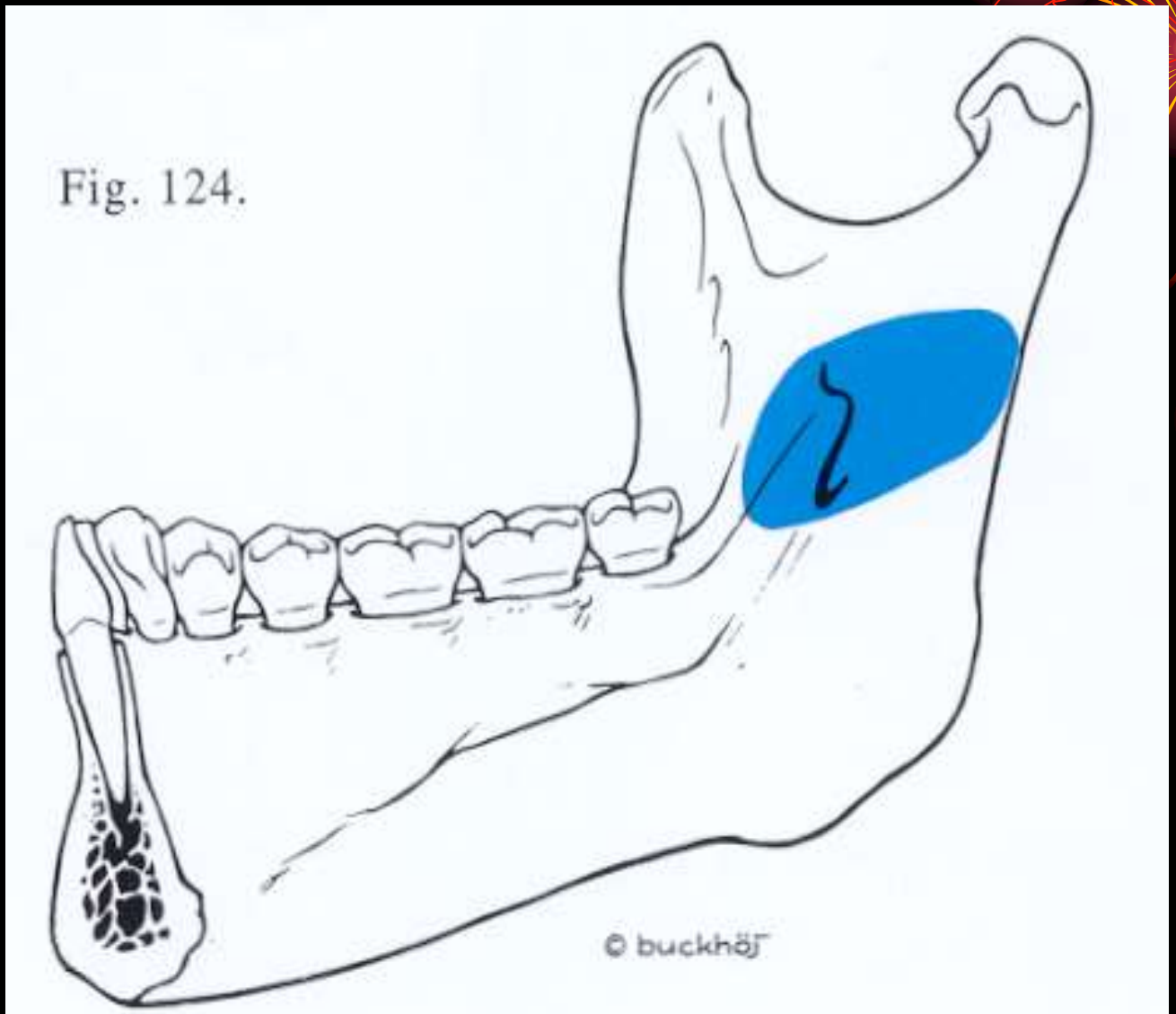
Inferior Alveolar Blocks



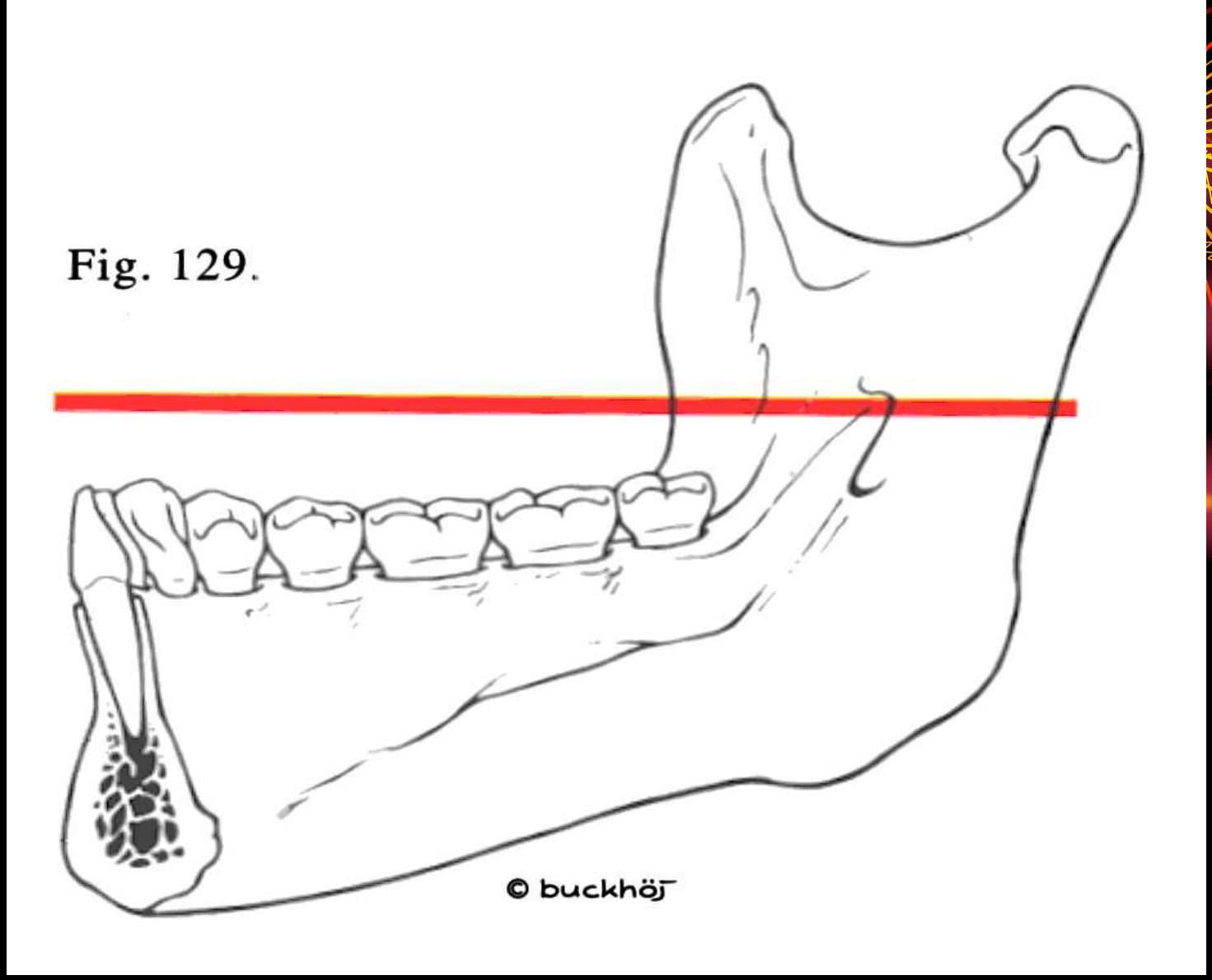
- Traditional Halstead approach (cross arch technique)
- Gow-Gates
- Akinosi
- ART- Anterior Ramus Technique
- “RPM”™ direct anatomical approach

Halstead approach Crossarch technique

- Injection at depth of Coronoid notch
- Soft tissue landmarks
  - Pterygo-mandibular raphe
  - Anterior tonsilar pillar
  - Insertion down to bone



Injection Site for Inferior Alveolar Nerve Block



The injection site is slightly above the mandibular foramen, at the level of the lingula, which is slightly above the plane of occlusion of the teeth.

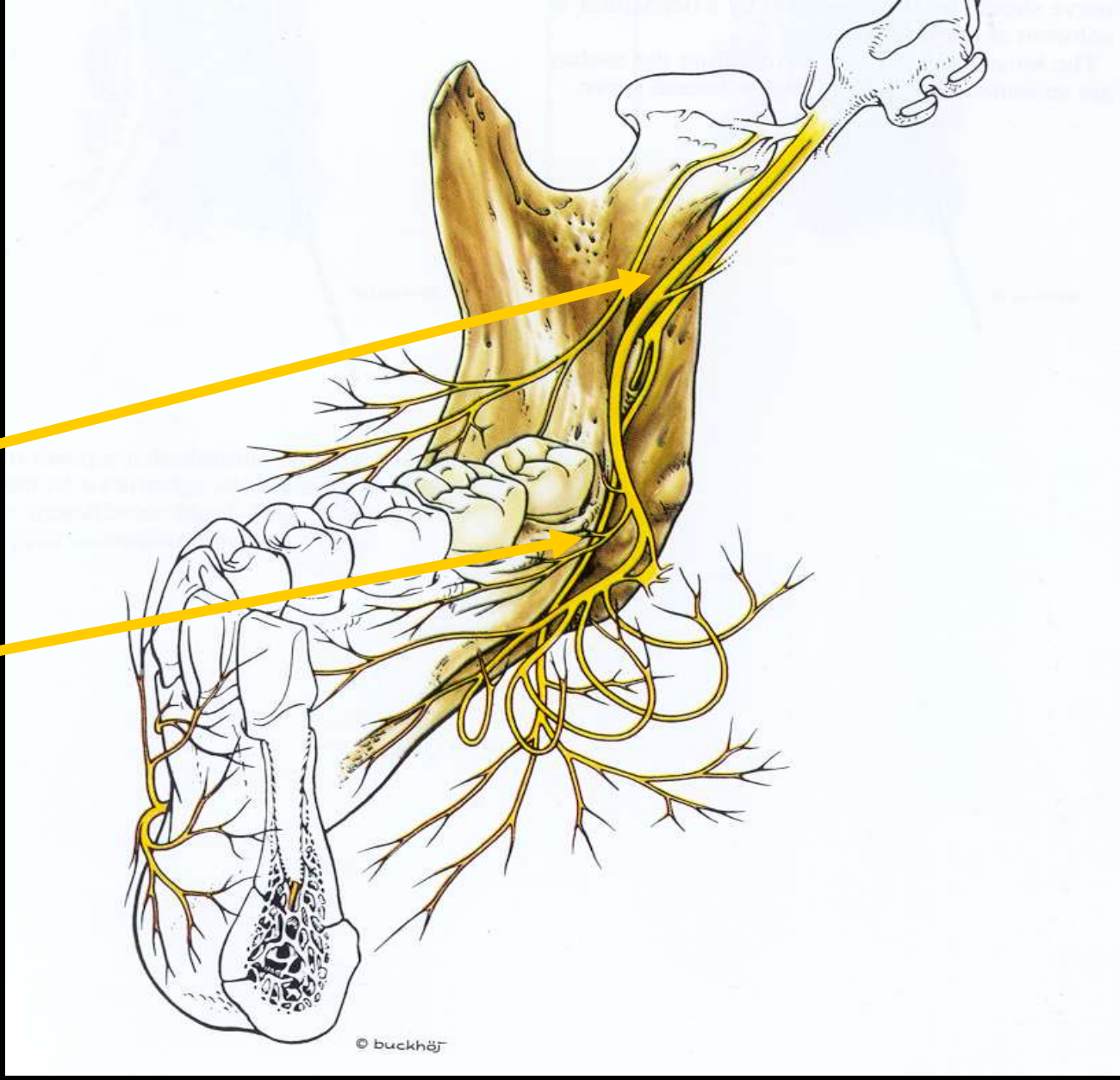
Think about this:

If I were going to miss the inferior alveolar nerve block, would I rather miss

<u>too high,</u>

or

<u>too low</u>?



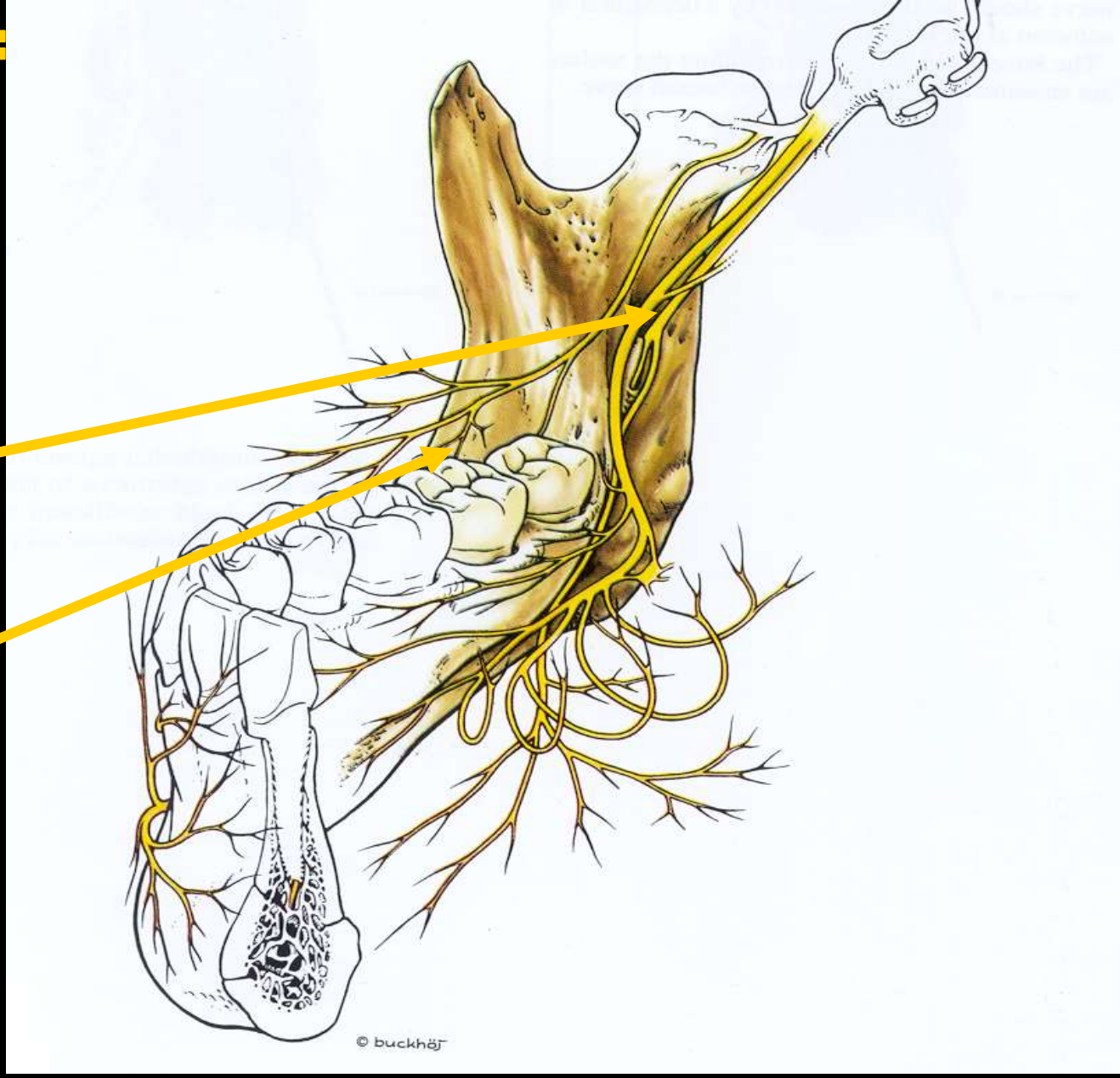
Think about this:

If I were going to miss the inferior alveolar nerve block, would I rather miss

<u>too deep,</u>

or

<u>too shallow</u>?



Major Reference Points IAN Block

- In order to understand the anatomy of the inferior alveolar nerve block, there are two important reference points:
  - Pterygomandibular raphe
  - Coronoid notch of the mandible

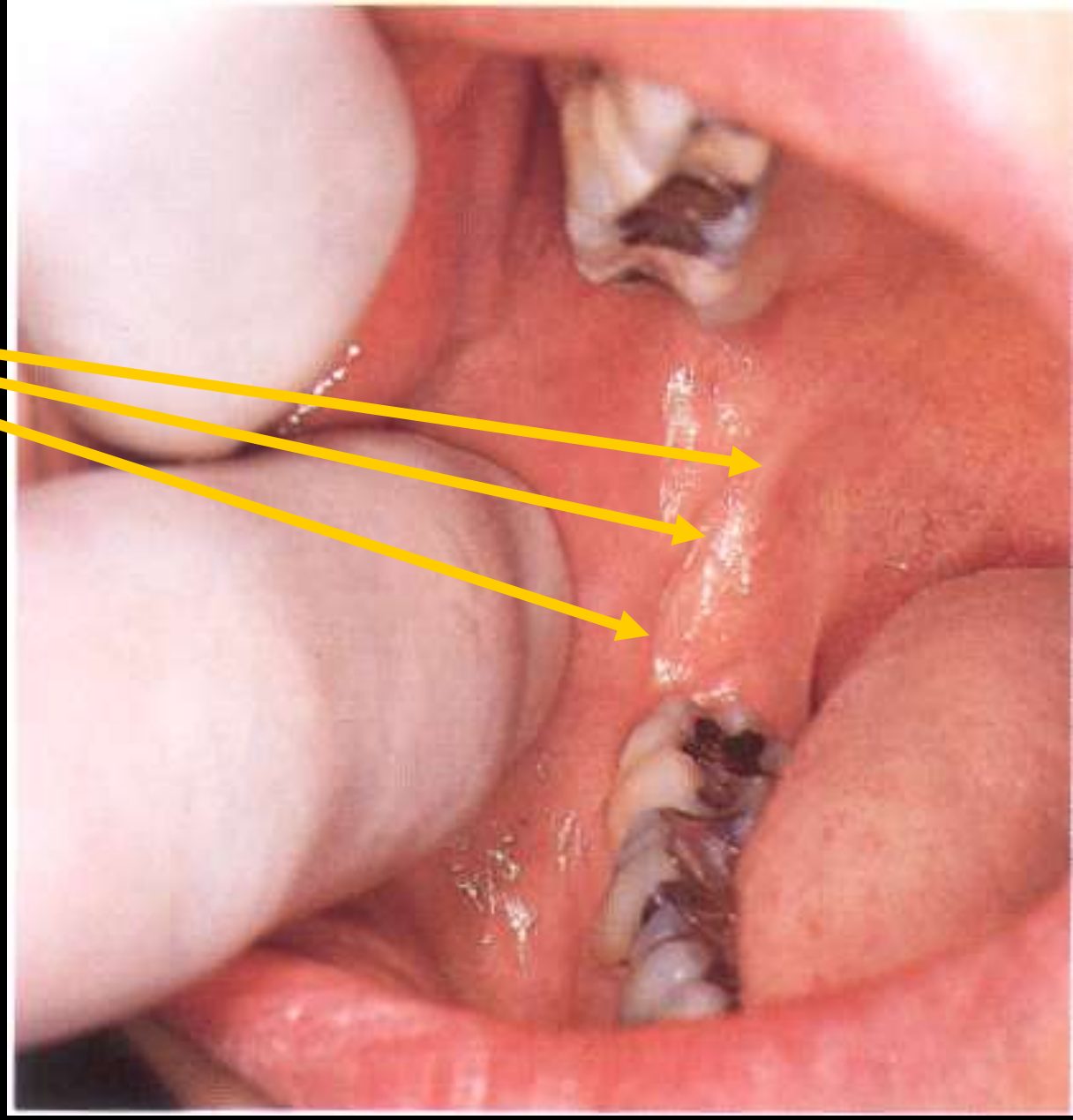
The Pterygomandibular Raphe

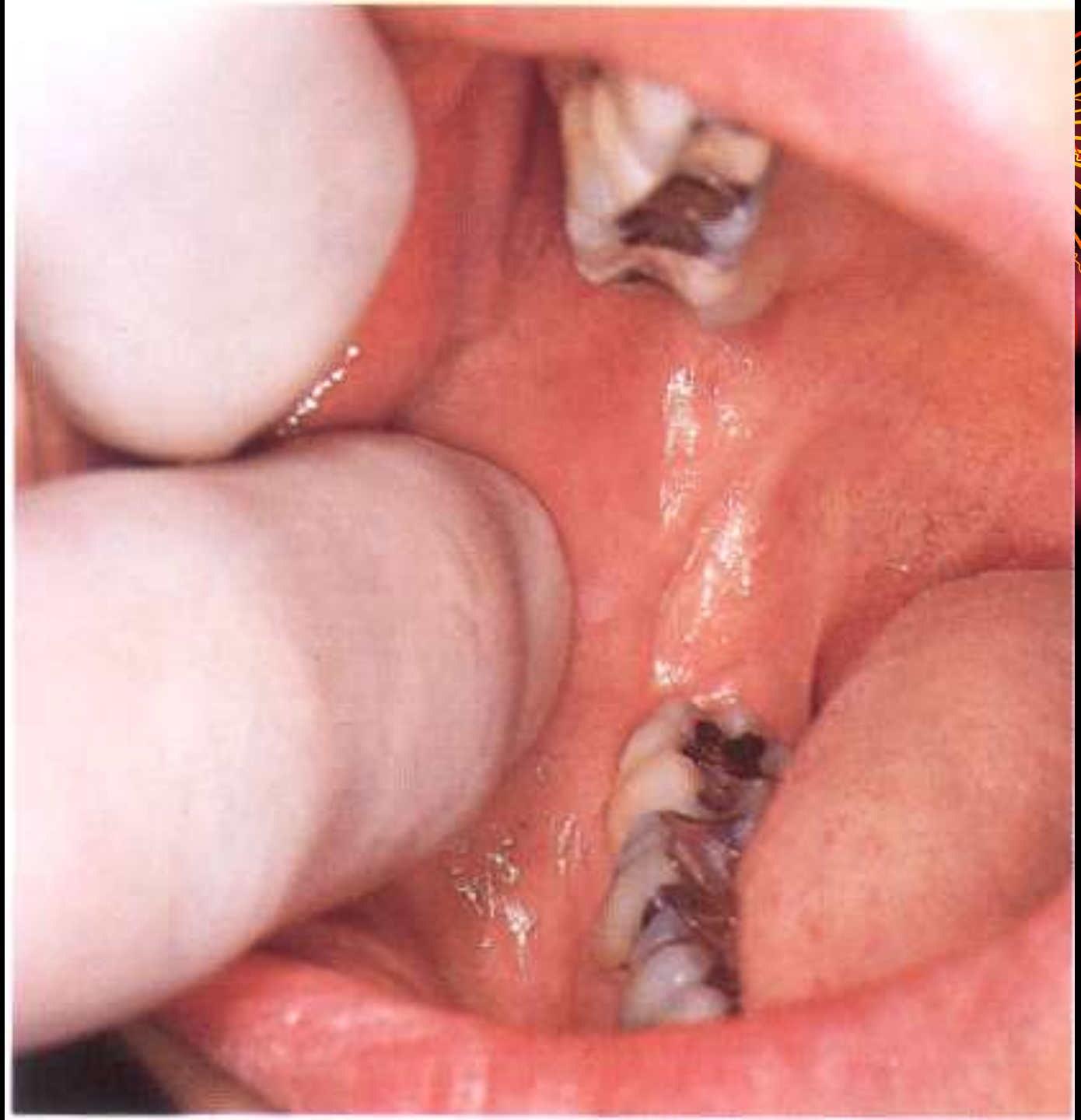
- **A ligament-type structure that connects the mandible to the skull.**

Malamed

- **If you want to really see the raphe, you must get your patient to open very wide.**

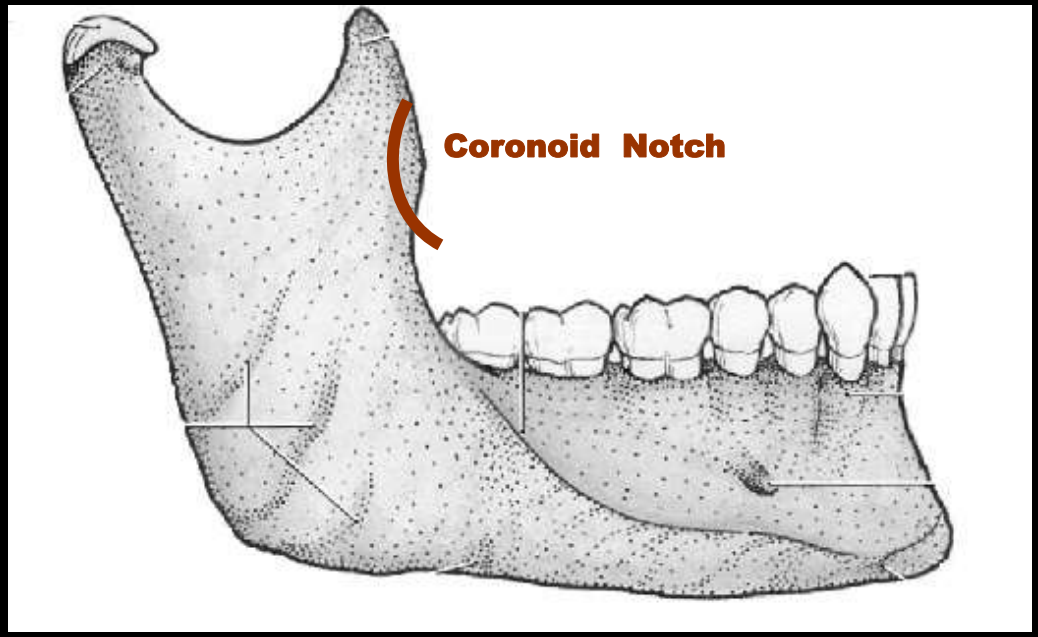
Pterygomandibular raphe





The Coronoid Notch of the Mandible

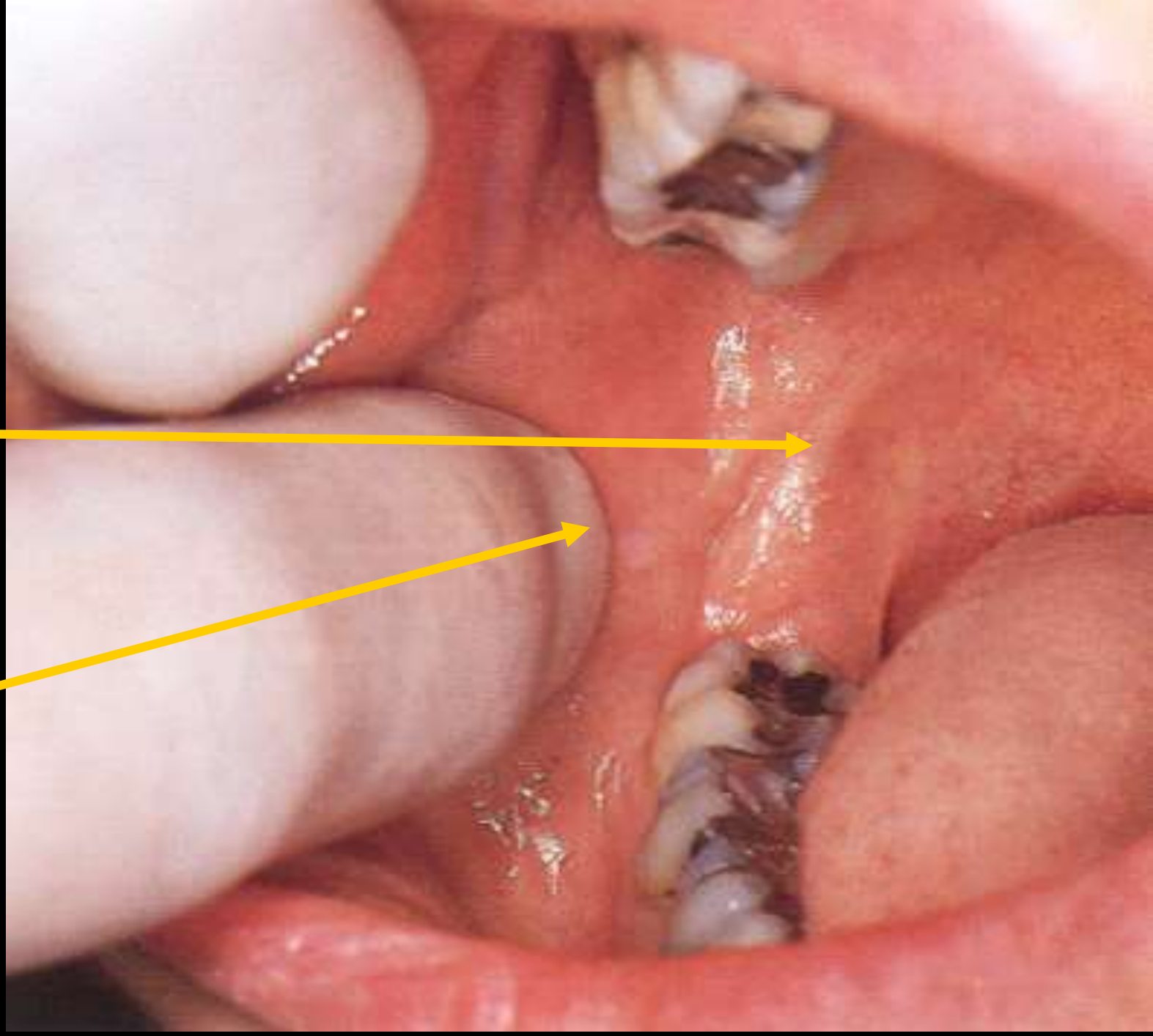
- **The coronoid notch is the concave part of the anterior border of the ramus of the mandible.**



The operator

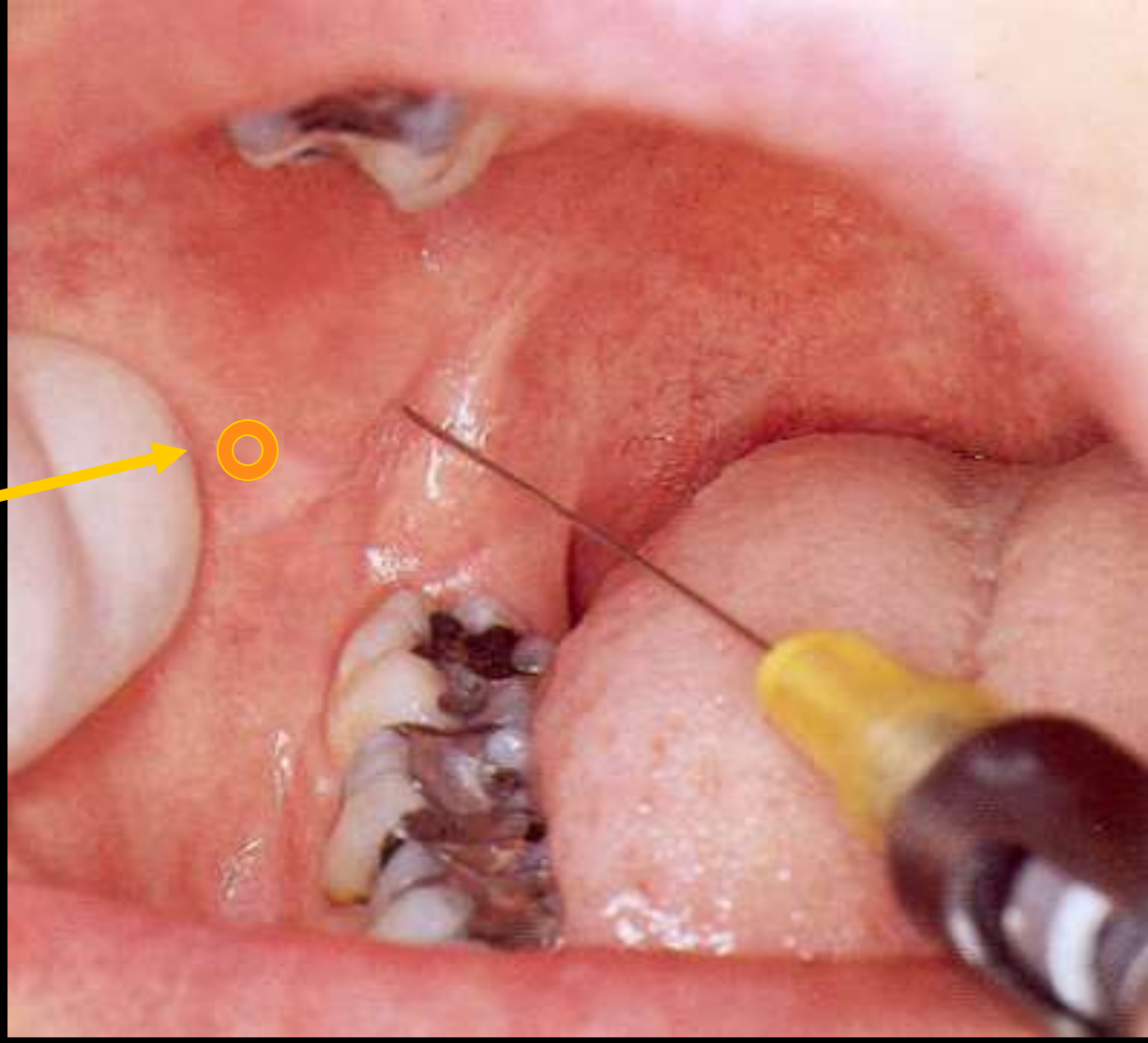
can observe the raphe,

And can feel the coronoid notch.



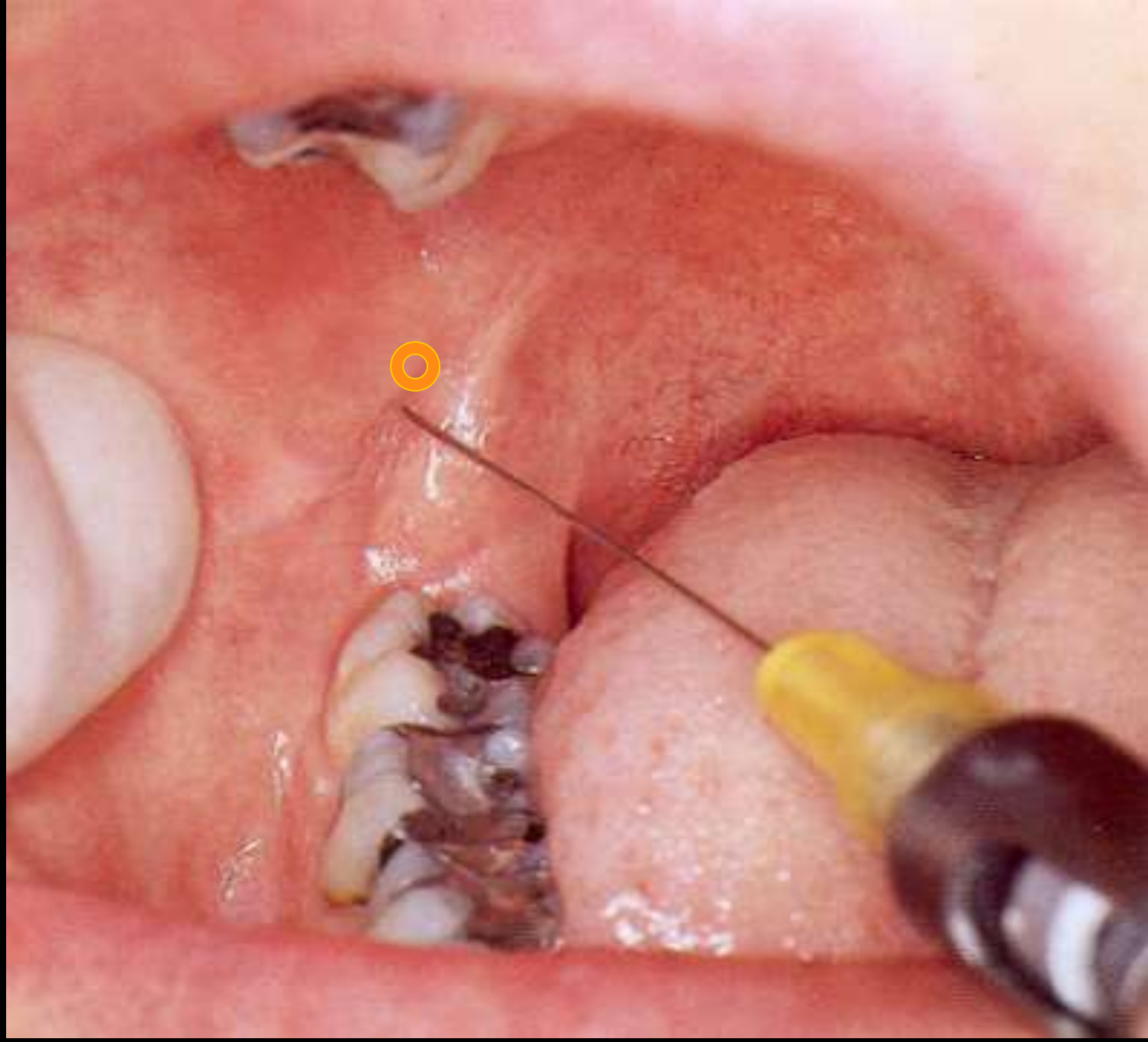
This author's depiction of inferior alveolar nerve block seems a little low.

I like to be half-way up the pterygomandibular raphe



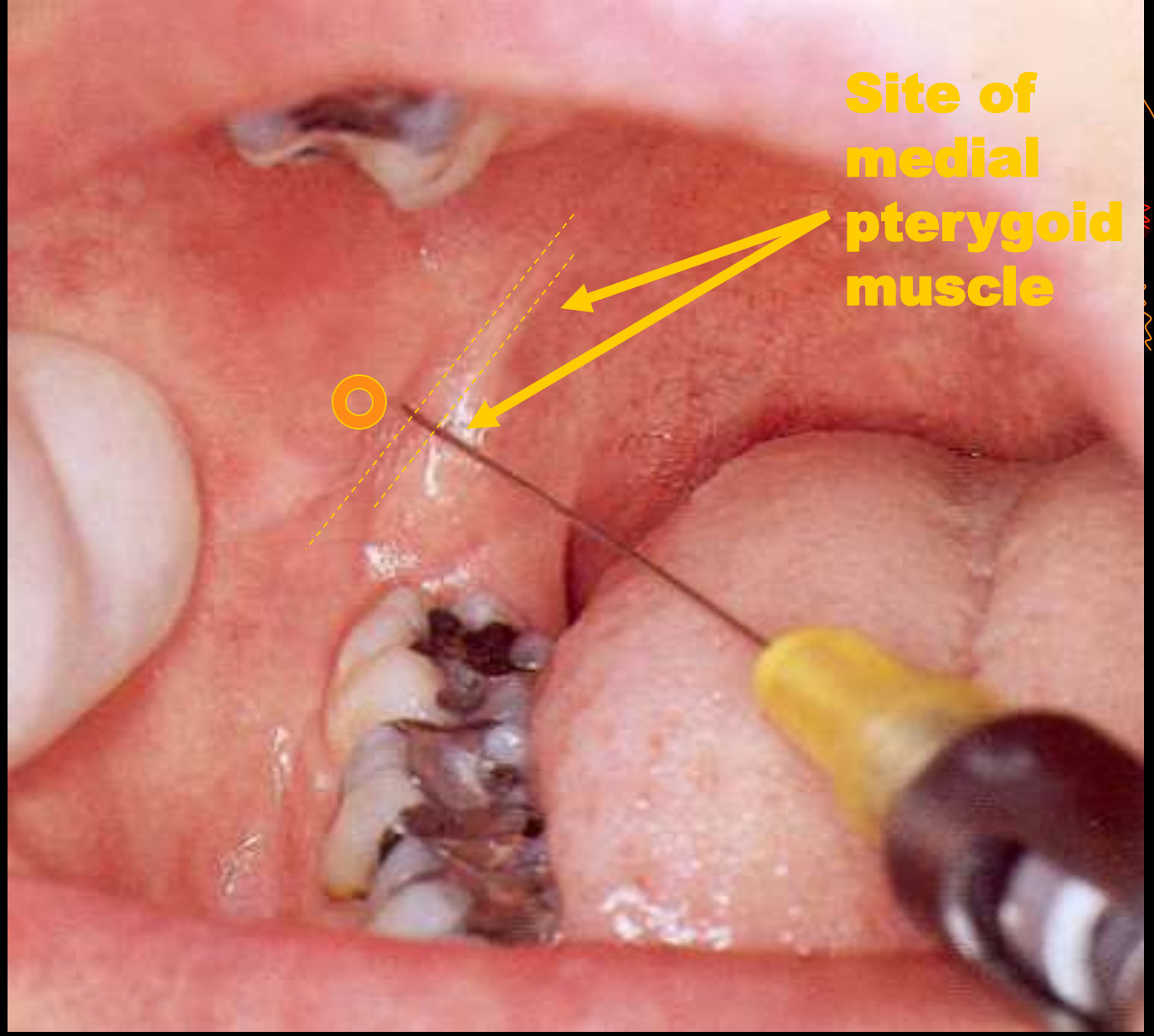
Be sure to stay just slightly lateral to the raphe.

This is important.



The reason we stay slightly lateral to the raphe is that medial pterygoid muscle lies just under the raphe.

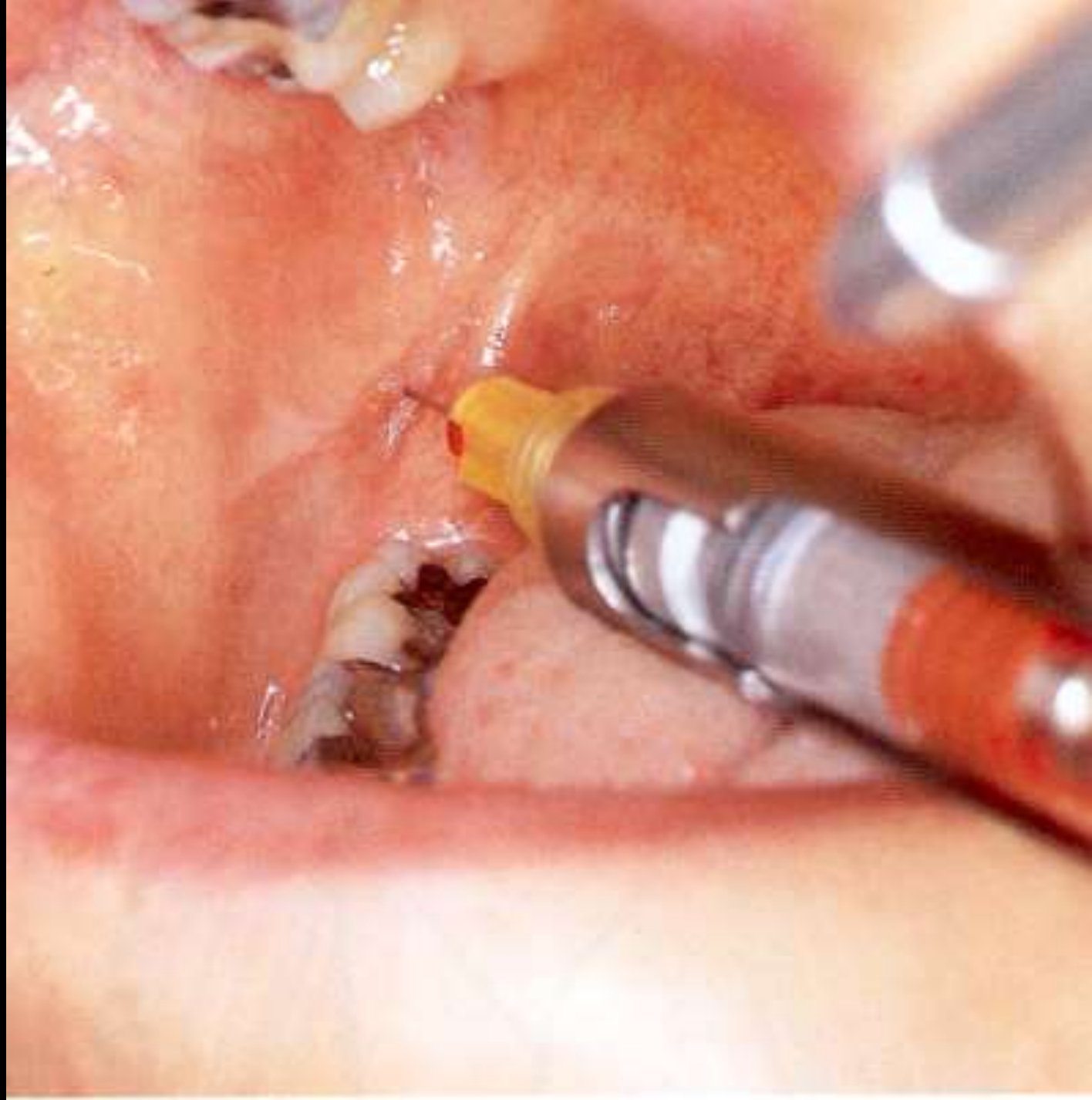
Medial pterygoid is an irritable, unhappy muscle.

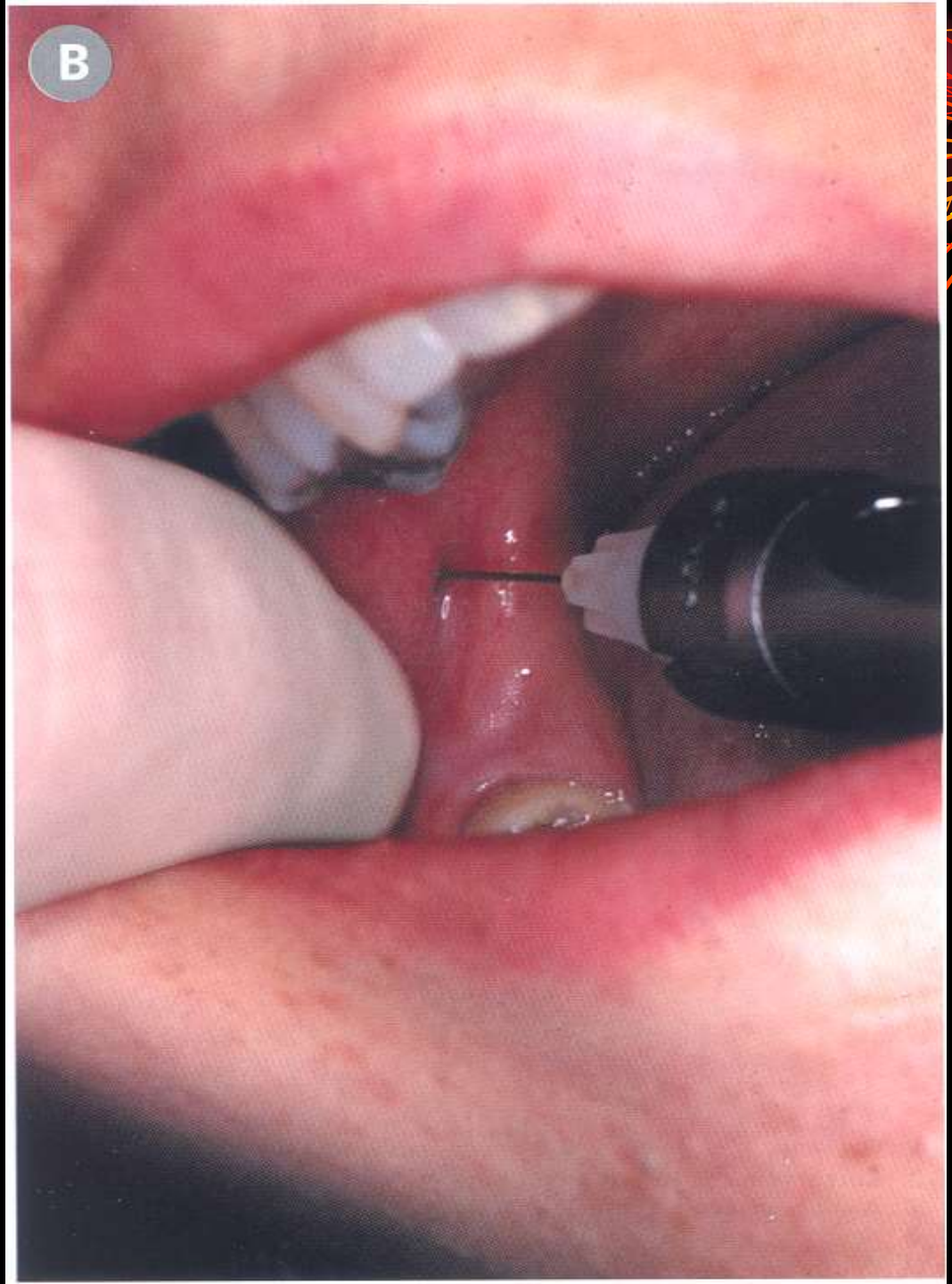


We try not to place a needle into the tissue to its hub.

¾ the length of a long needle.

If your orientation of the needle is good and you haven't struck bone at ¾ the length of a long needle, pretend you have.





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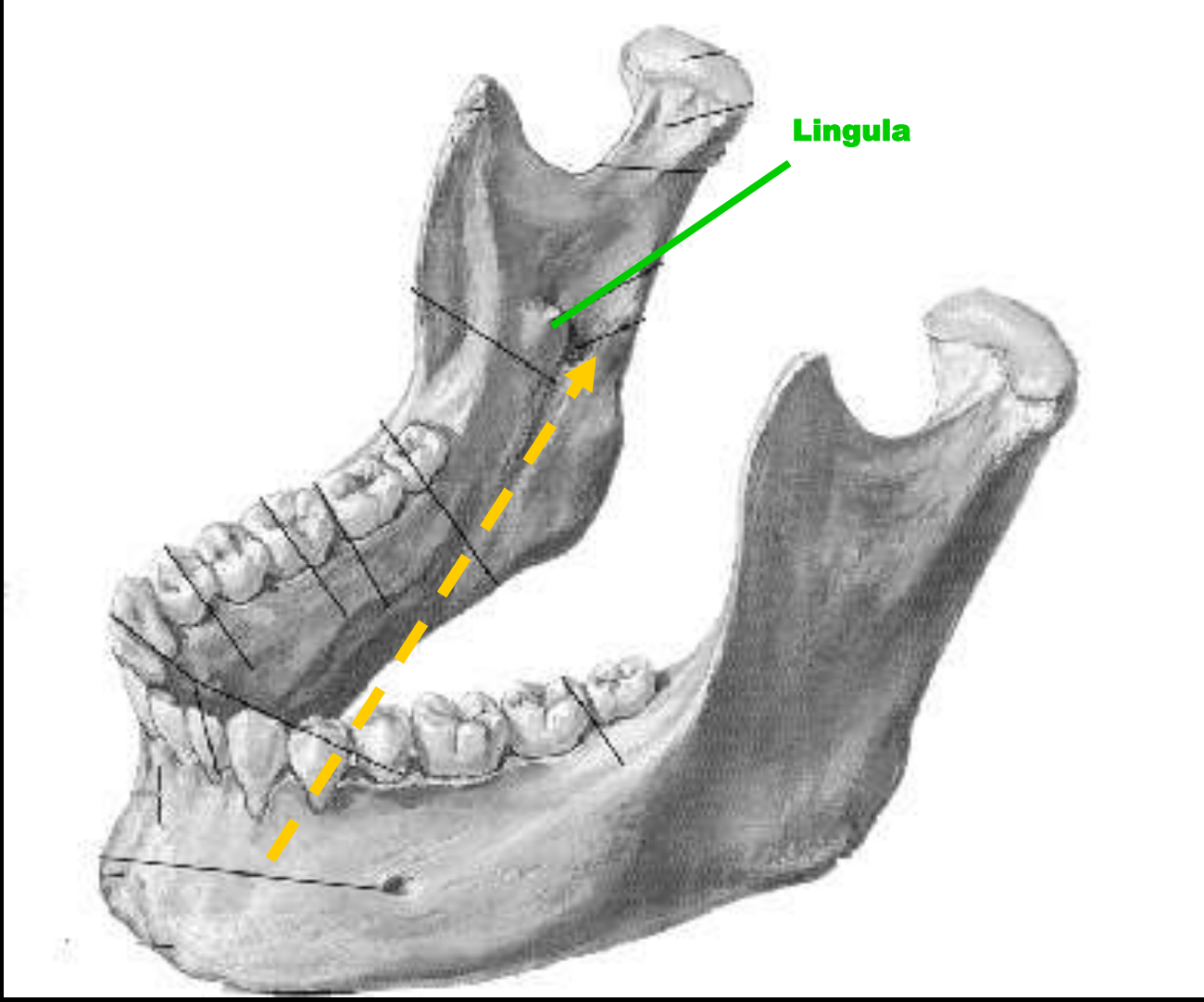
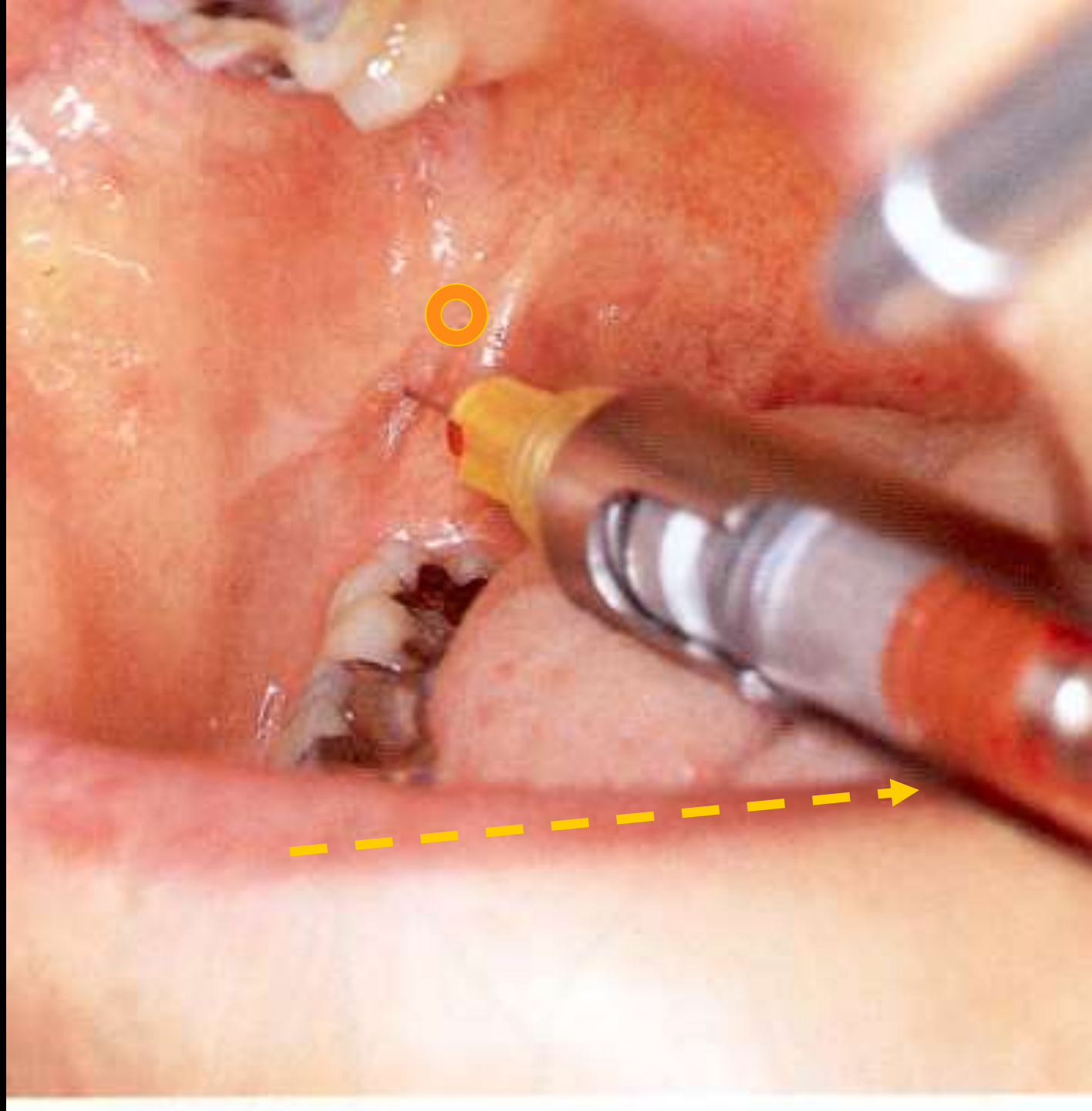
- We must avoid the tongue-shaped *lingula*, which seems to "protect" the mandibular foramen.

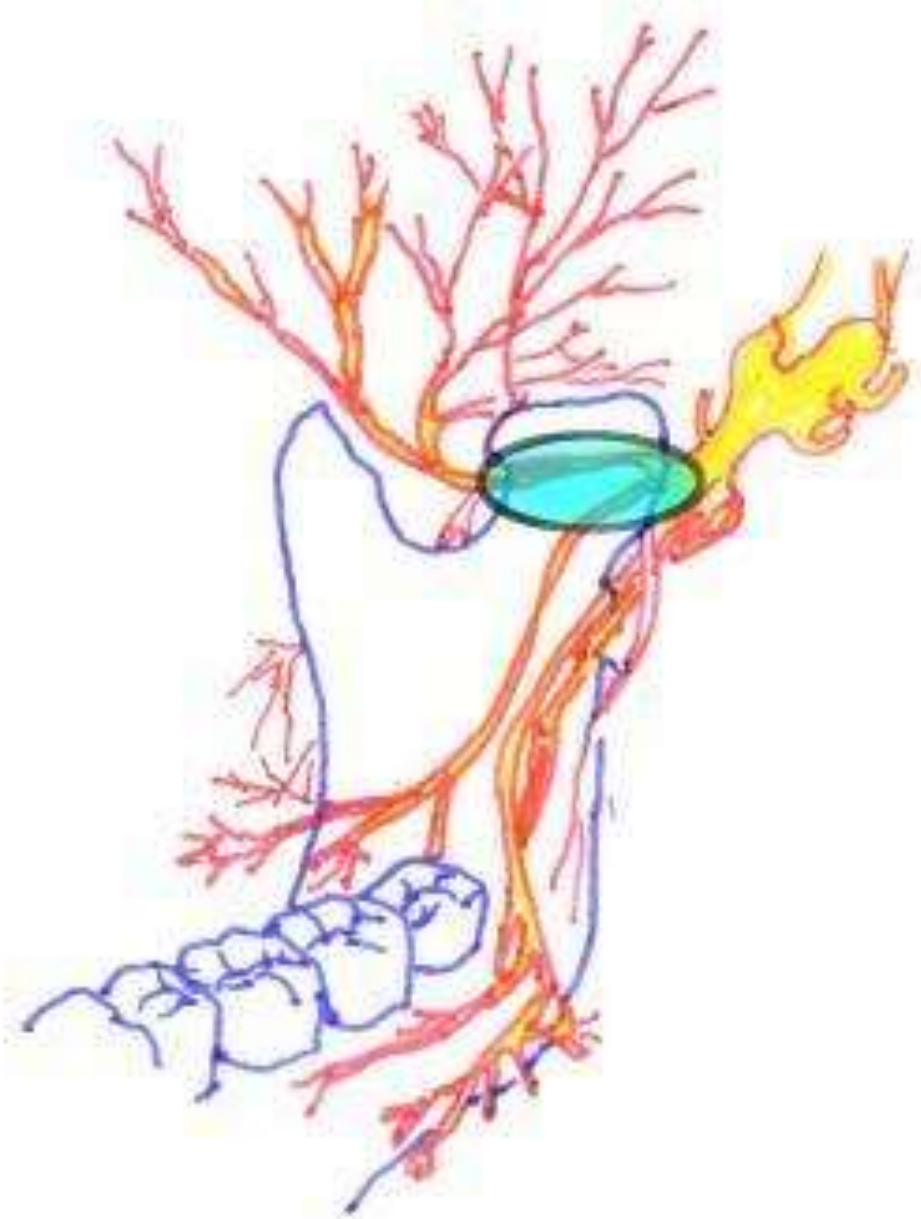


One of the reasons we place the barrel of the needle over the premolars of the opposite side is to avoid the lingula.

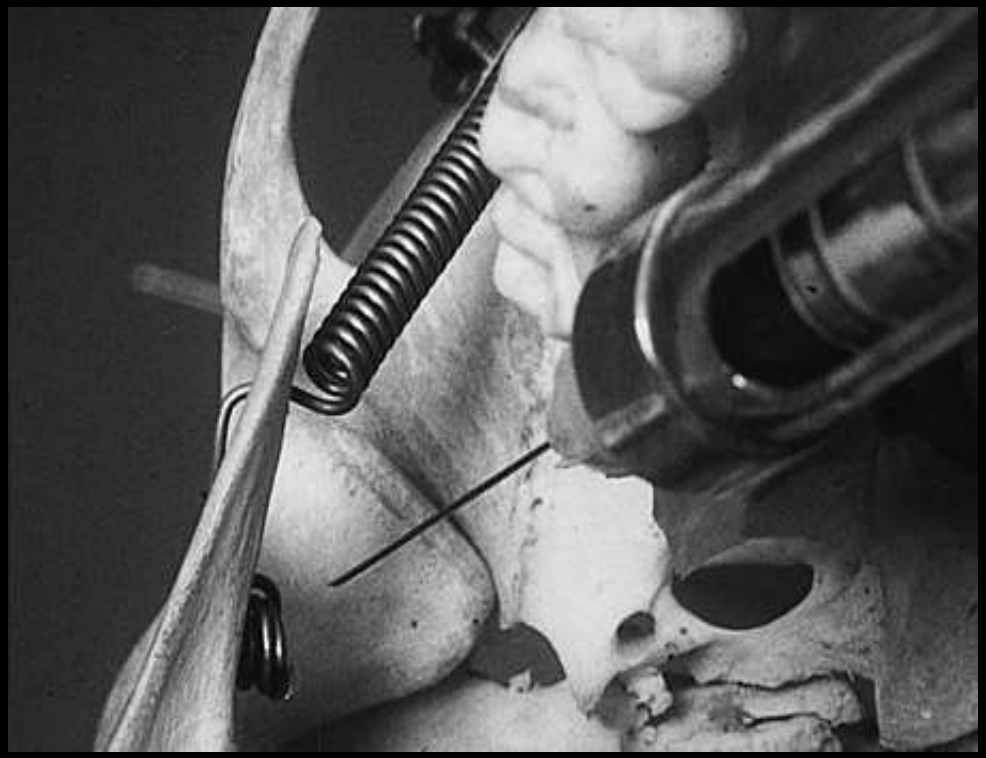


Gow-Gates

- **Alpha plane - lower border of the tragus to the corner of the mouth, joining both corners of the mouth**
- **Beta Plane - tragus of the ear with the side of the face**



Gow-Gates Technique

- 

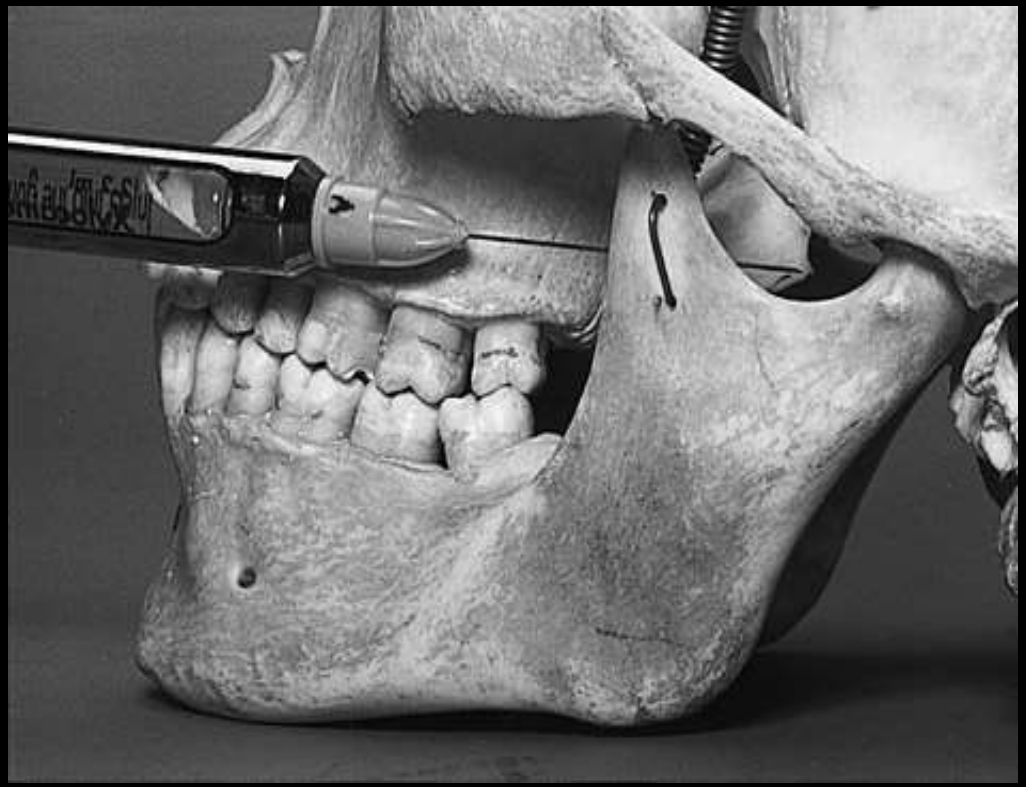
Gow-Gates

Akinosi technique

- **Orient the syringe parallel to and on a horizontal plane with the maxillary free gingiva, injection is midway between the standard technique (foramen) and the Gow-Gates**
- **<u>Done with the mouth in a closed position</u>**

Akinosi Technique

Akinosi



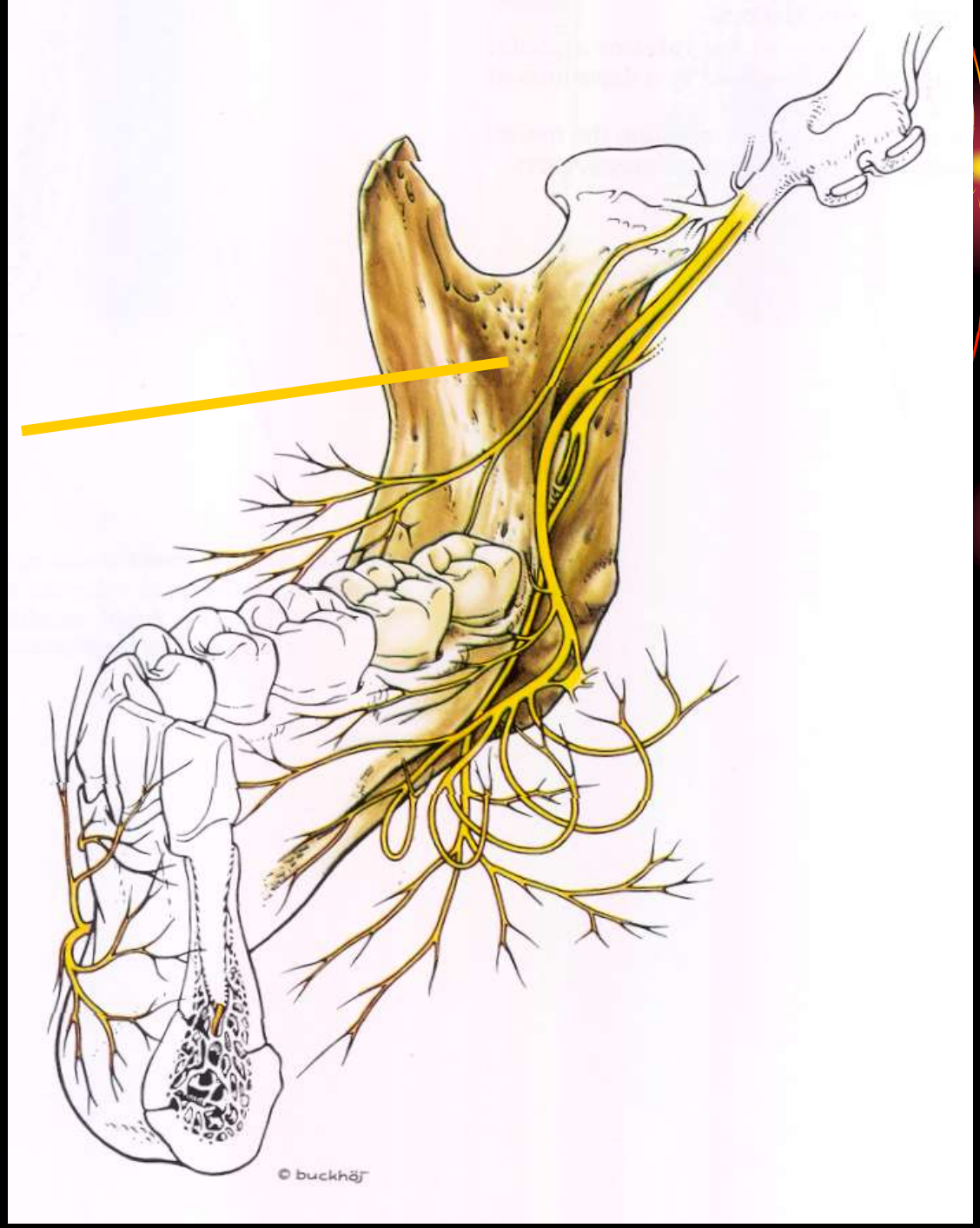
Problems/Failures of previous techniques

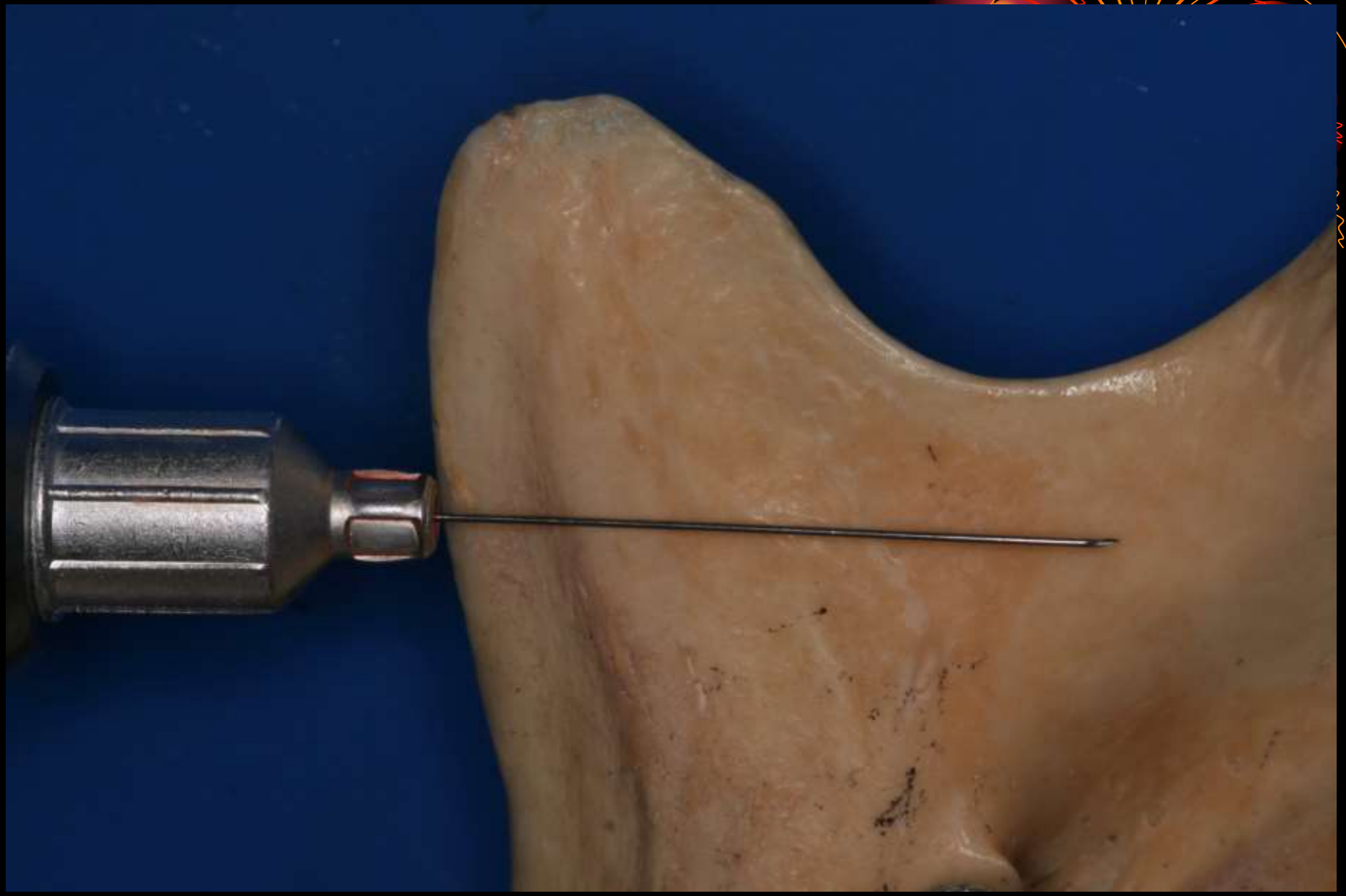
- Must use a 27 ga long needle- more risk of trauma to nerve, artery, and veins
- Based on soft tissue landmarks- which vary greatly and in many cases are not present
- High probability of intra-muscular injection--post op pain

“RPM”™ Technique

- Orient free hand on anterior border, centered on the Coronoid notch (deepest portion) and posterior ramus
- Syringe and needle align parallel to this lateral plane and enter straight in
- Redirect as needed to get around anterior border of ramus

The RPM injection avoids the lingula by injecting <u>superior</u> to it.

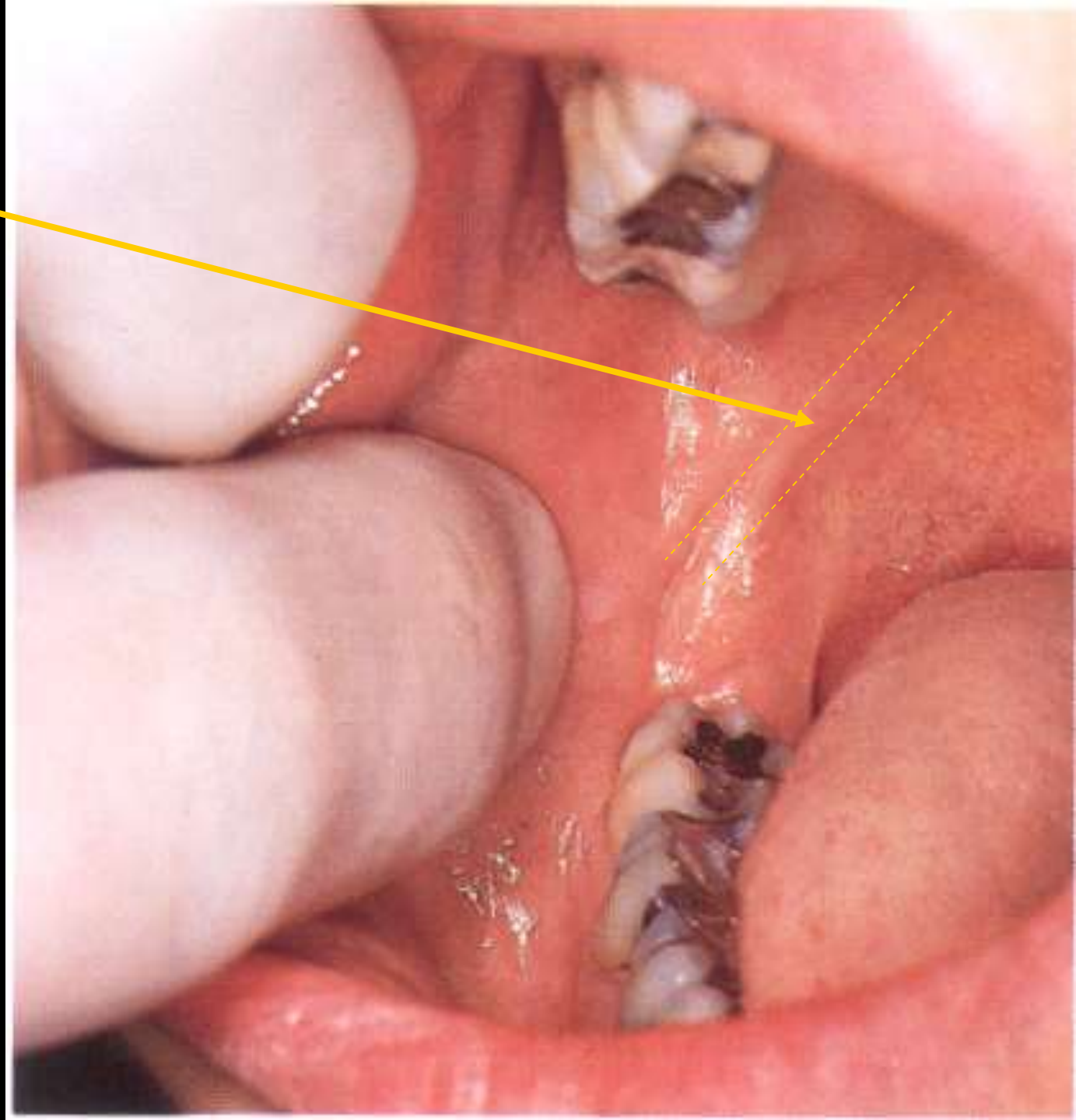




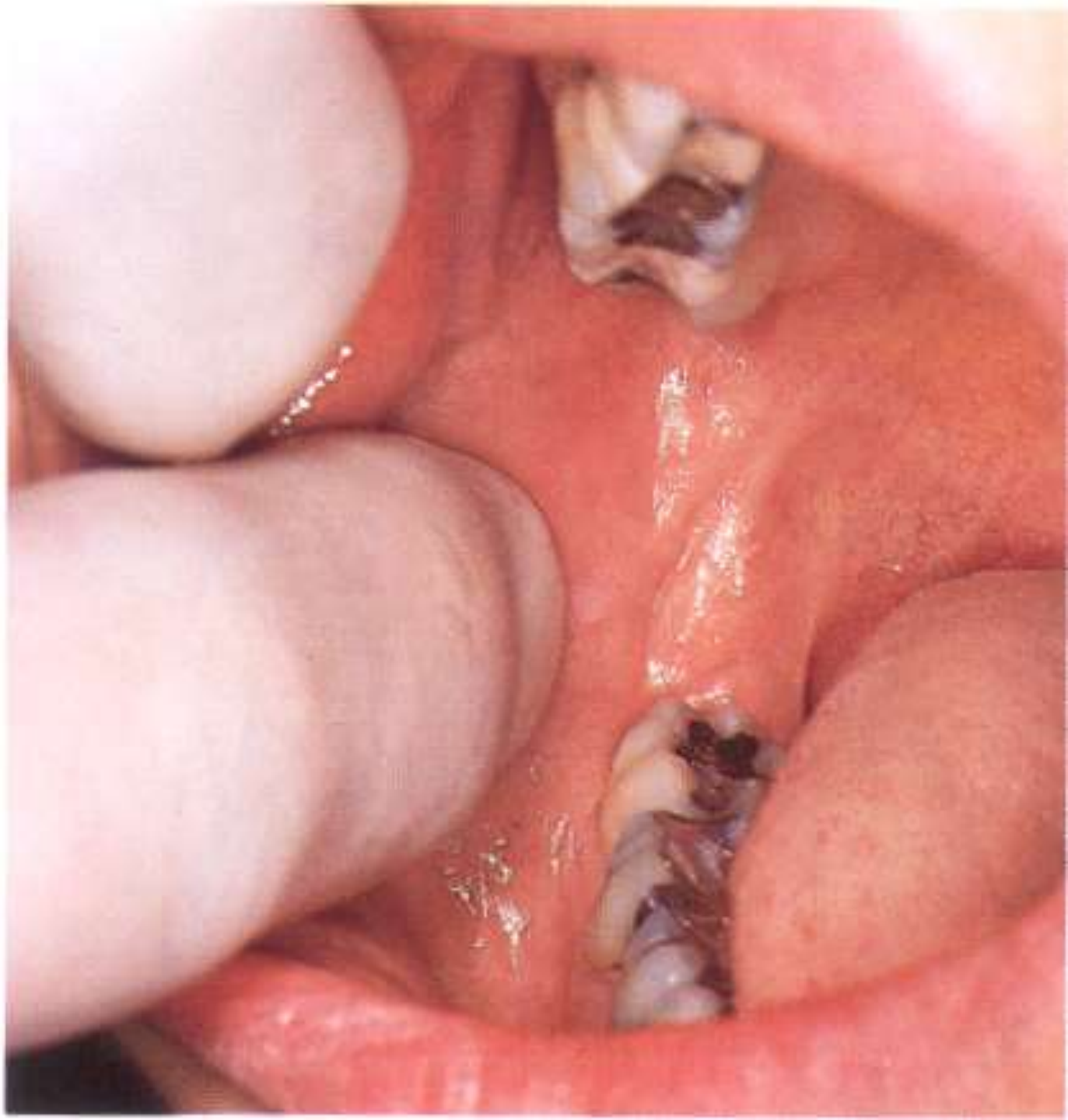
The RPM injection nicely avoids that surly medial pterygoid muscle.

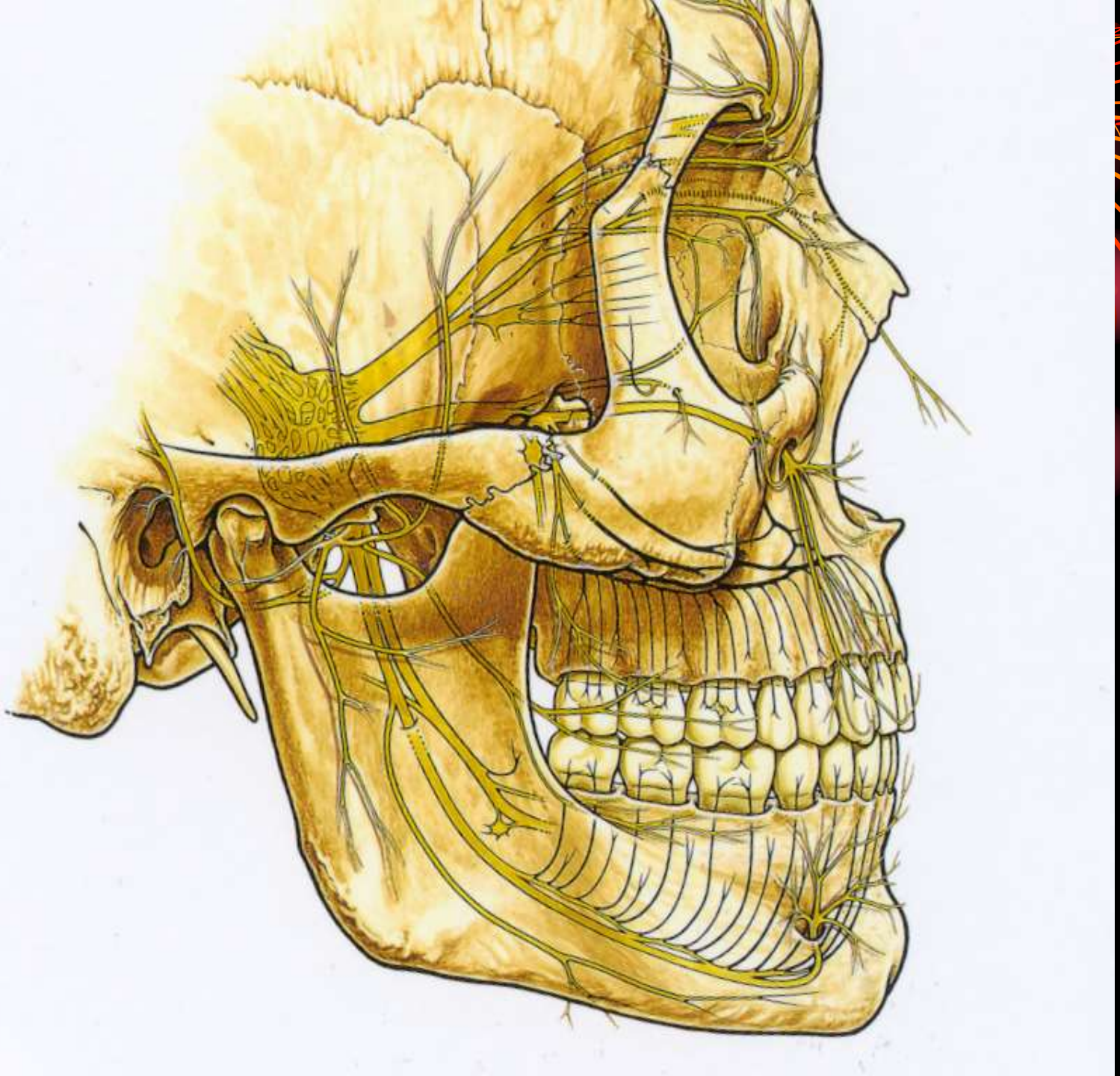
Its biggest advantage is it uses only one landmark: the bony mandible.

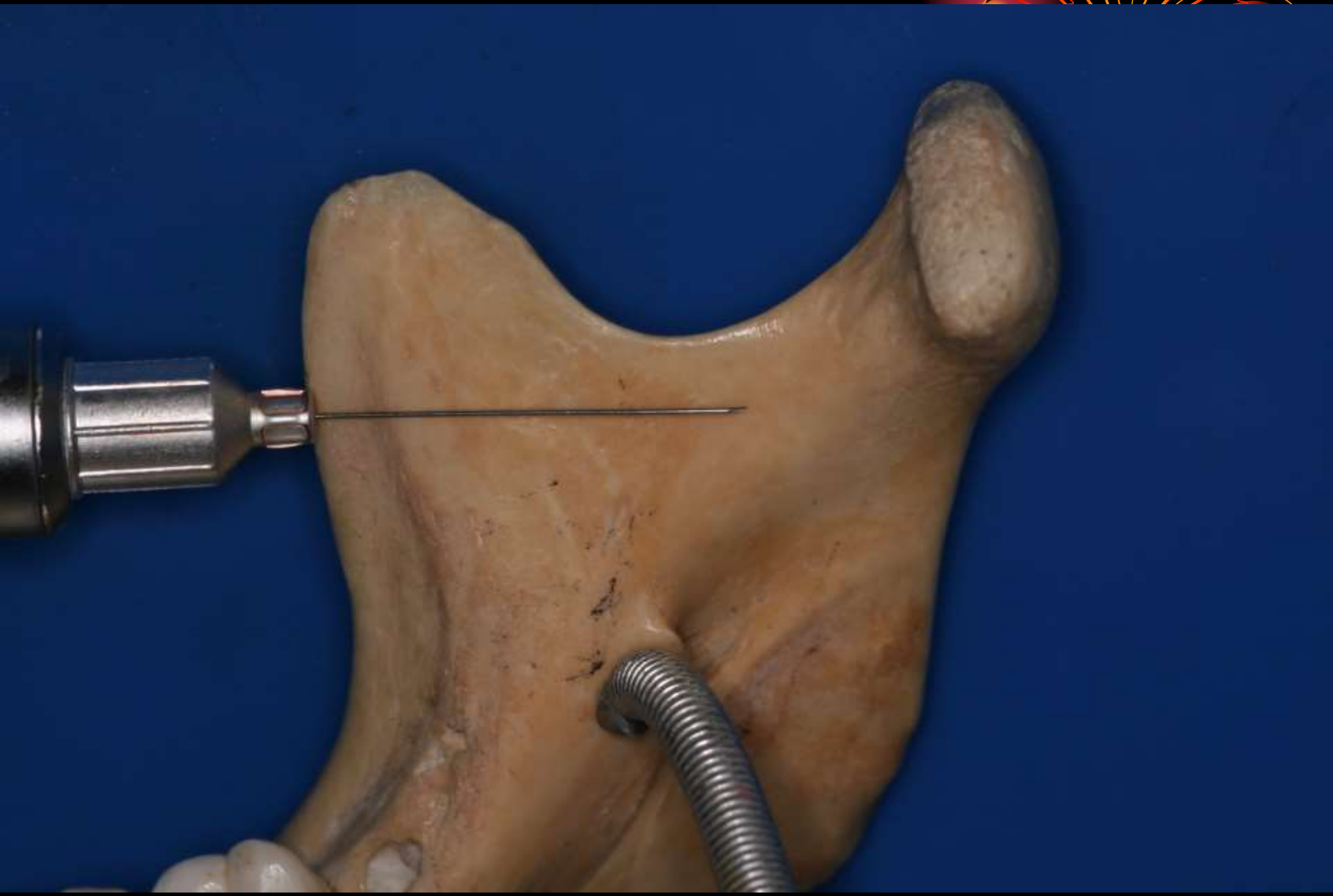
It presents only one variable, and it is not a soft tissue one, but a bony one, that can be well palpated by the operator.

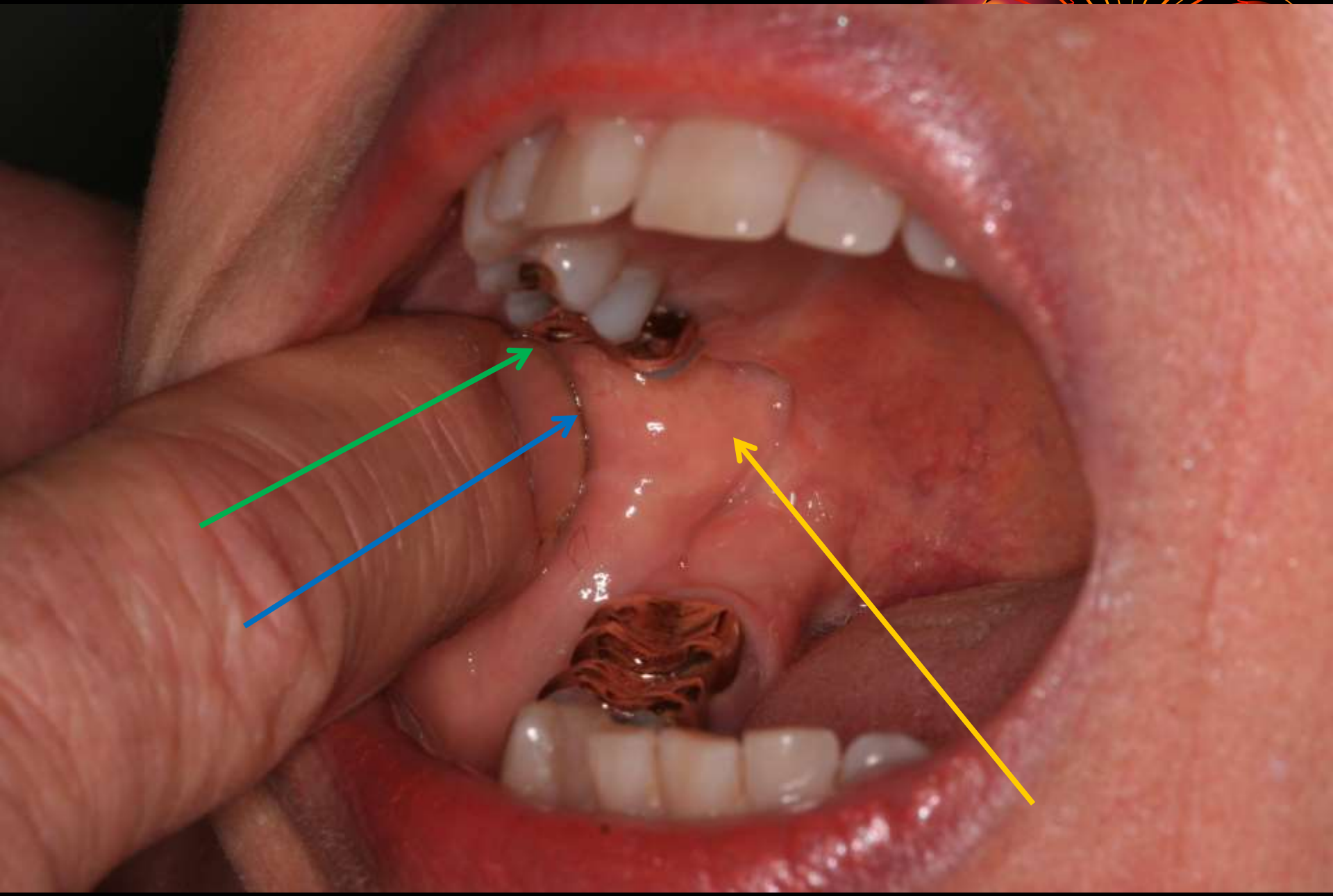


Another advantage of the RPM injection is that it will anesthetize the long buccal nerve as well as the inferior alveolar nerve, and lingual nerve with a single injection.





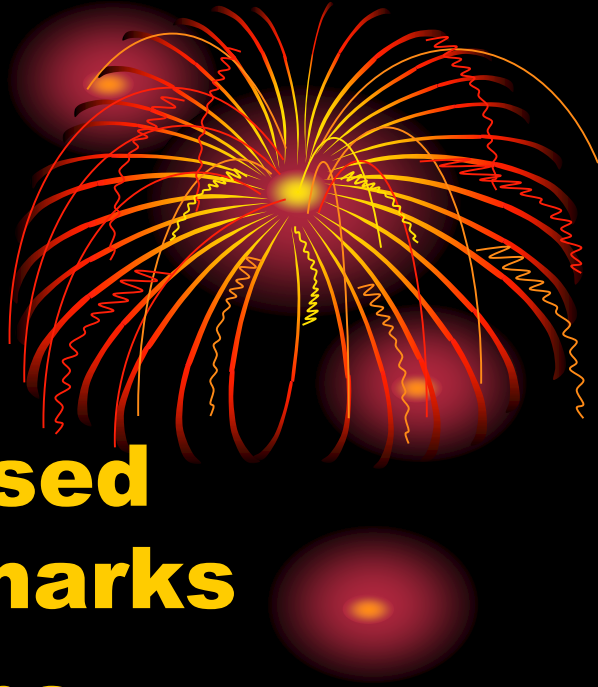




Advantages of "RPM"™ injection

- Can be preformed with a 30ga needle short (7/8" or 23MM)
- Idea depth to nerve is exactly to the hub of the 30ga needle (3/4 the length of a 27ga long)
- Can be perform with the mouth open, closed, or with a bite block in place

Advantages



- Injection landmarks based entirely on boney landmarks
- Avoids going through the muscle or ligaments to enter the pterygo-mandibular space
- One injection provides a full V3 division block-IAN, lingual, buccal, and myohyoid

Common reasons for failed blocks (IAN)

- Injection too low
- Injection too medial
- Lateral flare of the mandible
- Infection lower ph
- Accessory innervation
- Timing of procedure (too soon or too late)
- Intravascular injection

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Mandibular nerve anomalies

- Accessory Mylohyoid nerve
- Bifid mandibular nerve
- Retromolar foramen
- Contra-lateral innervation of anterior teeth