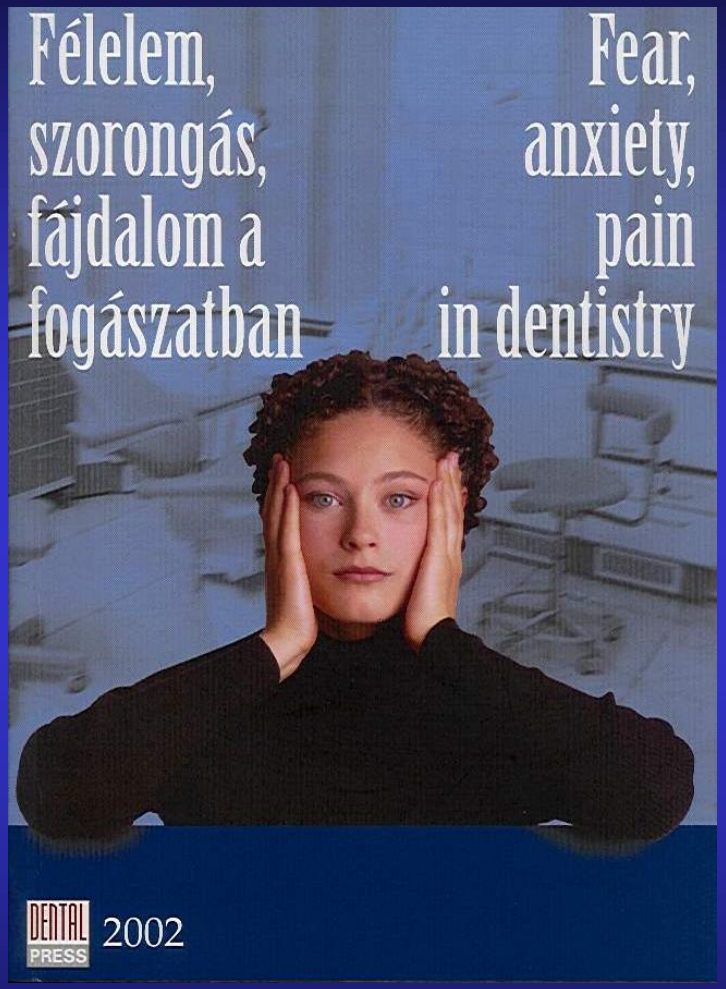
History, chemistry, technique of dental analgesia. Tooth removal

prof. Dr. Tamás Divinyi

Department of Oro-Maxillofacial Surgery and Stomatology
SEMMELWEIS UNIVERSITY
FACULTY OF DENTISTRY



What people are afraid of?

Agras et al.
1970

	Ranking
Height	1
Dentistry	**2**

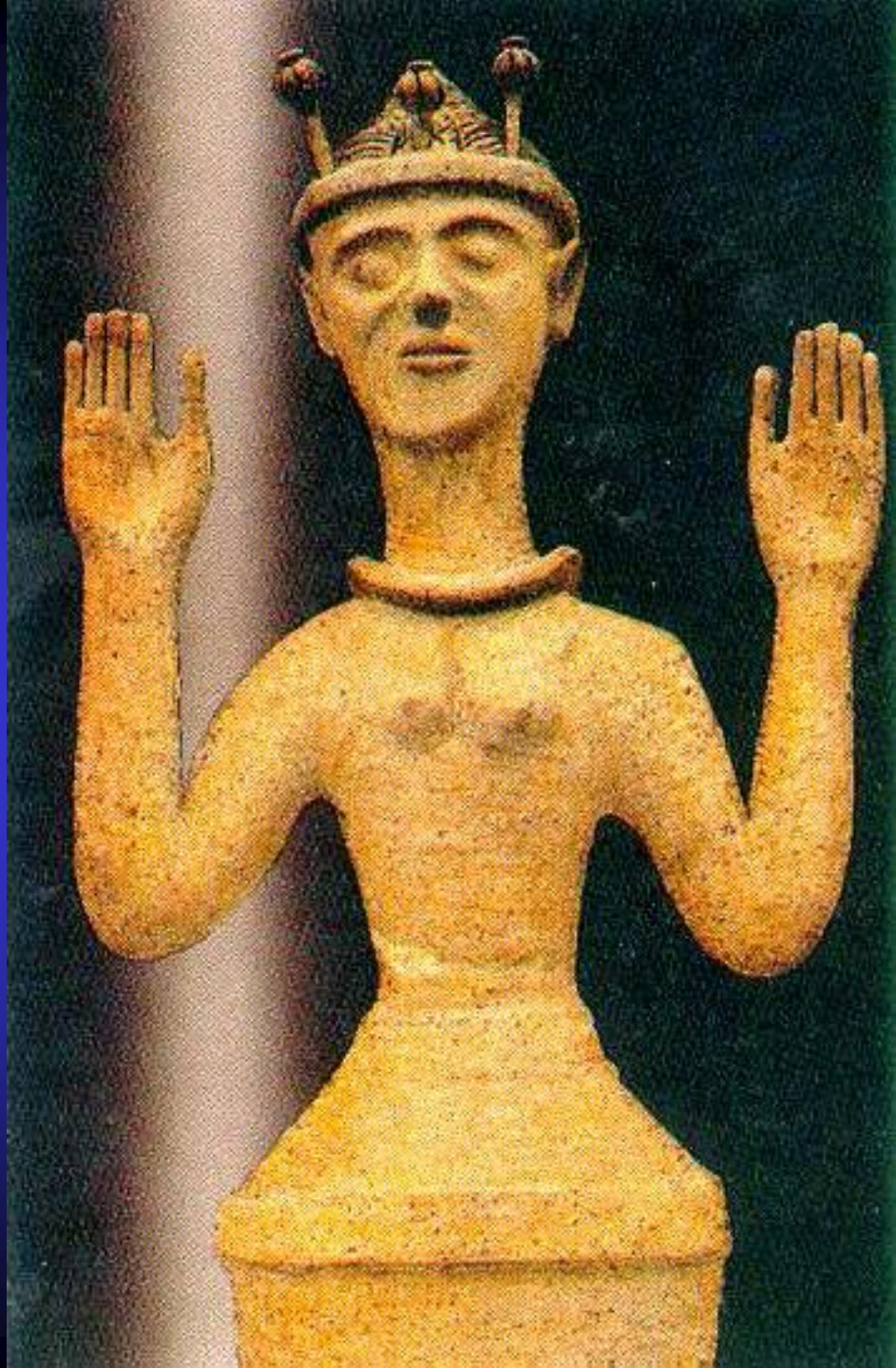
Milgrom et al.
1988

	Ranking
Height	1
Storm	2
Flying	3
Dentistry	**4**

History of the anaesthesia, analgesia

Statuette of moon-godess with garden poppies on her crown

/13th century B.C. Crete/

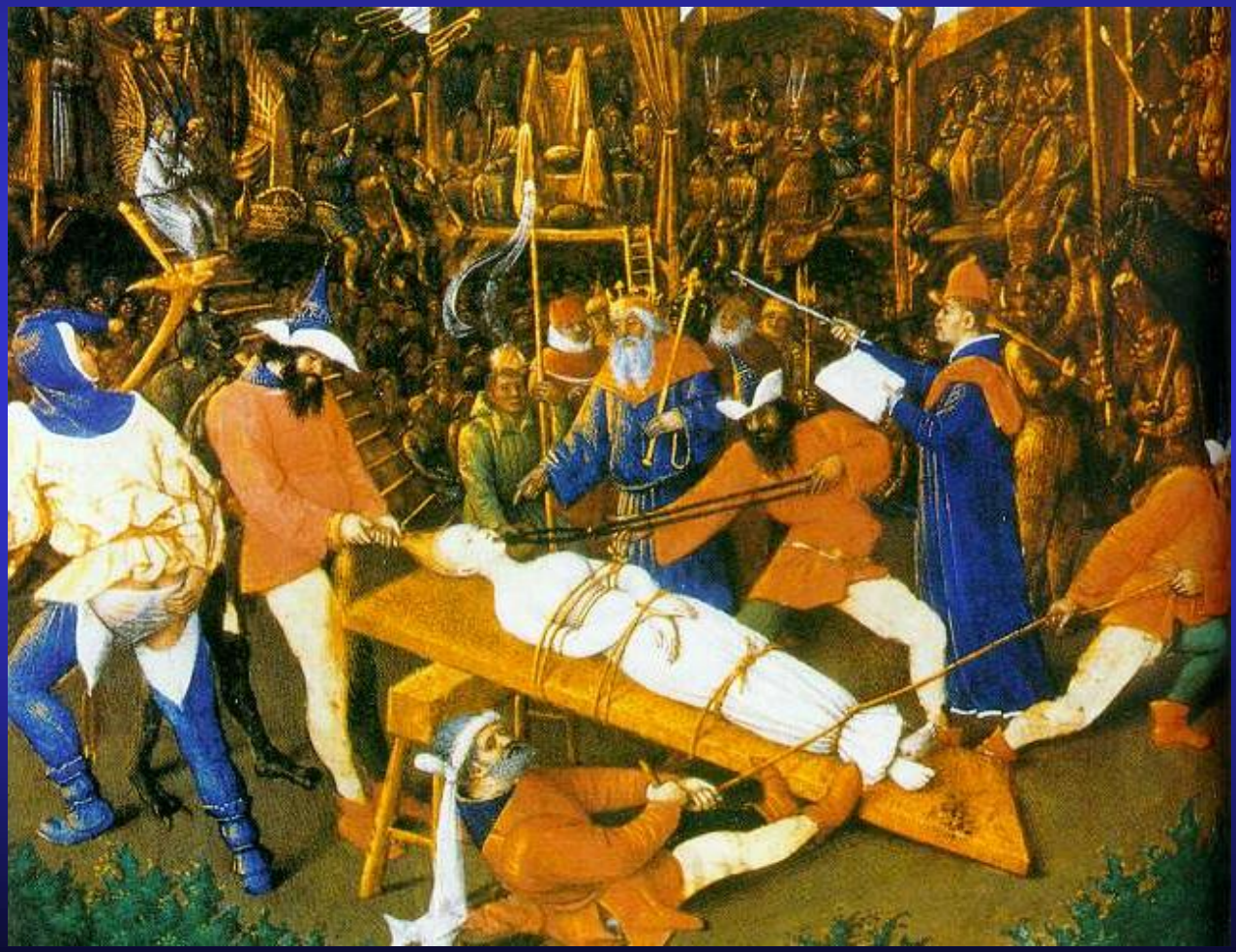


Oral surgical intervention of a fighter

/IV. century B.C./

The martyrdom of Saint Apollonia

/Jean Fouquet 1455./



A man is escorted to the extracteur by his wife

/Landesbibliothek Stuttgart 1467./

Tooth removal

/Jan Victors 1654./

L. Koecker: Grundsätzen der Zahn-Chirurgie 1828.

- proper psychological preparation
- quick extraction
- high technical skill

with the goal, to keep the **pain tolerable**

1772 **Joseph Priestly**
discovered the
„laughing gas” /N_2O/

1800 **Humphry Davy**
discovered the
anaesthetic effect of N_2O


LAUGHING
GAS

1844 **Horace Wells dentist**

tooth extraction with N_2O

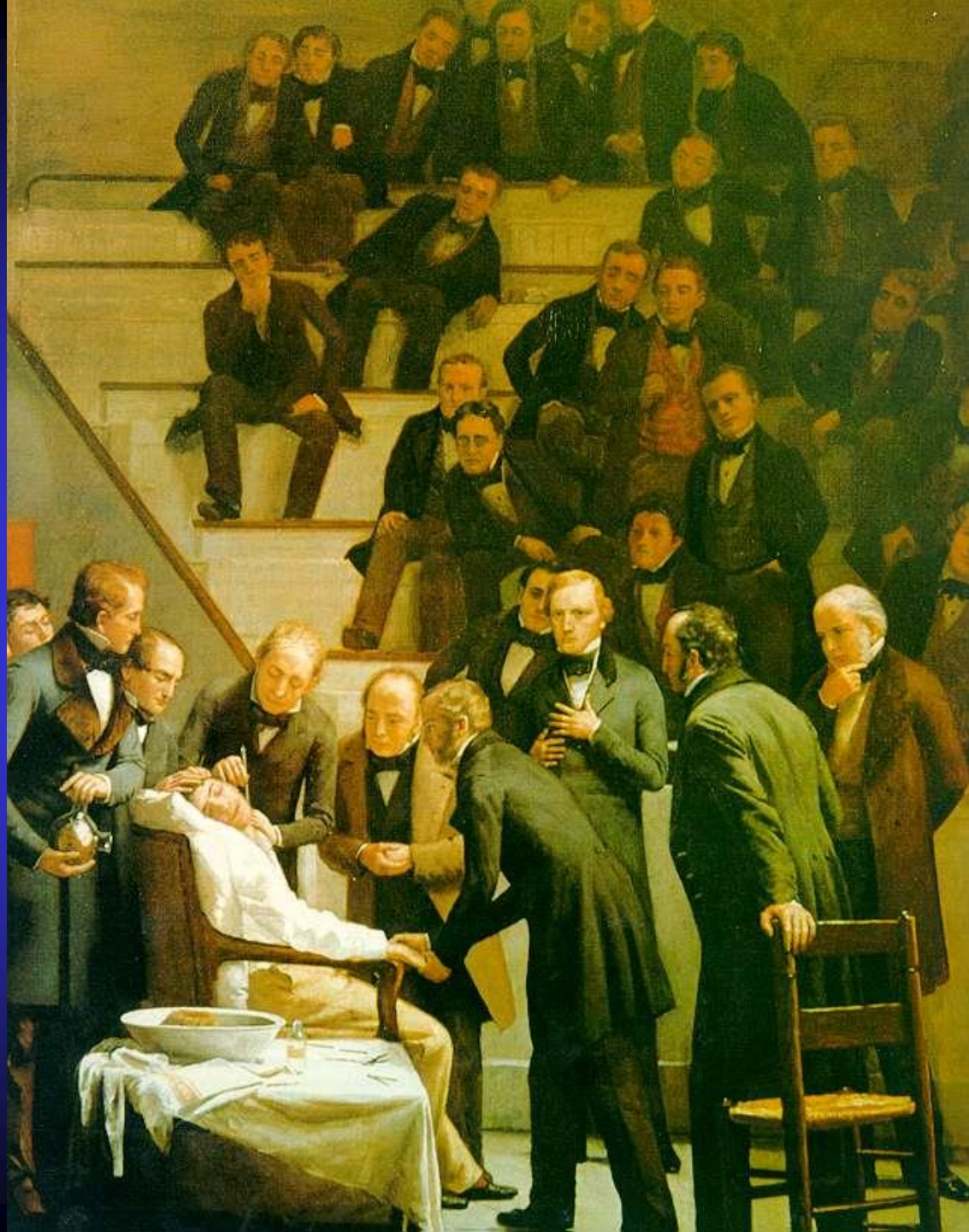
1846 **William Morton dentist**

the first aether anaesthesia

The first ether narcosis

Boston /U.S.A./ 1846.

/Painting of Robert Hinckley 1882/



1860 **Albert Niemann**

isolation of cocaine

1884 **Carl Koller ophtalmologist**
topical analgesia with cocaine

1885 **William S. Halsted surgeon**
nerve block analgesia

1865 **Charles Hunter**
hypodermic syringe

1897 metal-glass syringes

1905 **Alfred Einhorn**

procaine /Novocain/

1905 **Heinrich Braun surgeon**

procaine + adrenaline

local analgesia

Olga Lenz, the first female dentist in the U.S.A.

/photograph 1910./

1943 **N. Löfgren**
synthesis of the lidocaine

1946 introduced into clinical practice

What is the pain?

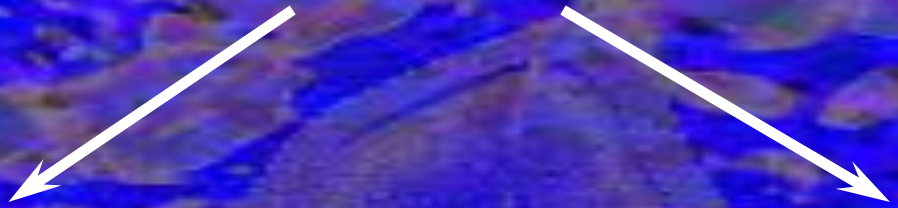
PAIN

is an unpleasant sensory and emotional experience

PAIN

can be in connection with an acute or threatening tissue damage

COMPONENTS OF PAIN



physiological

psychological

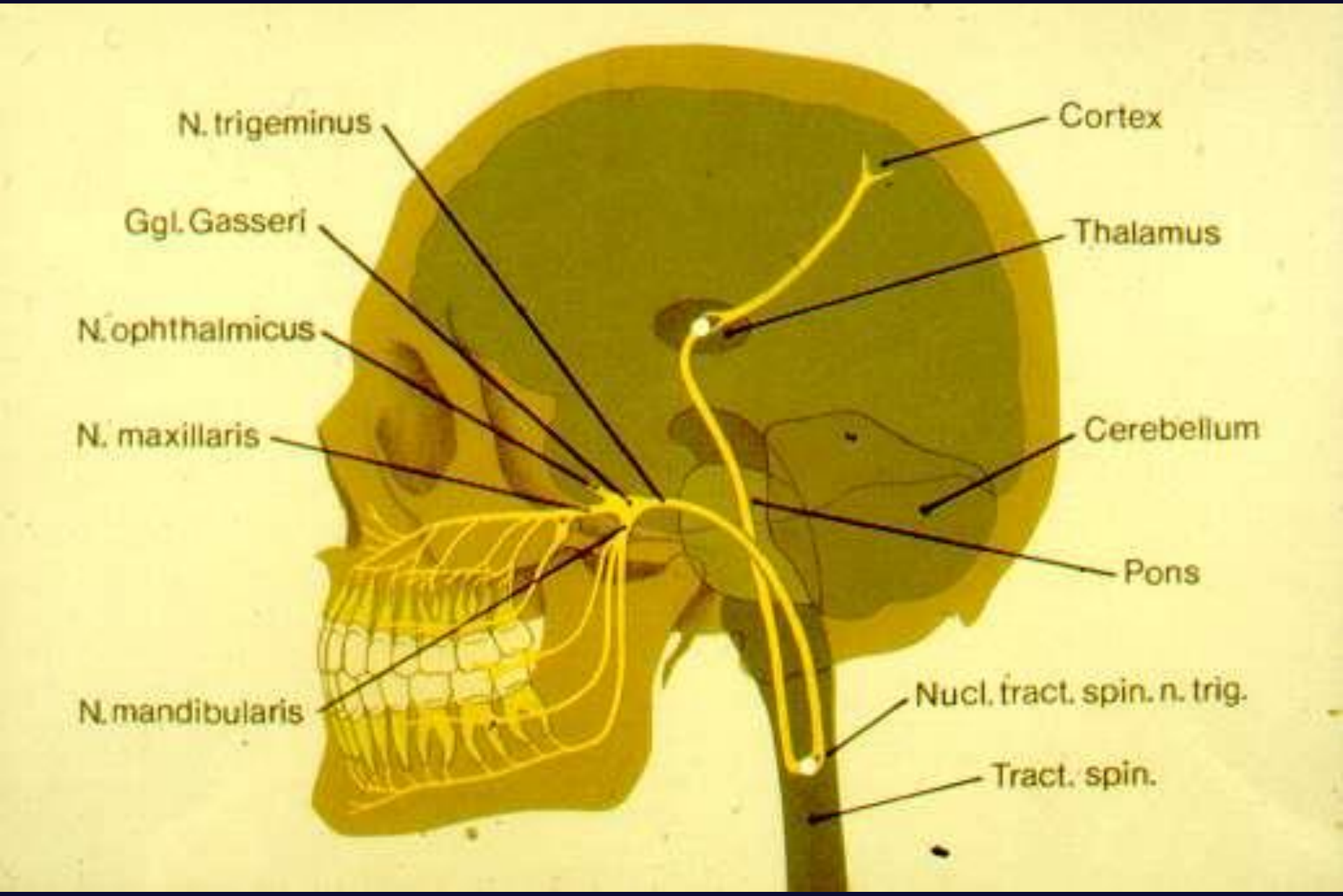
pain-perception

pain-reaction

PAIN

can not be accurately measured. From a clinical and practical standpoint we must rely on subjective responses and accept the patient's definition

COMPONENTS OF PAIN


N. trigeminus
Ggl. Gasseri
N. ophthalmicus
N. maxillaris
N. mandibularis
Cortex
Thalamus
Cerebellum
Pons
Nucl. tract. spin. n. trig.
Tract. spin.

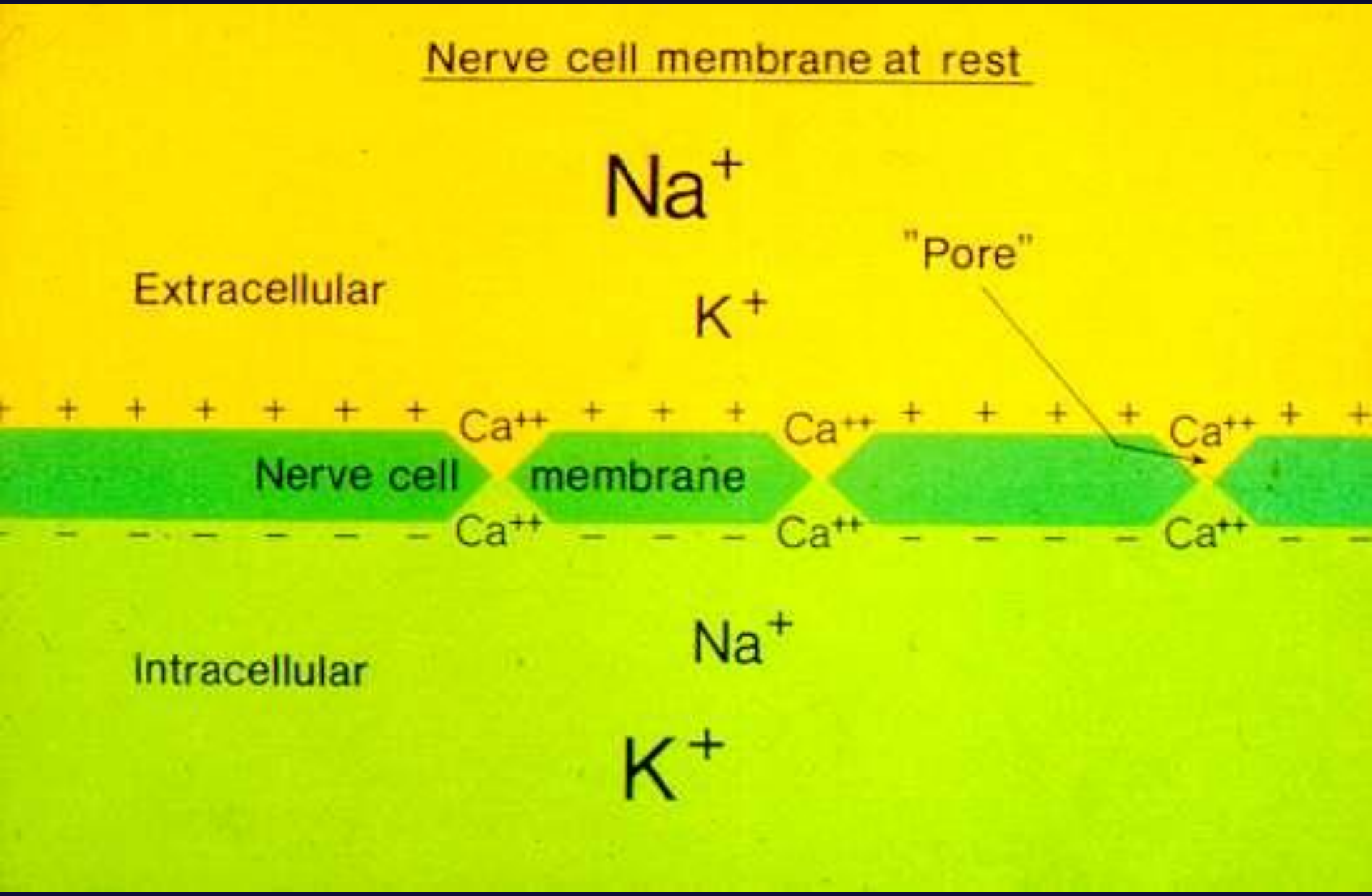
Local anaesthetic solution =

1. anaesthetic agent

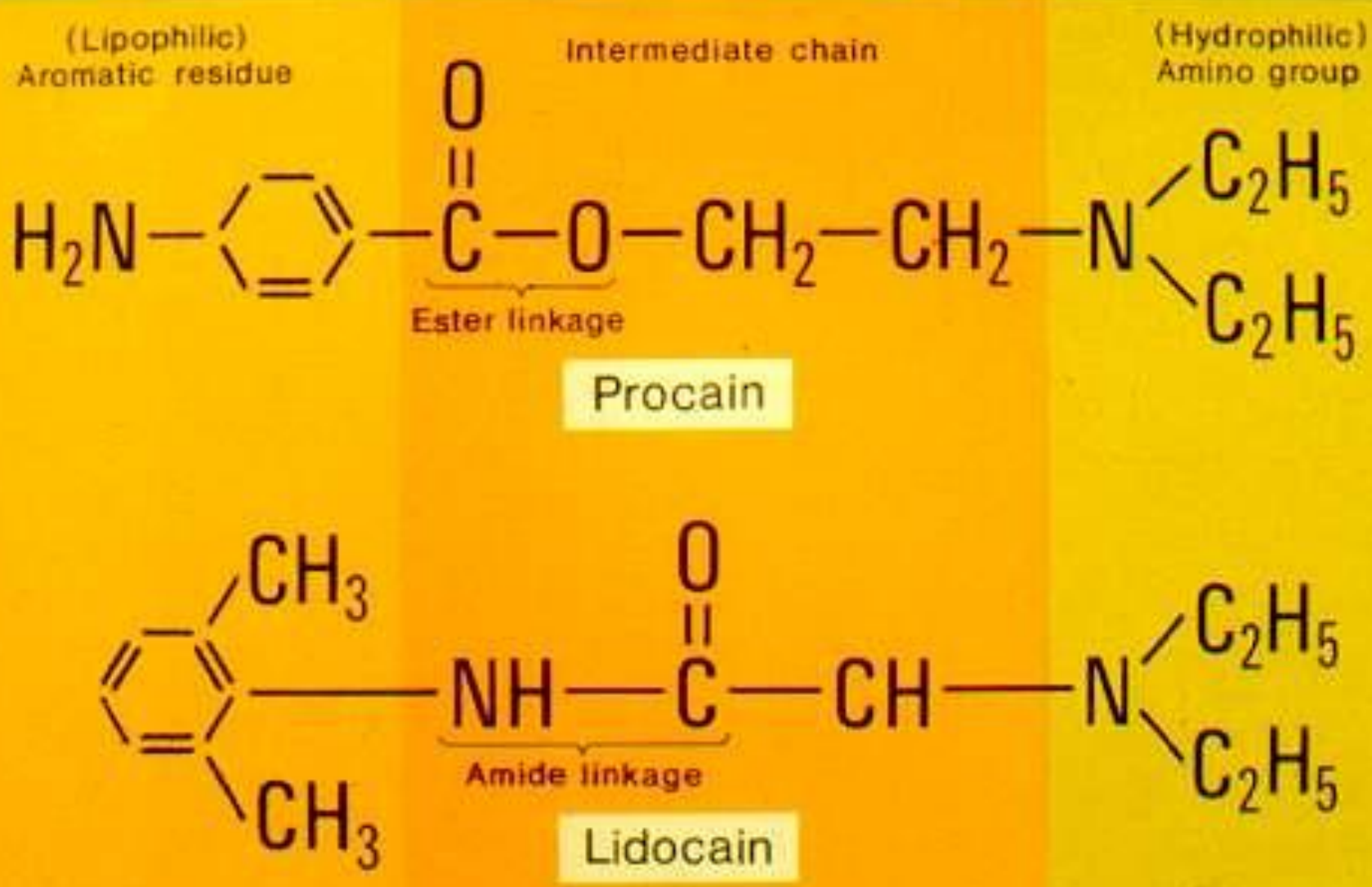
2. vasoconstrictor

3. preservative

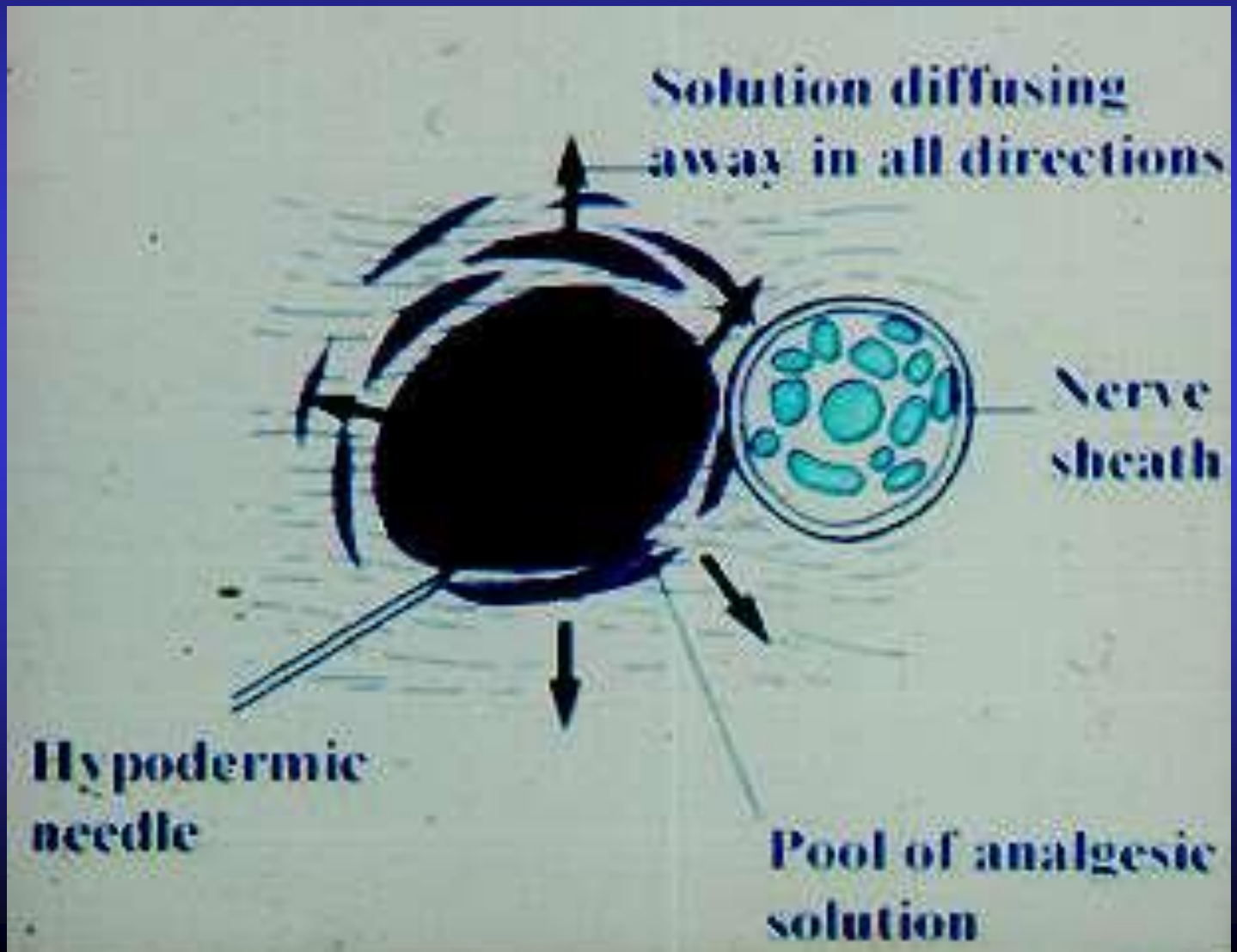
Local anaesthetics are drugs, which temporarily interrupt the conduction of the peripherial nerves, without causing any disturbances of the consciousness

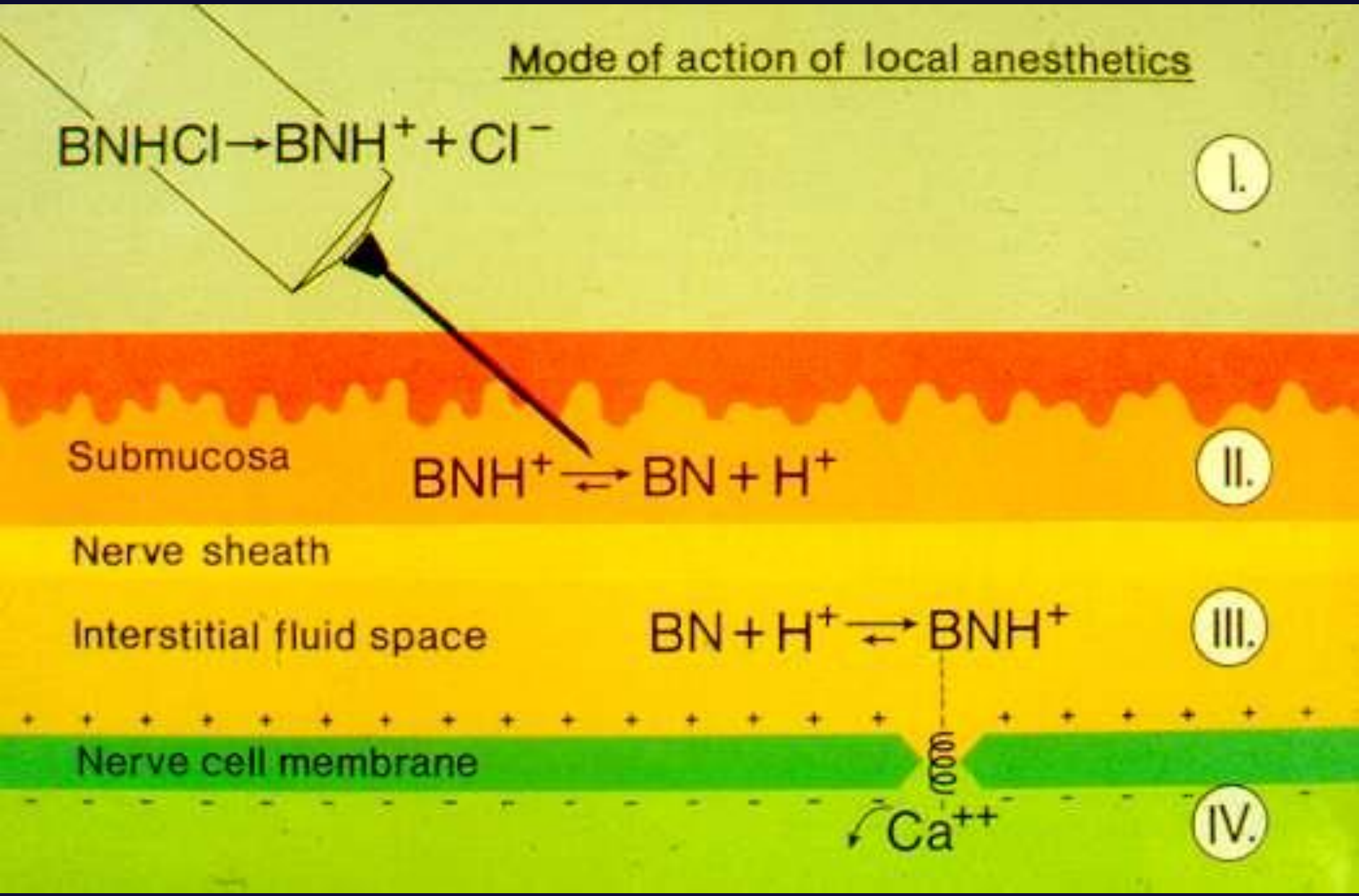

Nerve cell membrane at rest
Na+
"Pore"
Extracellular
K+
Ca++
Ca++
Ca++
Nerve cell membrane
Ca++
Ca++
Ca++
Na+
Intracellular
K+

Basic molecular structure of local anesthetic agents



Diffusion of local anaesthetic




Mode of action of local anesthetics
BNHCl → BNH⁺ + Cl⁻
I.
Submucosa
BNH⁺ ⇌ BN + H⁺
II.
Nerve sheath
Interstitial fluid space
BN + H⁺ ⇌ BNH⁺
III.
Nerve cell membrane
Ca⁺⁺
IV.

ANALGESIC POTENCY

- **The minimum effective concentration of the drug**
- **Depends on the lipid-solubility of the local anaesthetic agent**

TOXICITY

- **Therapeutical ratio =** $\frac{LD_{50}}{ED_{50}}$

- **Depends on the metabolism of the local anaethetic agent**

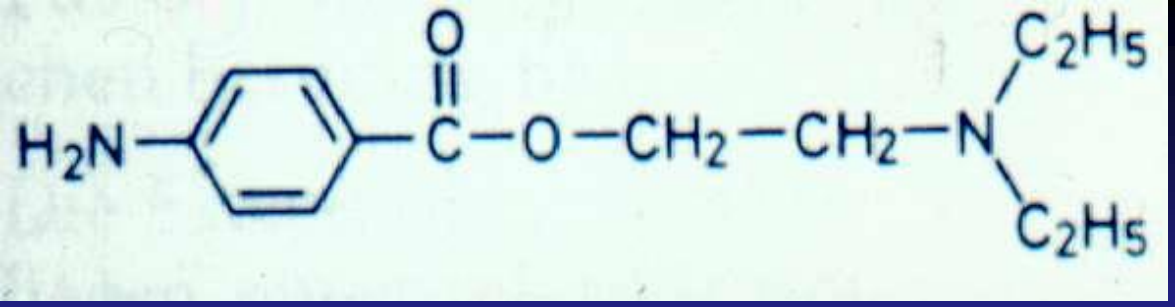
RAPIDITY OF ONSET

- Depends on the lipid-solubility and the pKa value of the drug

- Depends on the technique used

DURATION OF EFFECT

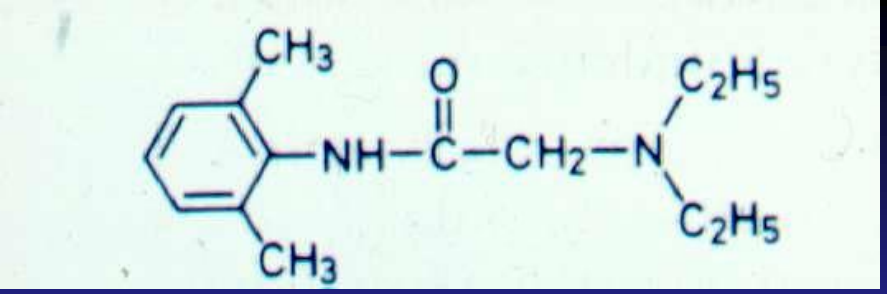
- Depends on the protein-binding
- Depends on the concentration
- Depends on the effect on the peripherial blood-vessels



Procaine

Proprietary name: Novocain

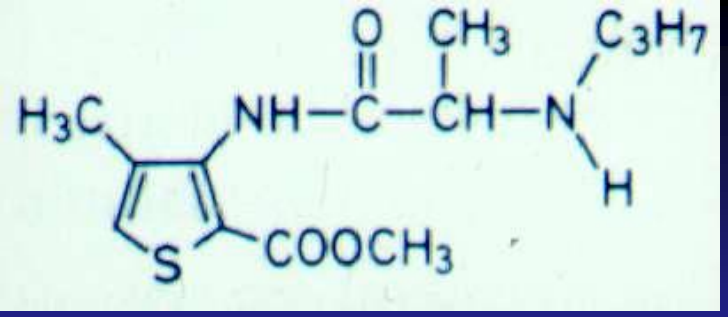
Potency:	1
Toxicity:	1
Rapidity of onset:	5-10 min.
Duration of effect:	30-40 min.
Side effect:	vasodilatation, allergy



Lignocaine

Proprietary name : Lidocaine
Xilocaine /2%/

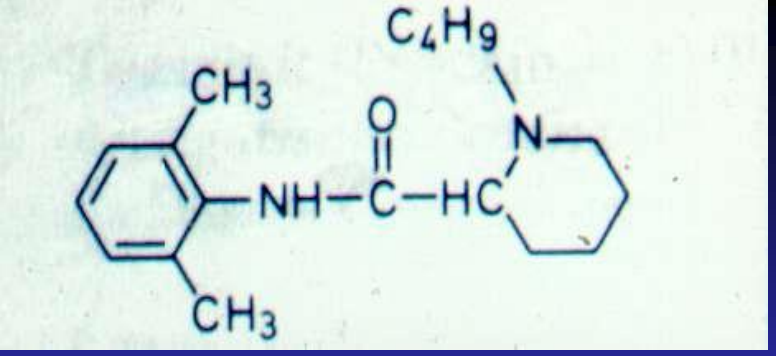
Potency:	2-4
Toxicity:	2
Rapidity of onset:	2-3 min.
Duration of effect:	100-200 min.
Side effec:	Sedative effect in higher dosis



Articain

Proprietary name: Ubistesin, Ultracain /4%/

Potency:	5
Toxicity:	1,5
Rapidity of onset:	2-4 min.
Duration of effect:	180-240 min.
Remark:	Excellent bone penetration!



Bupivacain

Proprietary names: Bupivacain, Carbostesin
Marcain /0,5%/

Potency:	16
Toxicity:	8
Rapidity of onset:	4-6 min.
Duration of effect:	180-540 min.
Side effect:	heart arrythmias
Clinical use:	neuralgias

Local anaesthetic solution =

1. anaesthetic agent

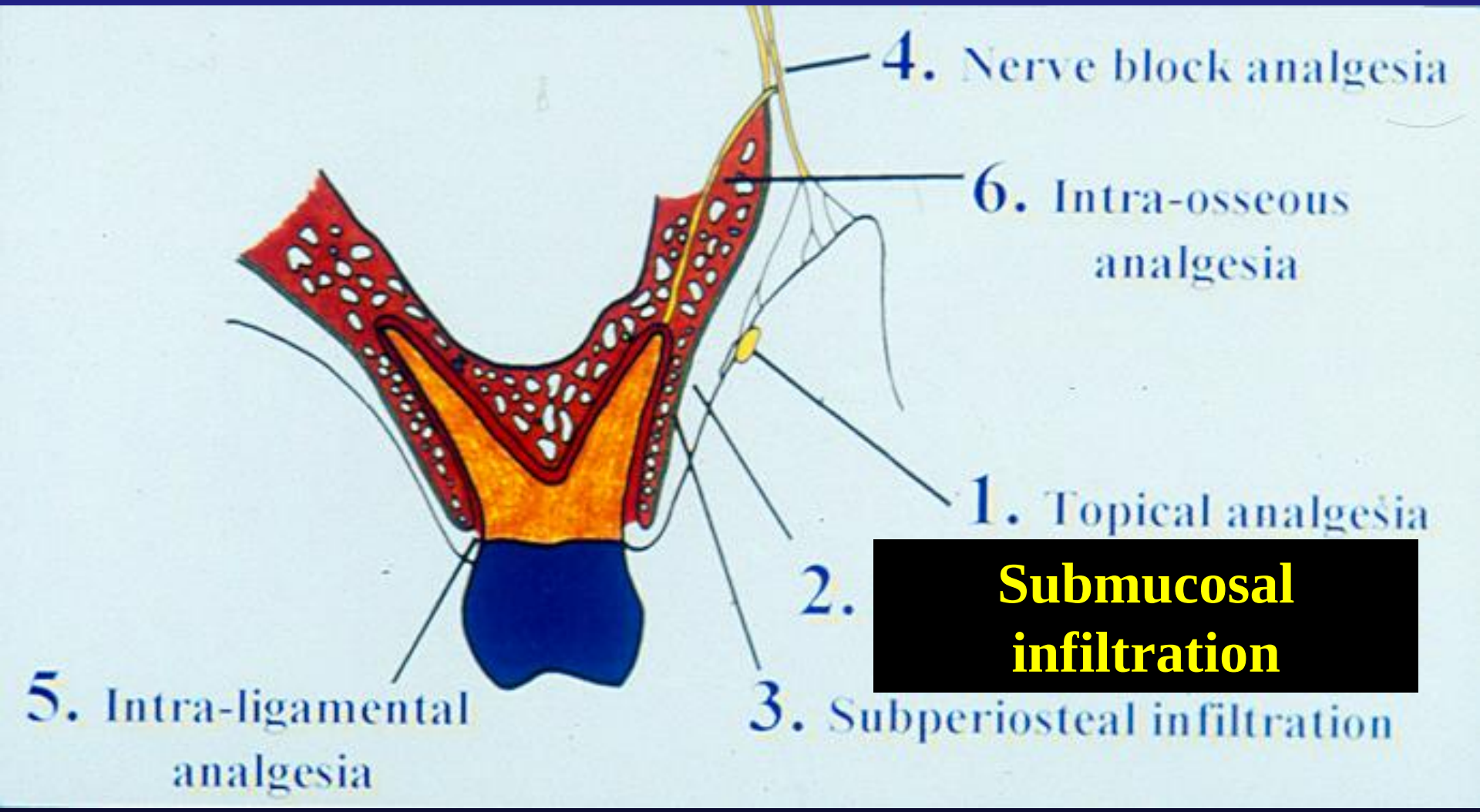
2. vasoconstrictor

3. preservative

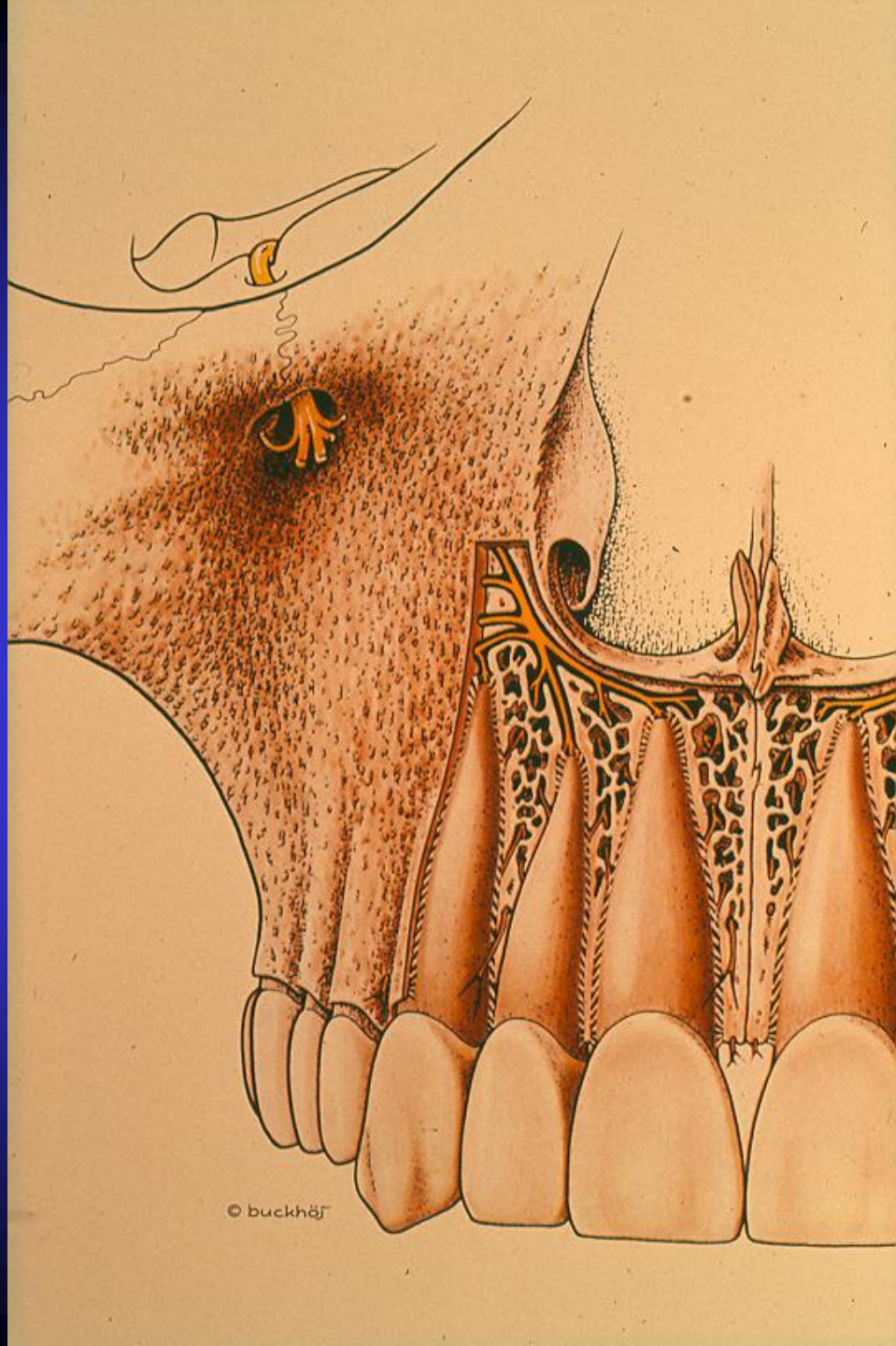
The role of vasoconstrictor in local anaesthetics

- Increase the potency and the duration of effect
- Reduce toxicity
- Easy surgical access

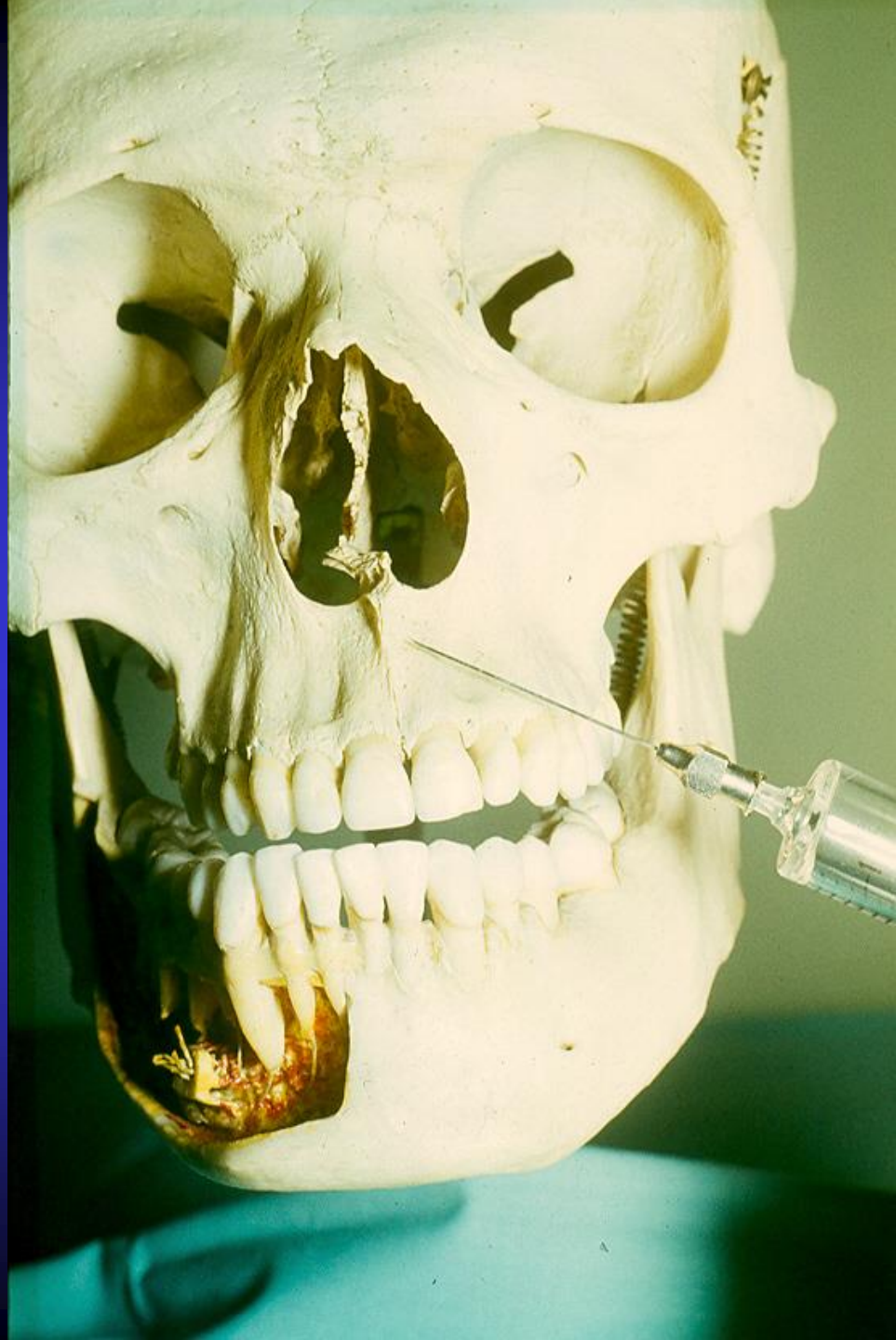
TYPE OF LOCAL ANALGESIA

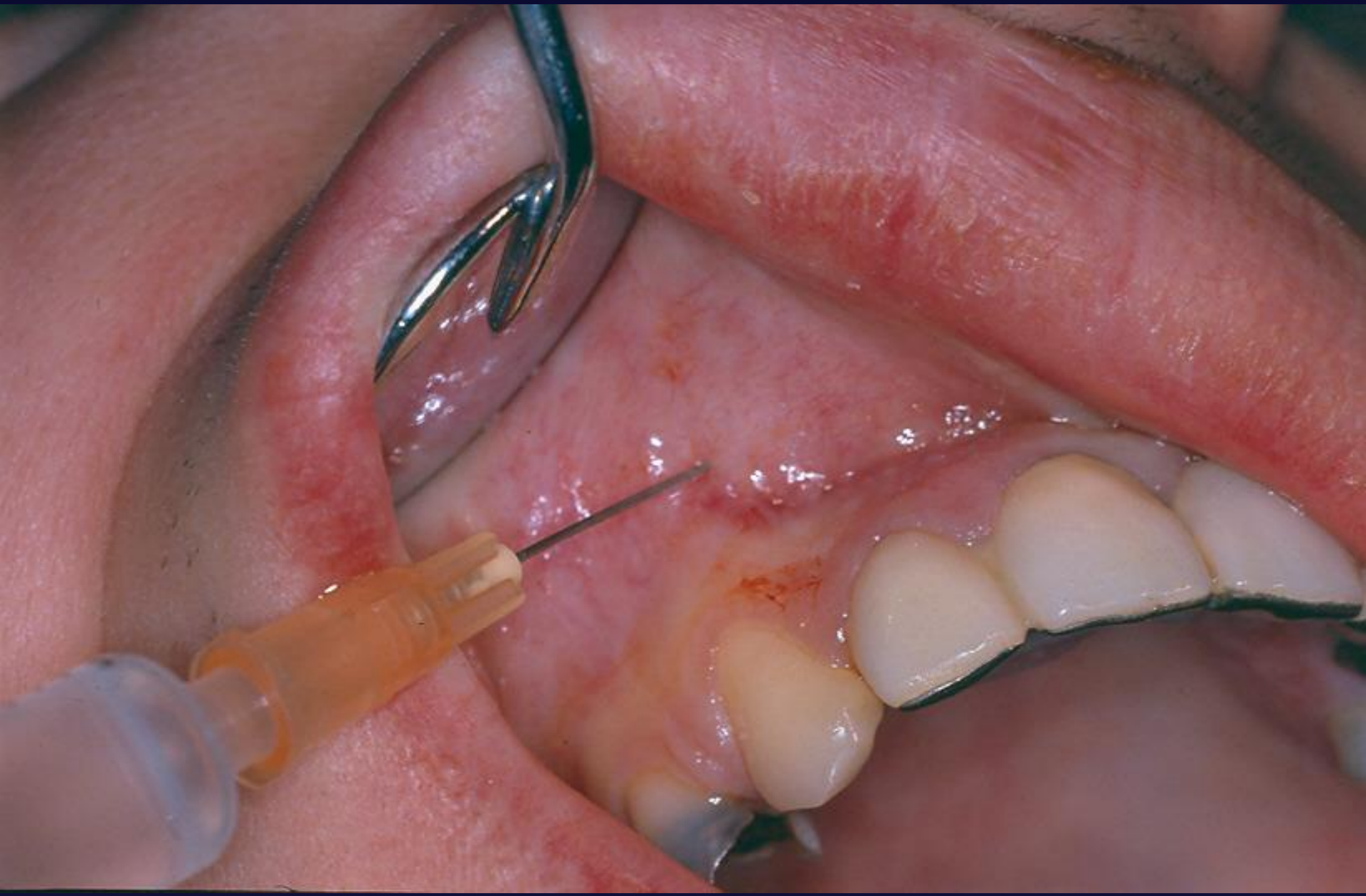


Nerve supply of the upper incisive teeth

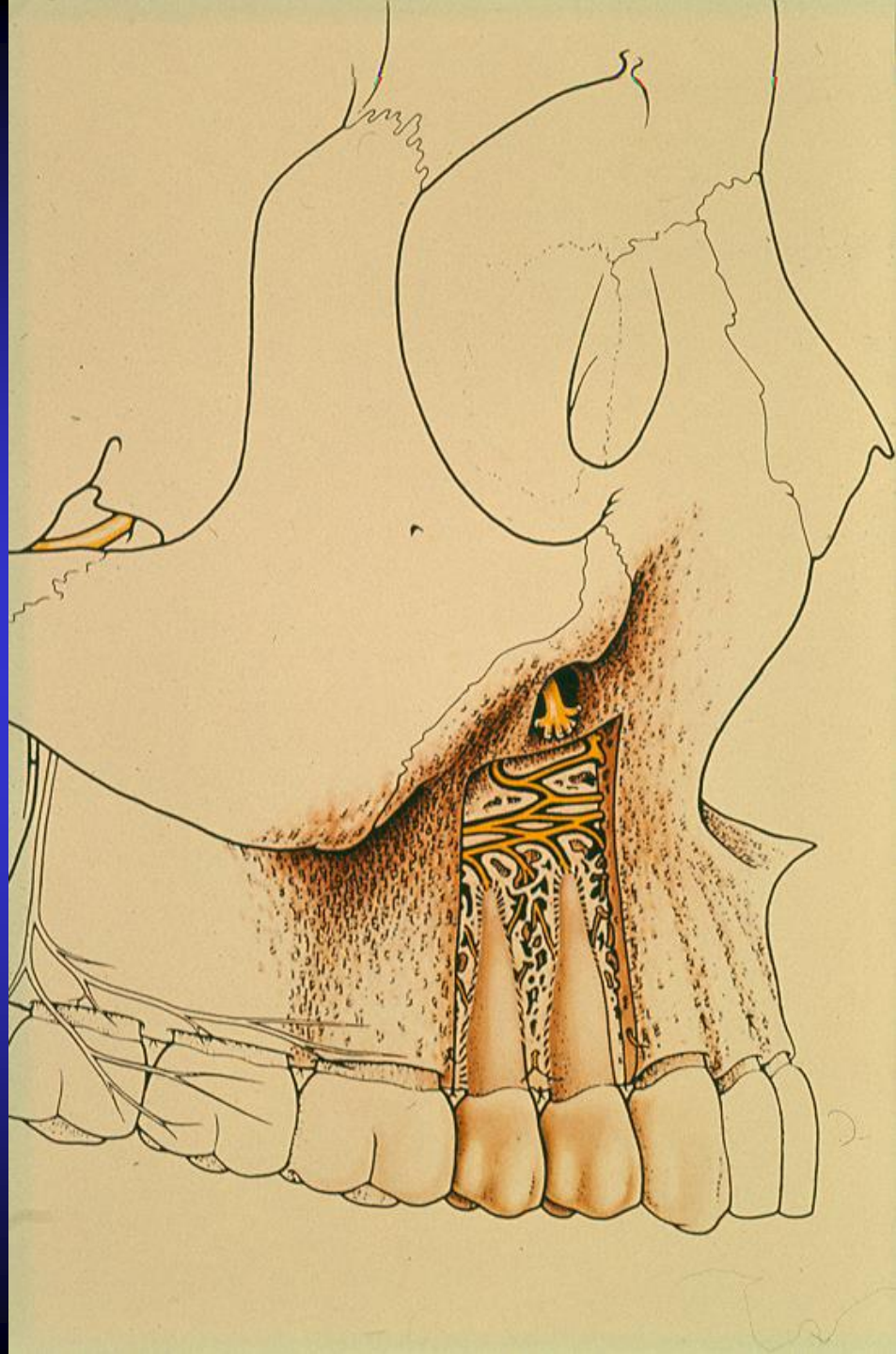


Technique of submucosal infiltration of upper incisive teeth

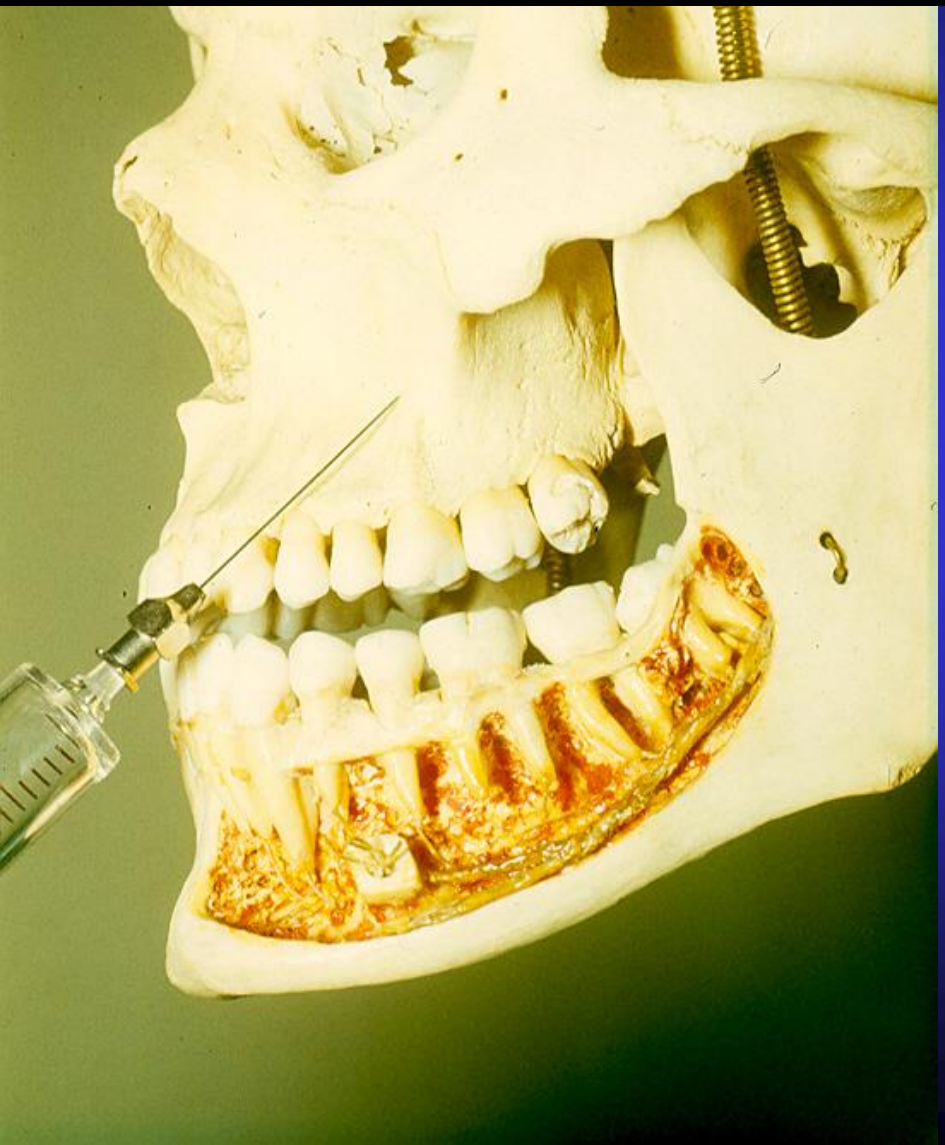


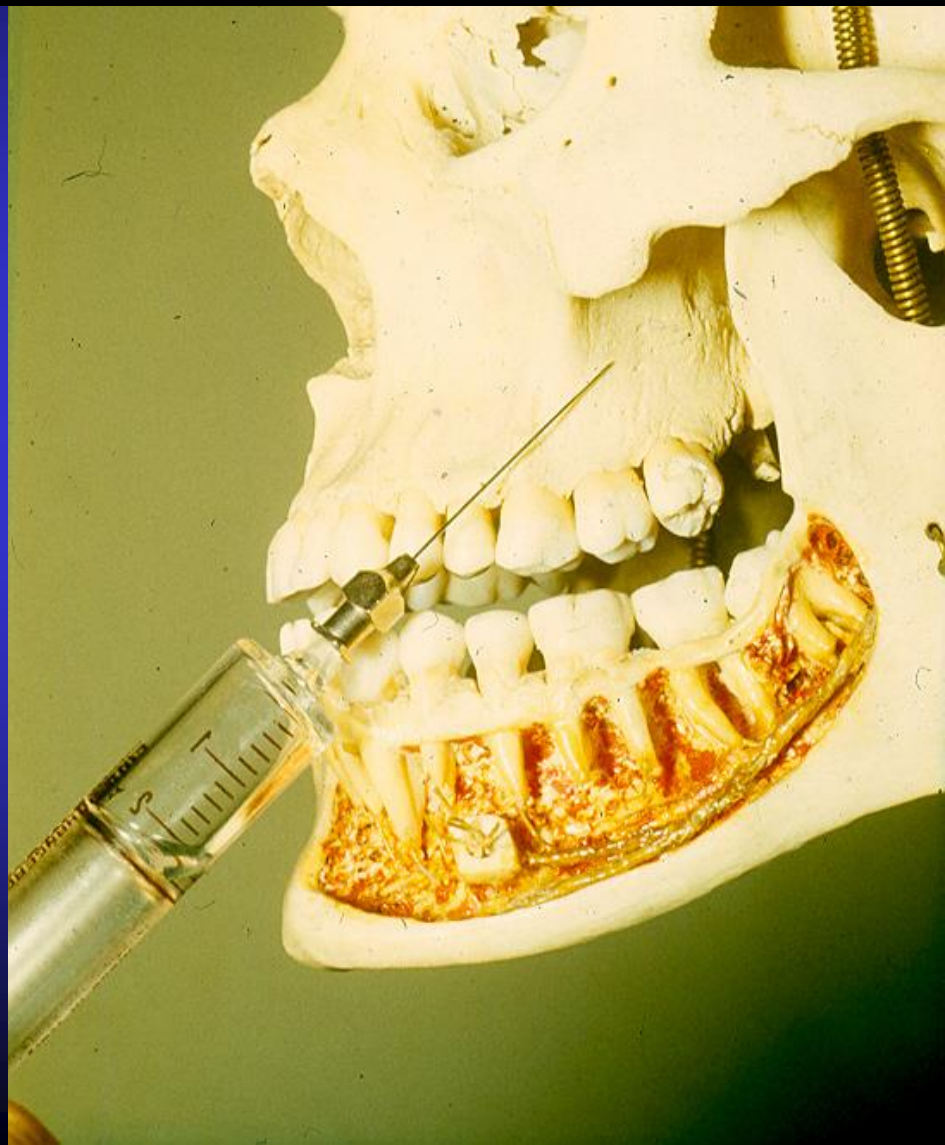


Nerve supply of upper premolar teeth

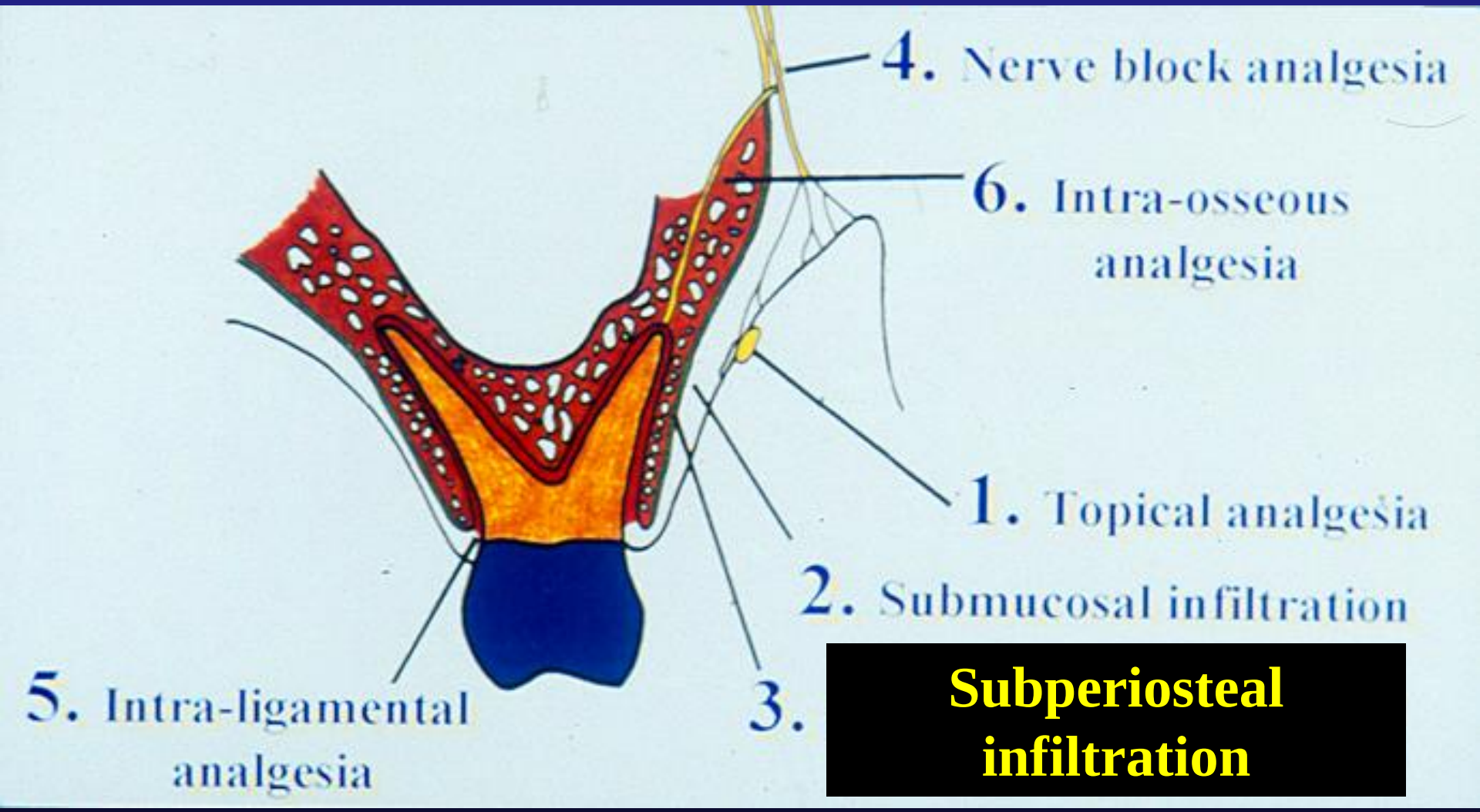


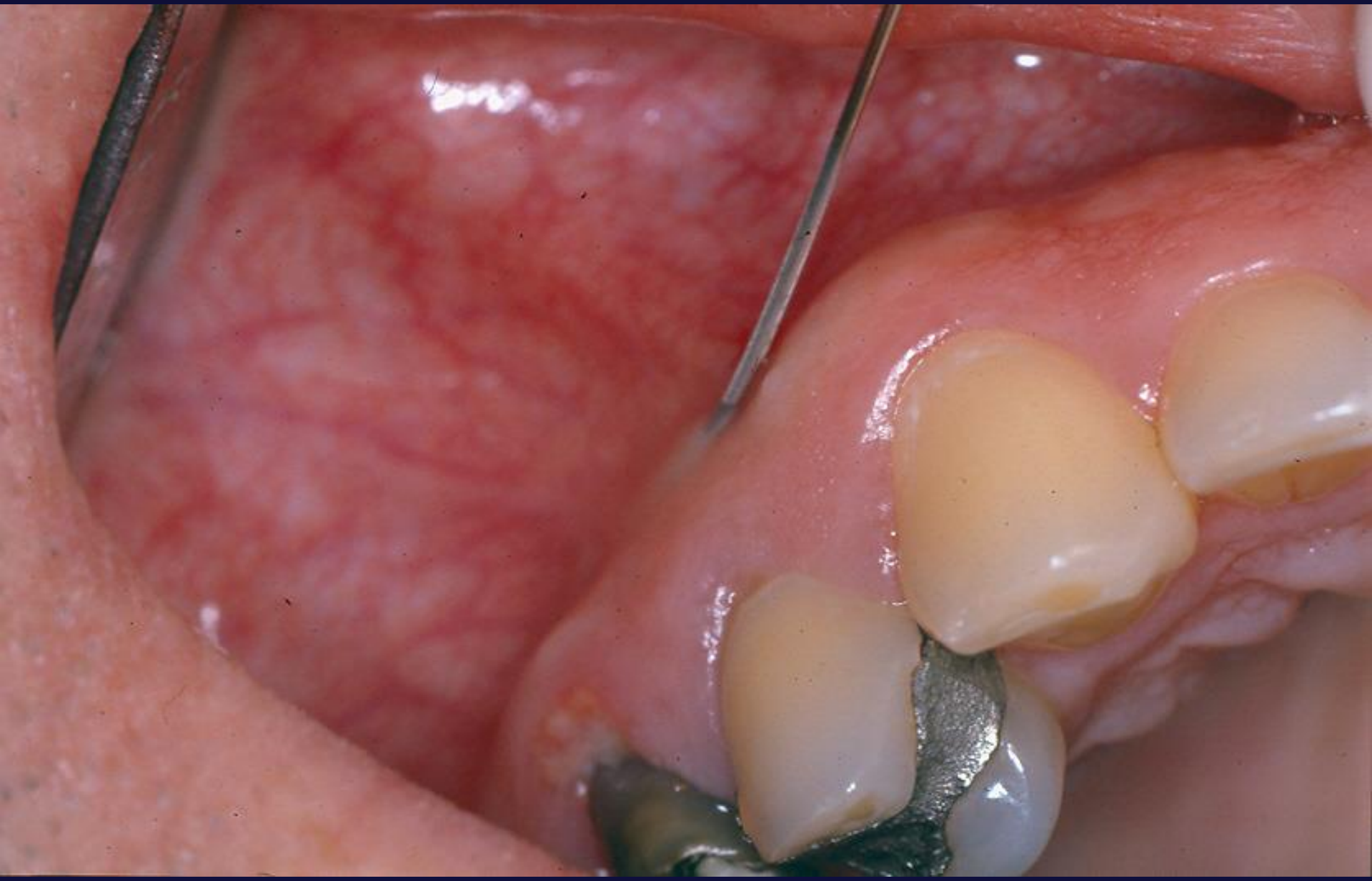
Technique of submucosal infiltration analgesia of upper first molar

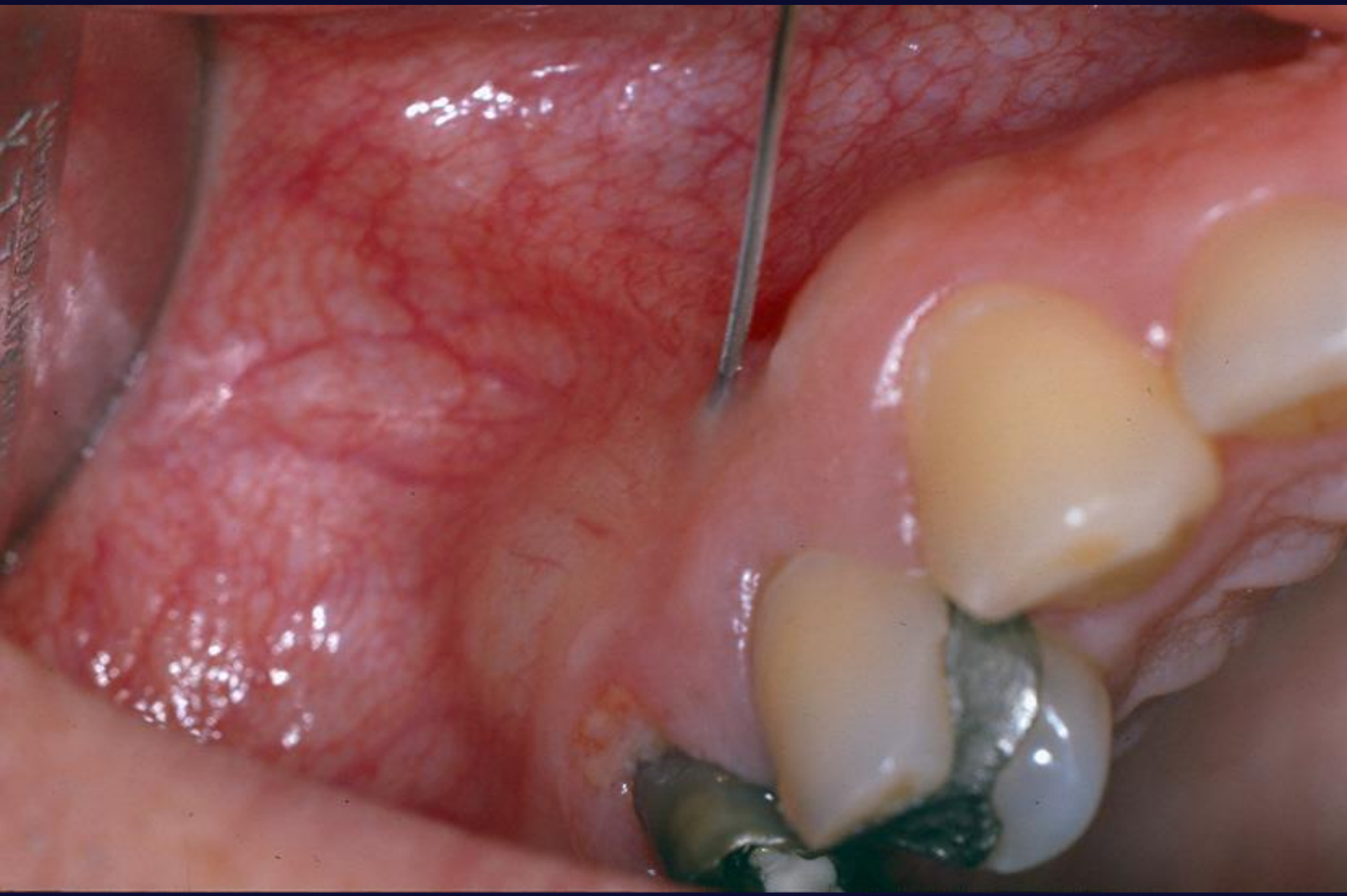




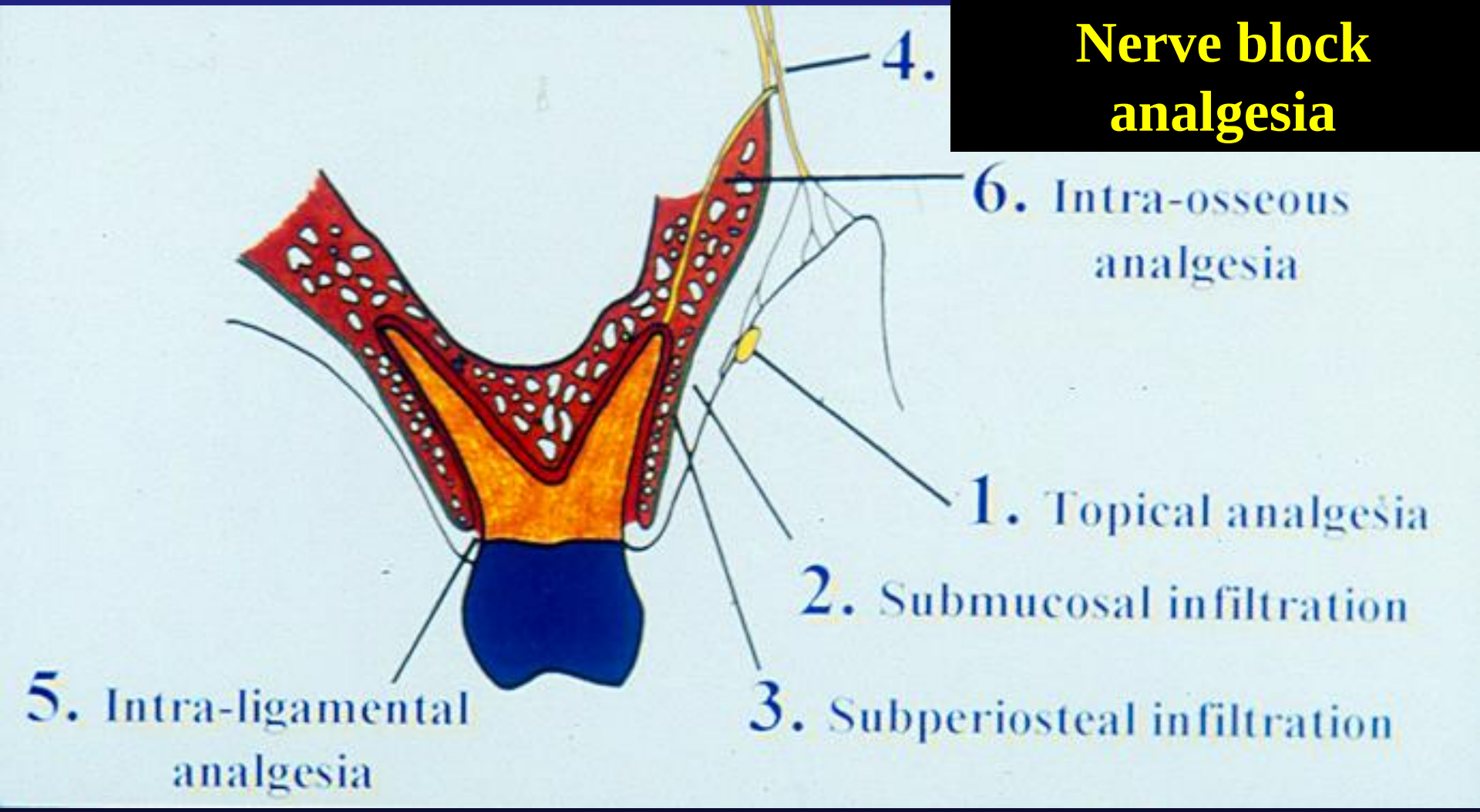
TYPE OF LOCAL ANALGESIA



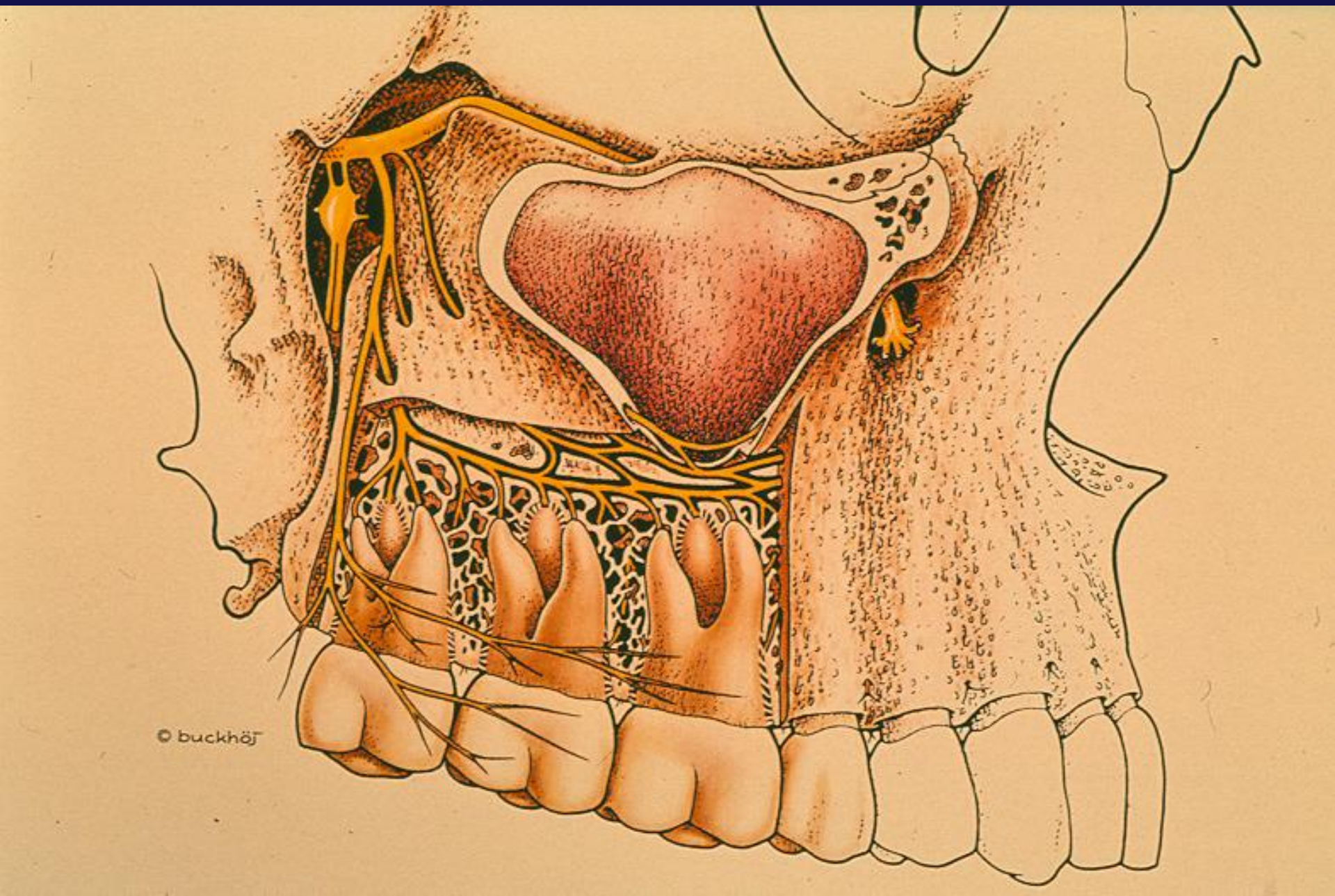




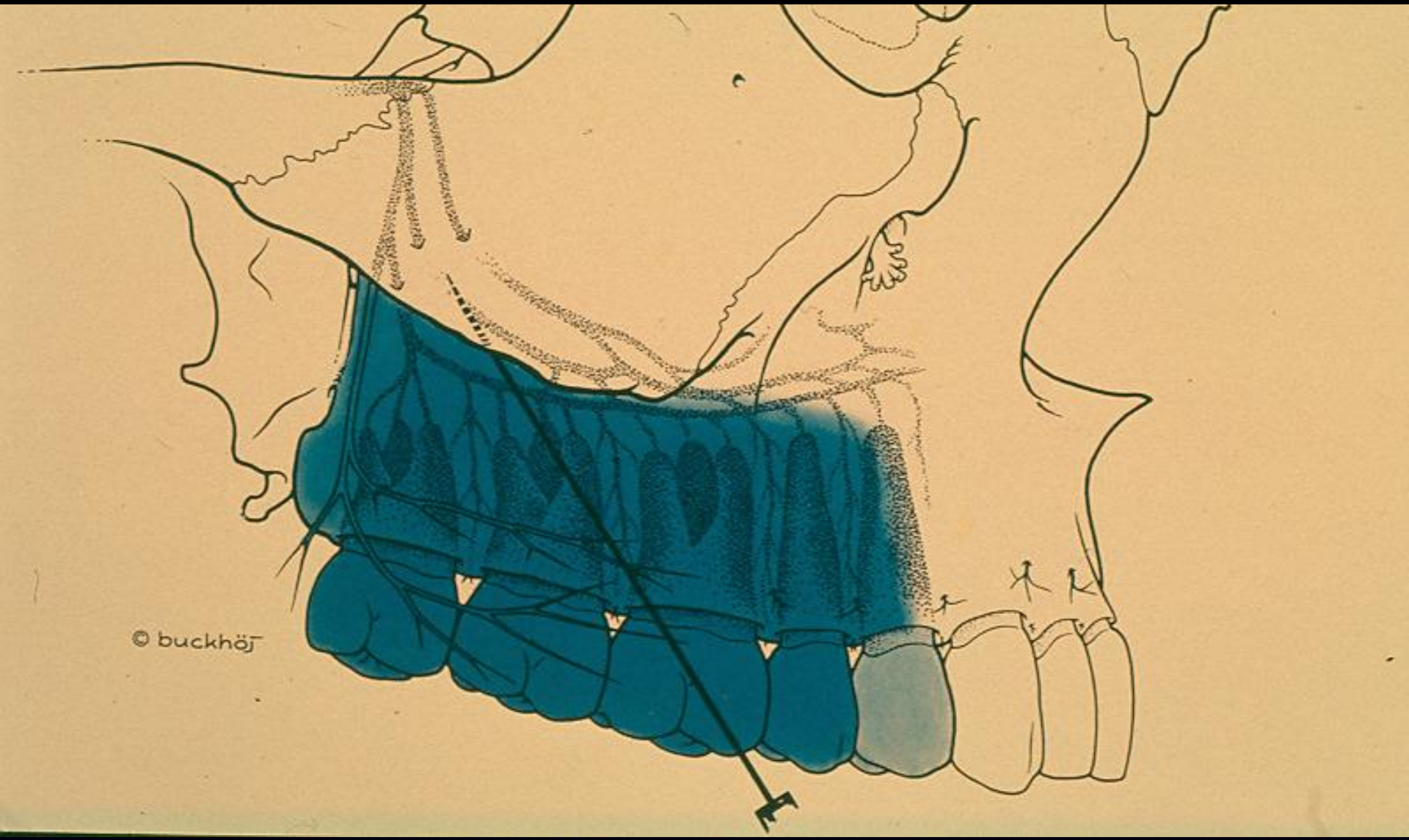
TYPE OF LOCAL ANALGESIA



Nerve supply of upper molar teeth

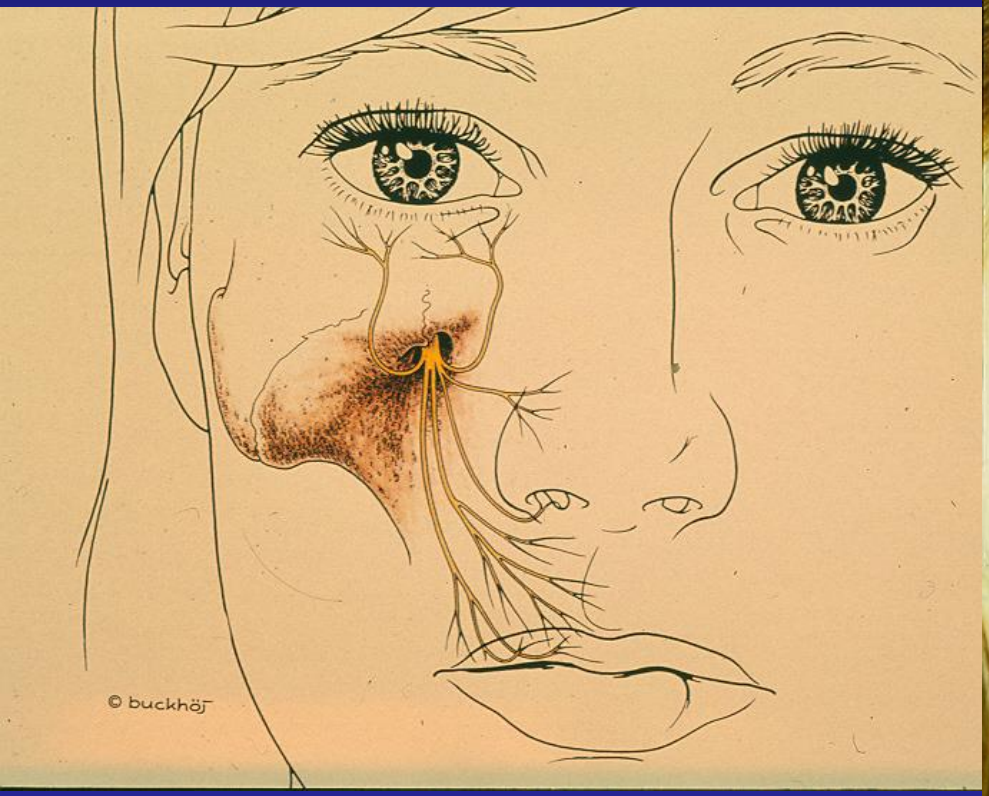


Extension of analgesia at tuberal nerve block technique

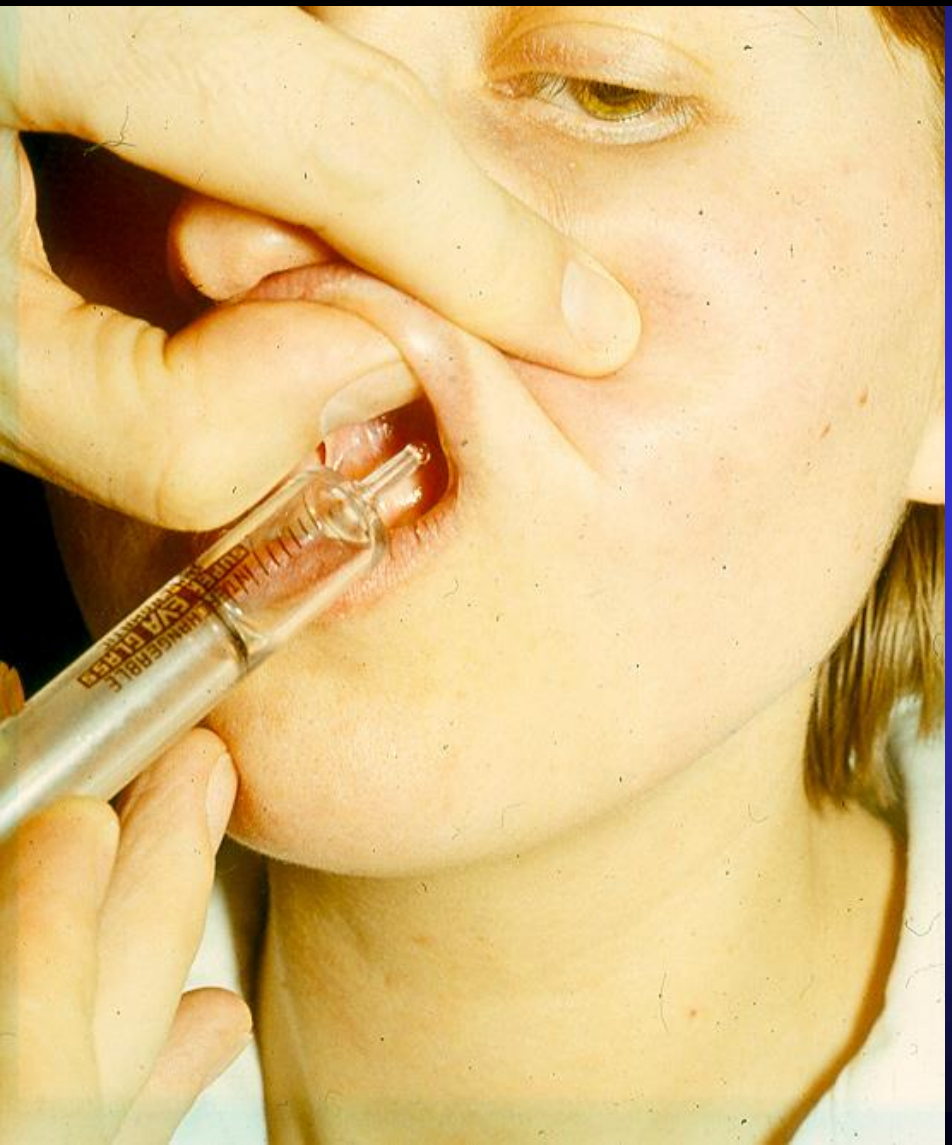


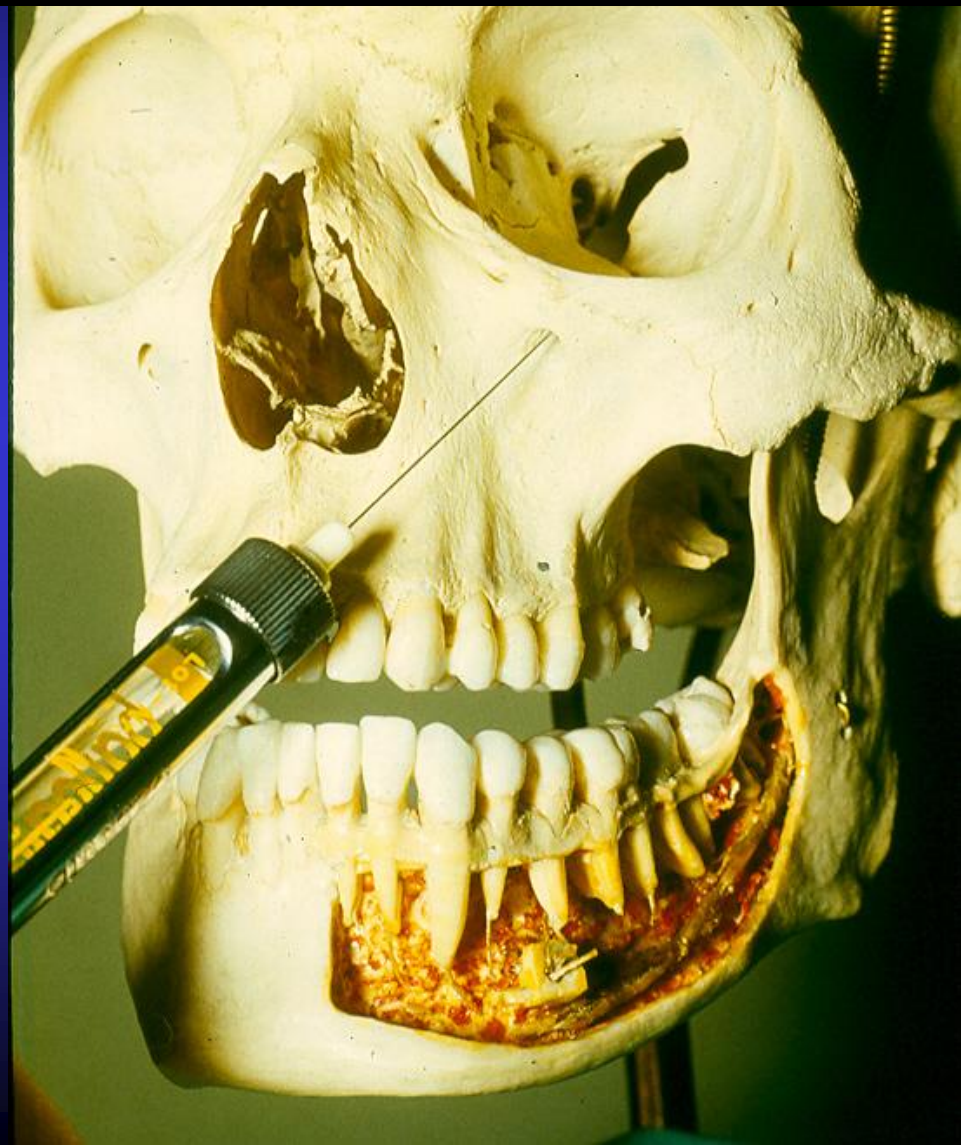
Technique of tuberal nerve block analgesia

Localization of infraorbital nerve

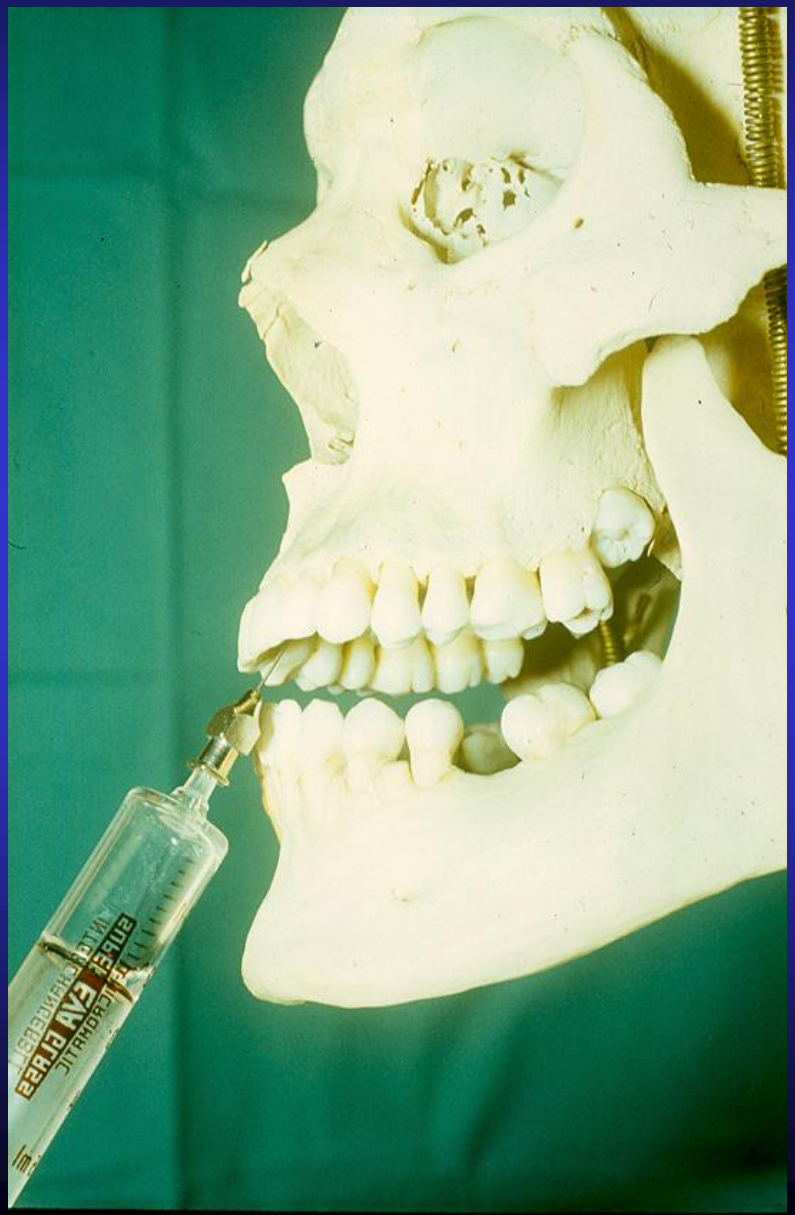


Technique of infraorbital nerve block analgesia

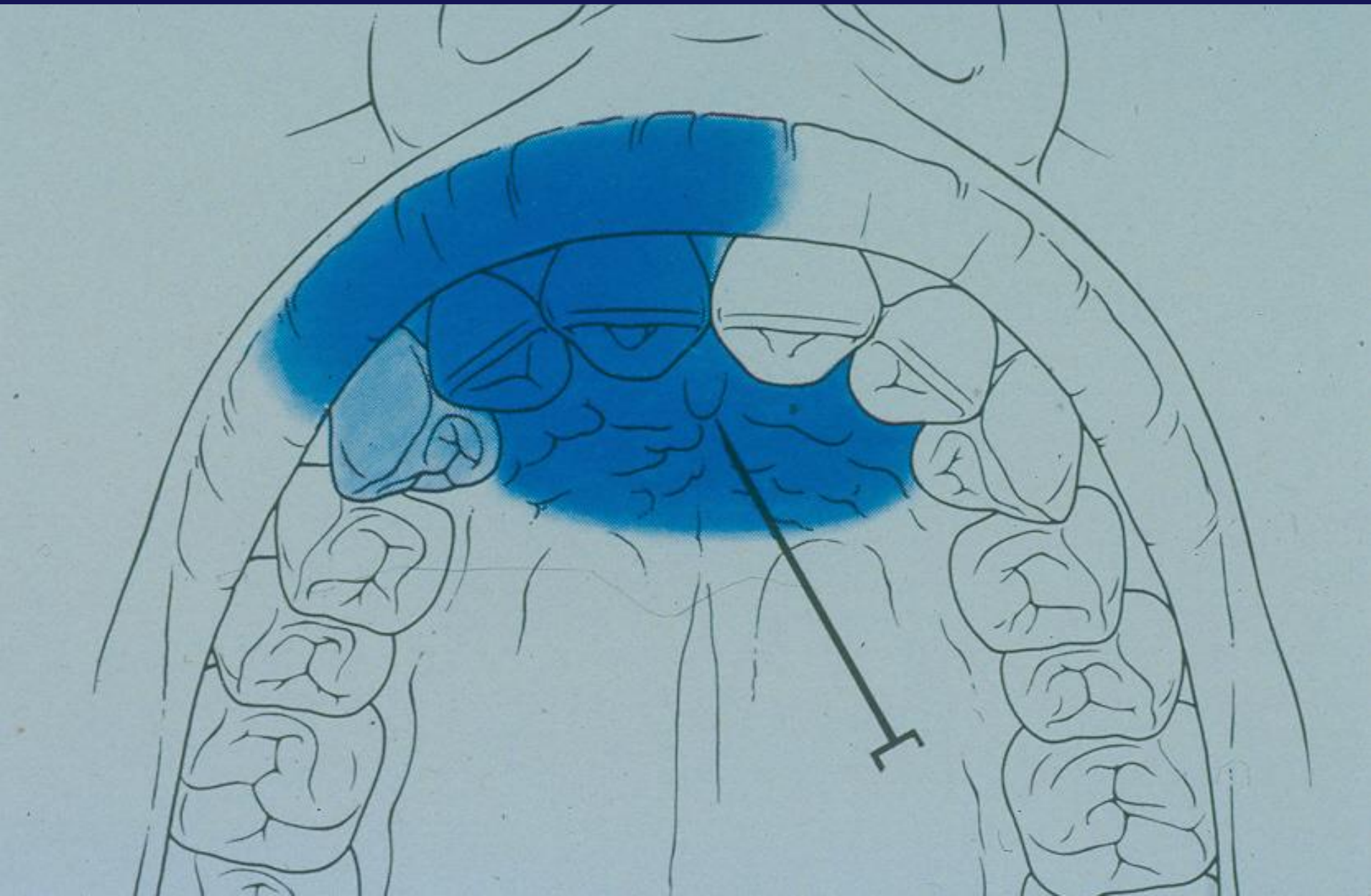




Nerve block analgesia of incisival nerve

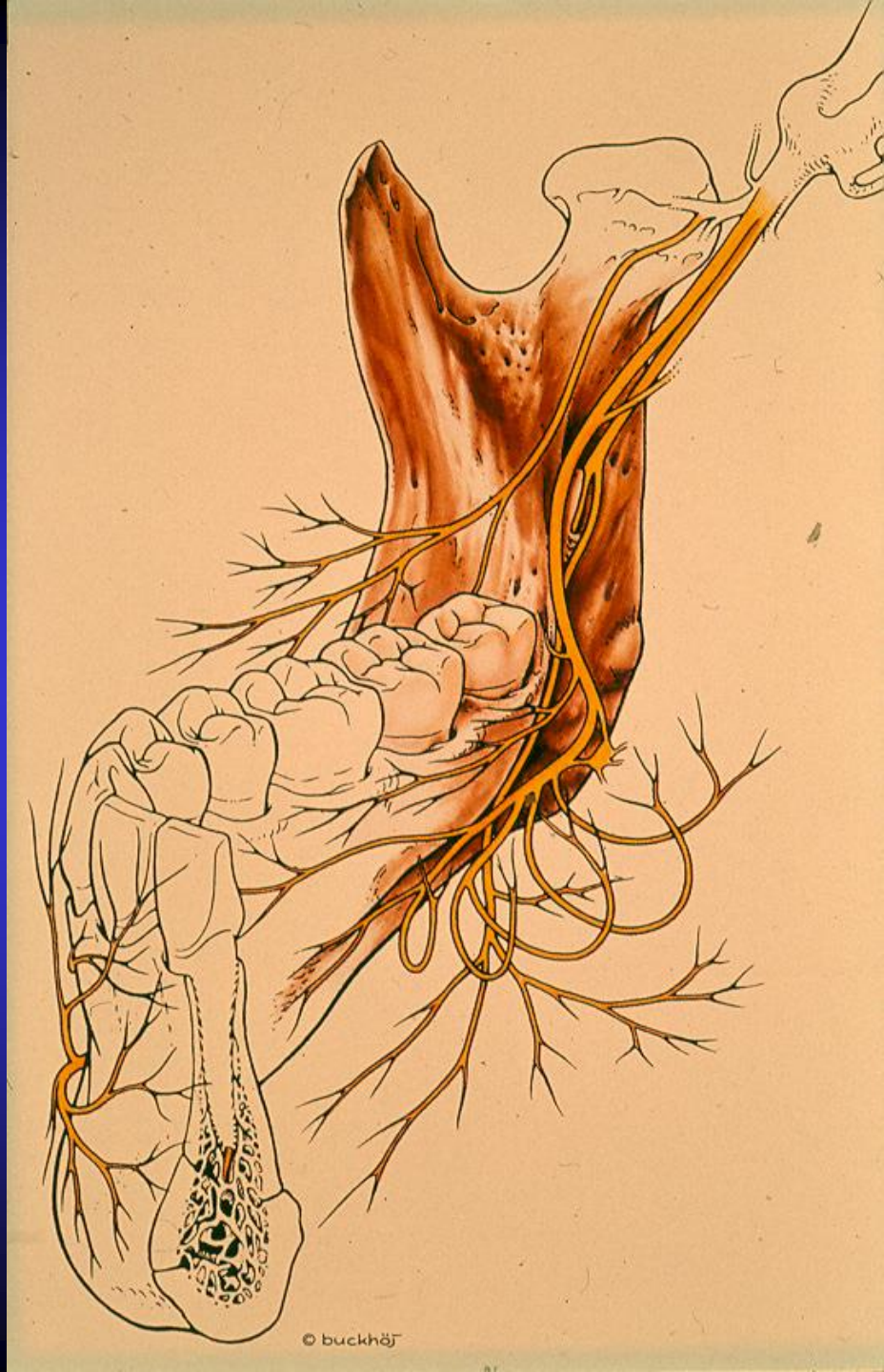


Extension of analgesia at incisival nerve block

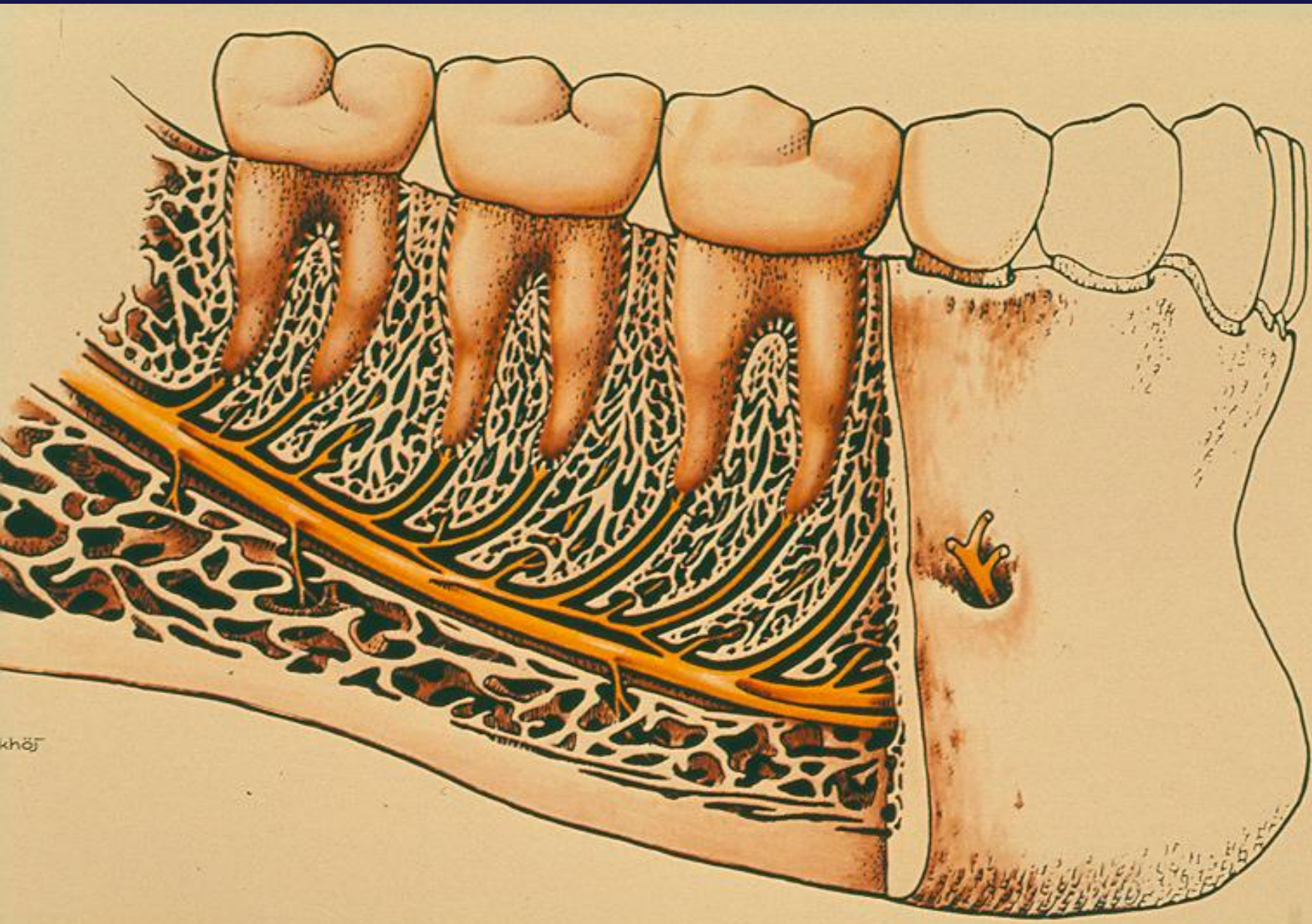


Nerve block analgesia of great-palatine nerve

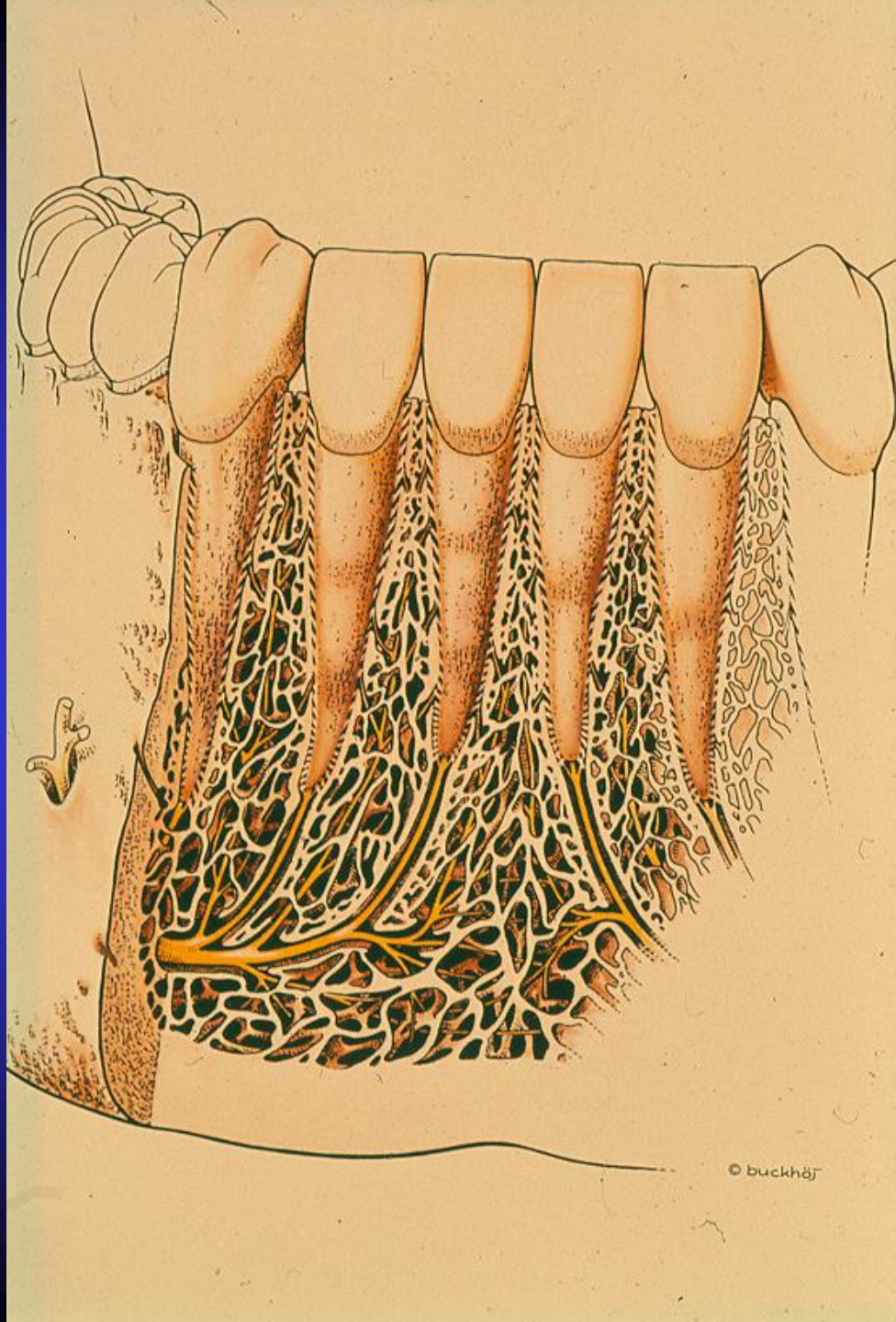
The sensory innervation of the mandible



Nerve supply of lower molar teeth

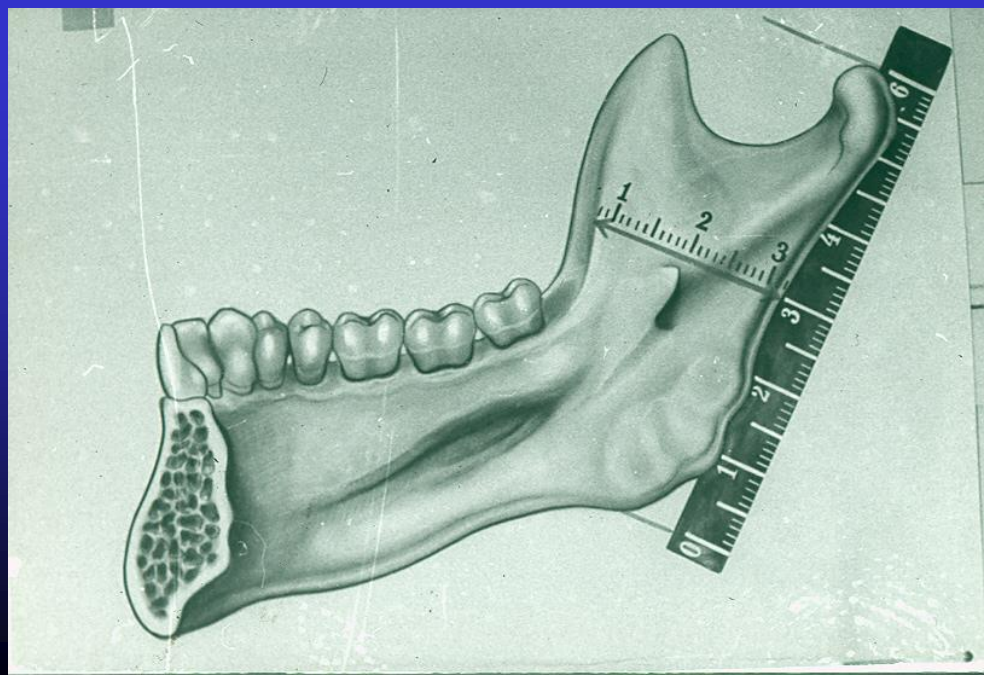


Nerve supply of lower incisive teeth

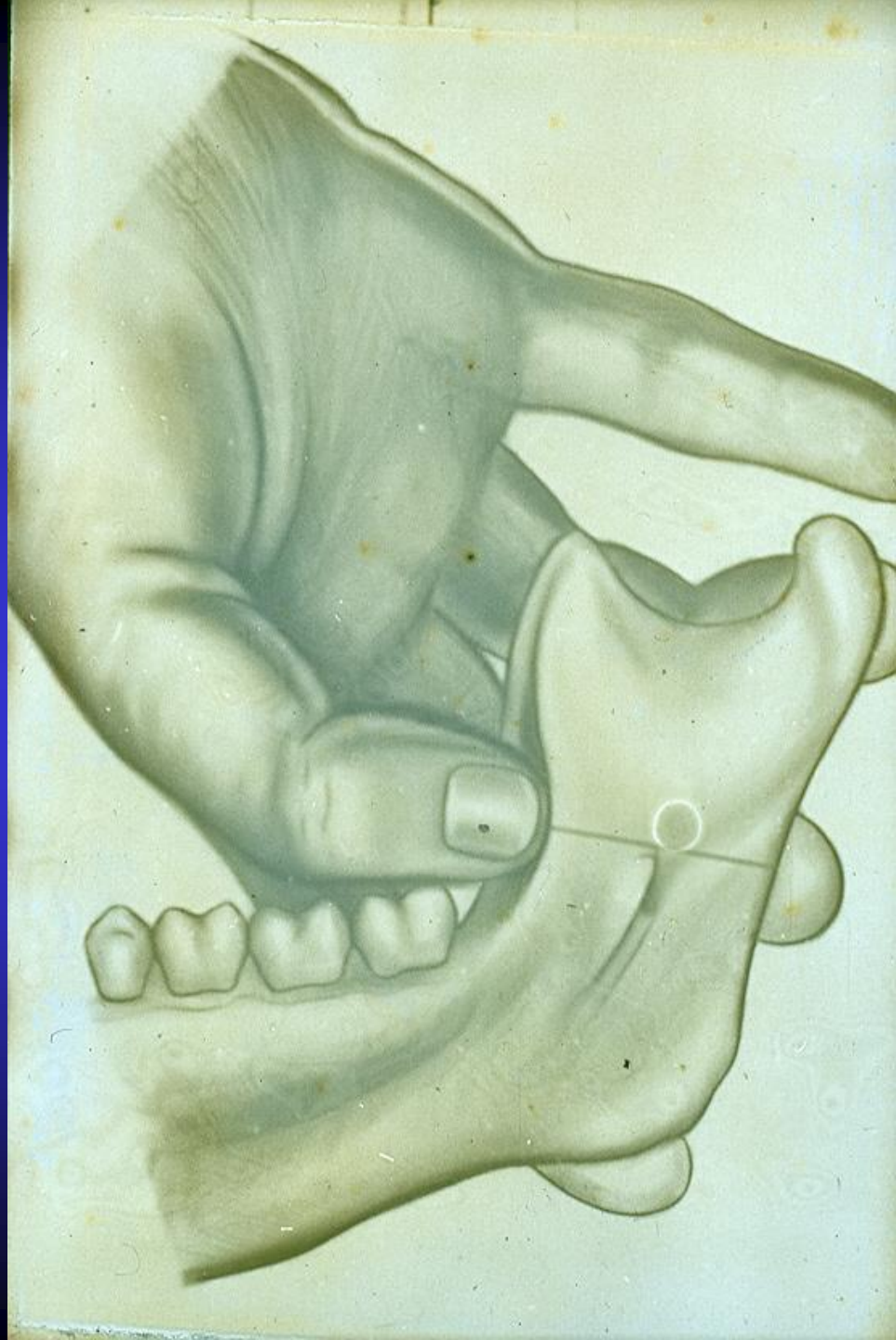


„Szokoloczy” method for completing mandibular nerve block analgesia:

- localization of the position of lingula mandibulae /entrance of inferior alveolar nerve/
- by using anatomical landmarks



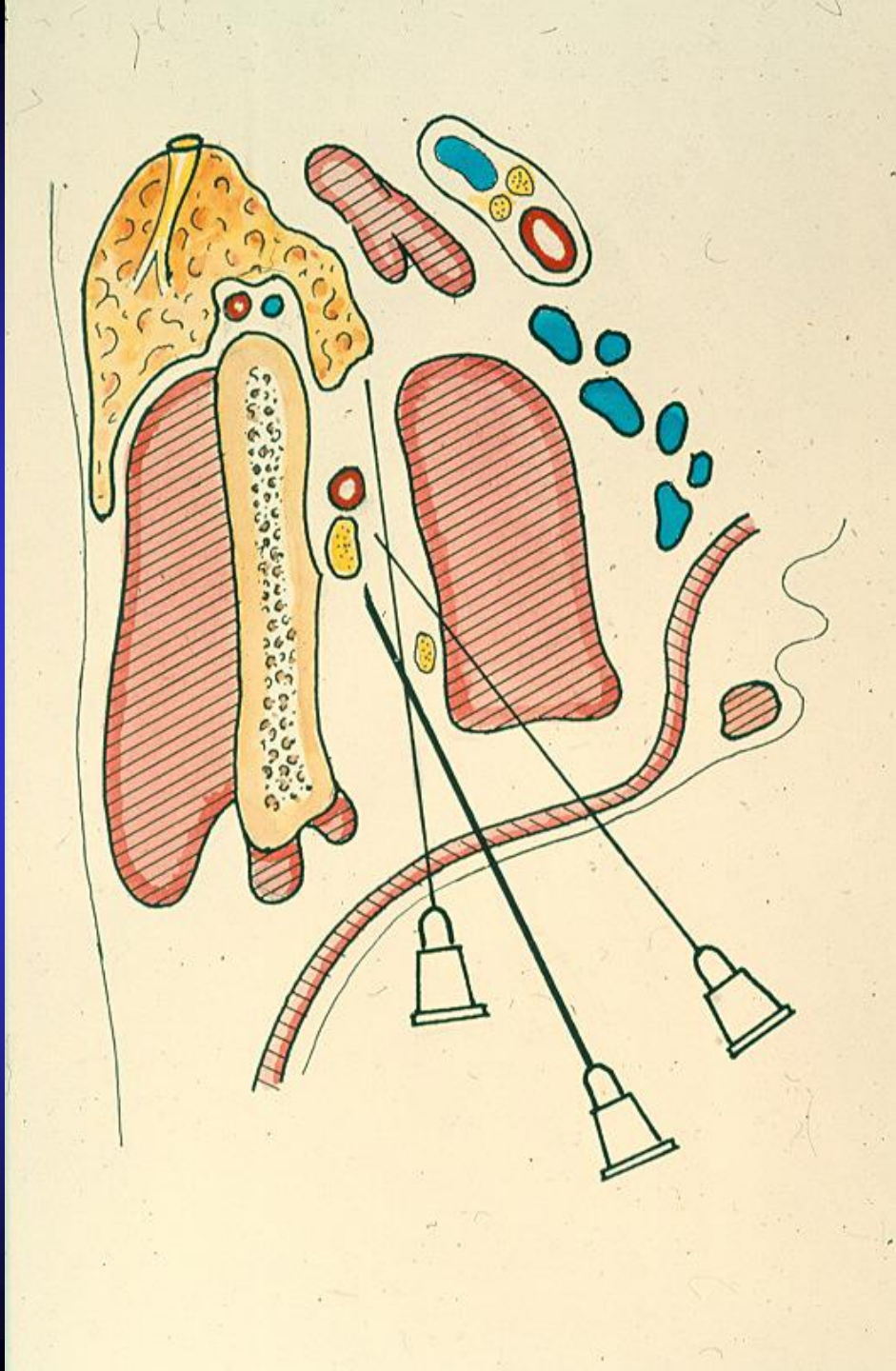
Lingula mandibulae is located in the half-way centre of the height and the width of the ramus mandibulae



Technique of the mandibular nerve block analgesia

Technique of the mandibular nerve block analgesia

Horizontal section of the pterygo-mandibular space at the level of the lingula mandibulae



Basic considerations of tooth removal

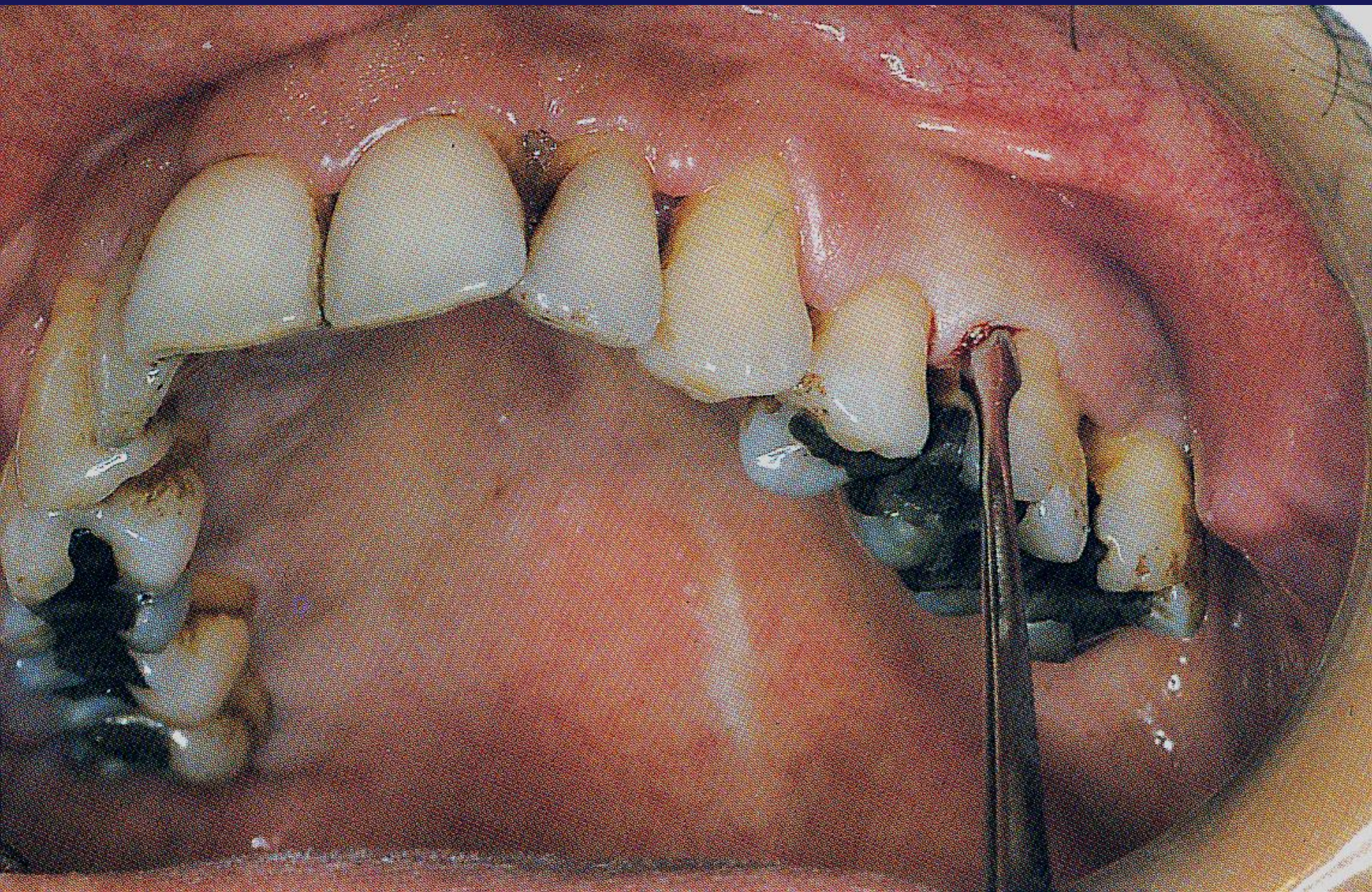
Indications for removal of teeth

1. Severe periodontal disease
2. Parodontal disease with eccessive mobility
3. Cracked teeth
4. Pulpal necrosis, untreatable by standard endodontic techniques
5. Teeth, where the endodontic treatment has failed
6. Non-restorable roots
7. Impacted, supernumerary teeth
8. Orthodontic reasons

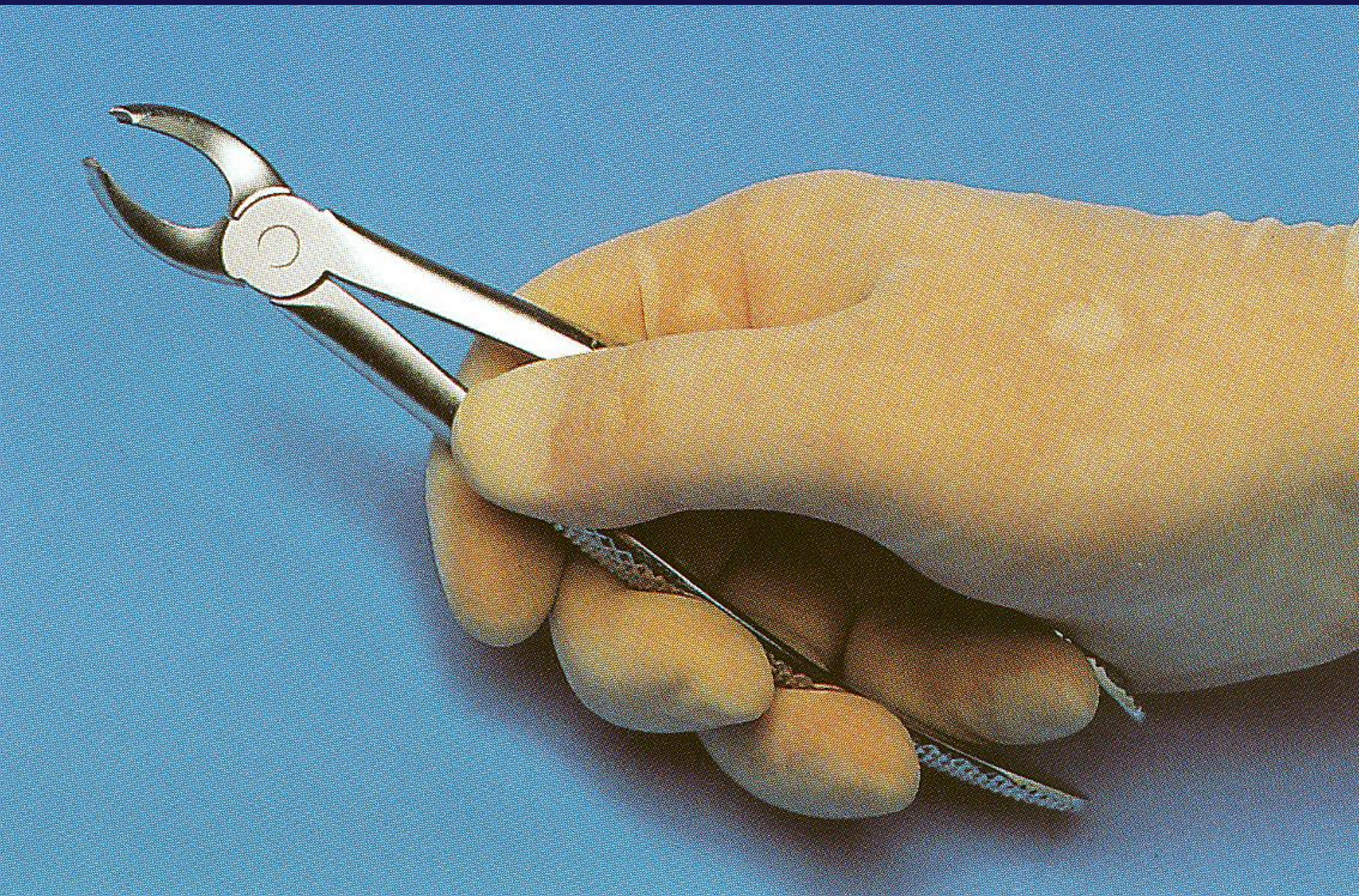
Contraindications for removal of teeth
(relative contraindications)

1. Uncontrolled leukemias
2. After therapeutic radiation
3. Recent myocardial infarction
4. Severe bleeding disorders, anticoagulant therapy
5. Necrotic inflammations of the gingiva (pericoronitis, stomatitis)

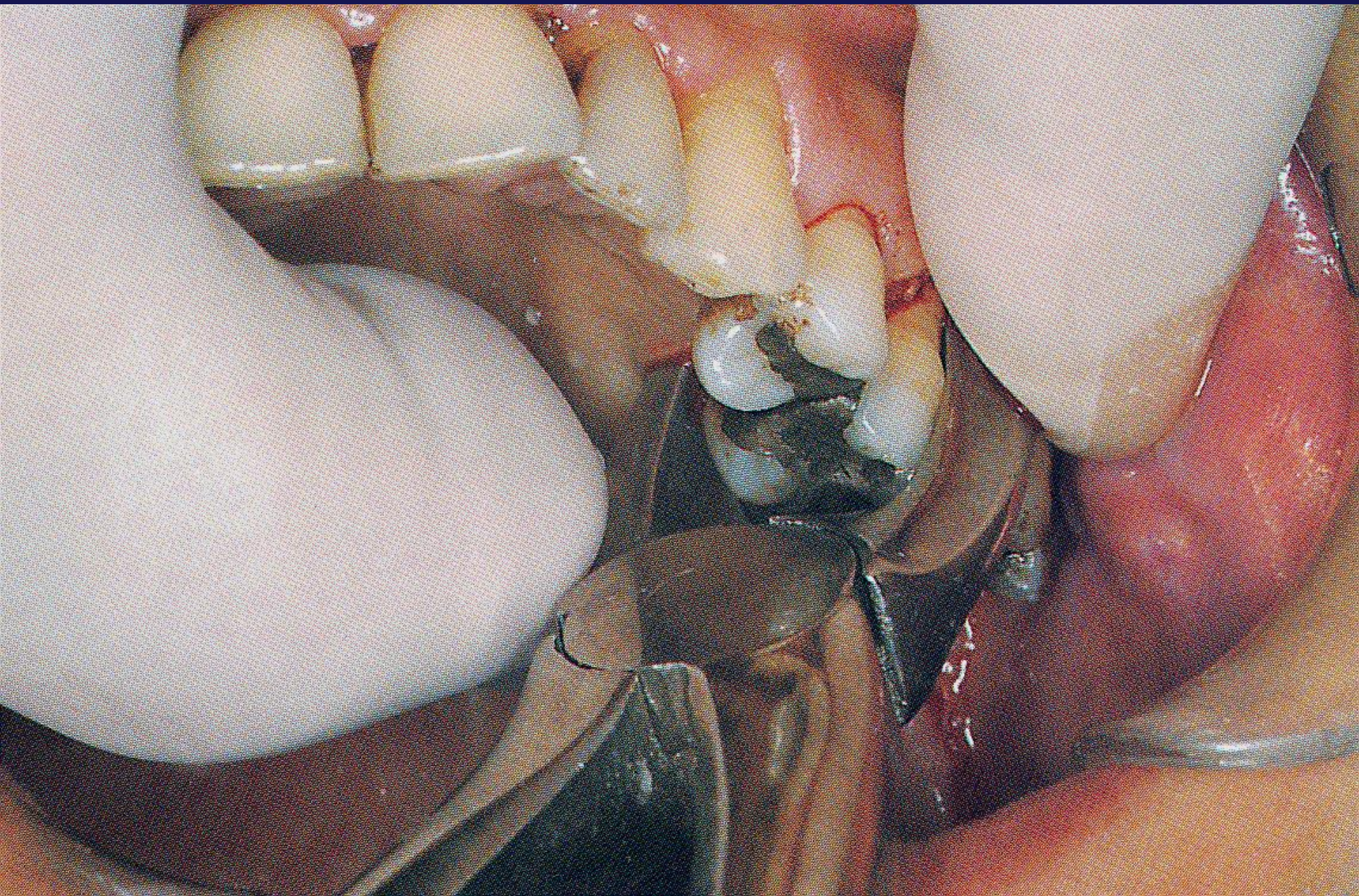
Extraction of a maxillary molar–severing the soft tissue fibers with a desmotome



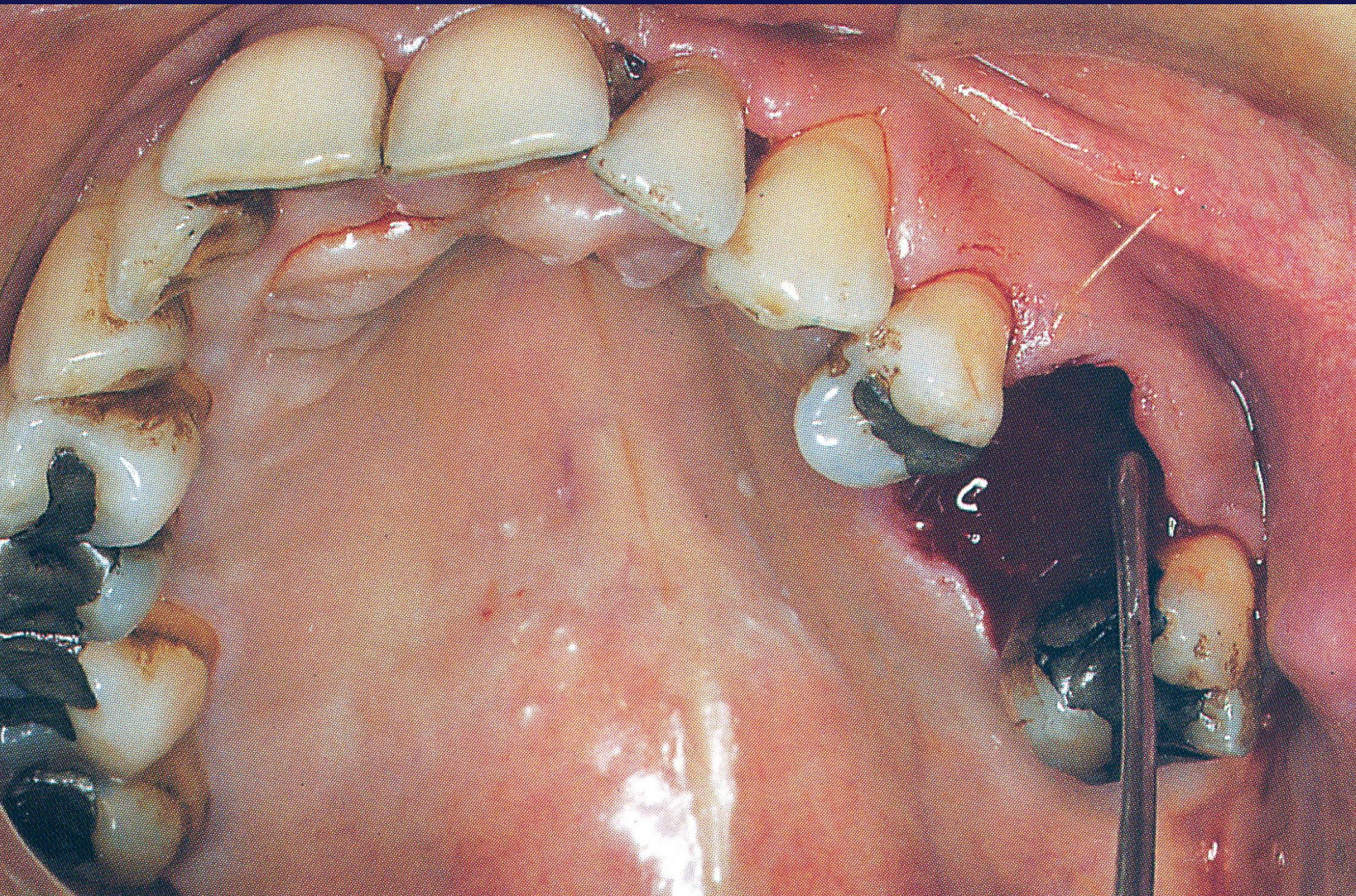
Extraction of the tooth–use of the forceps



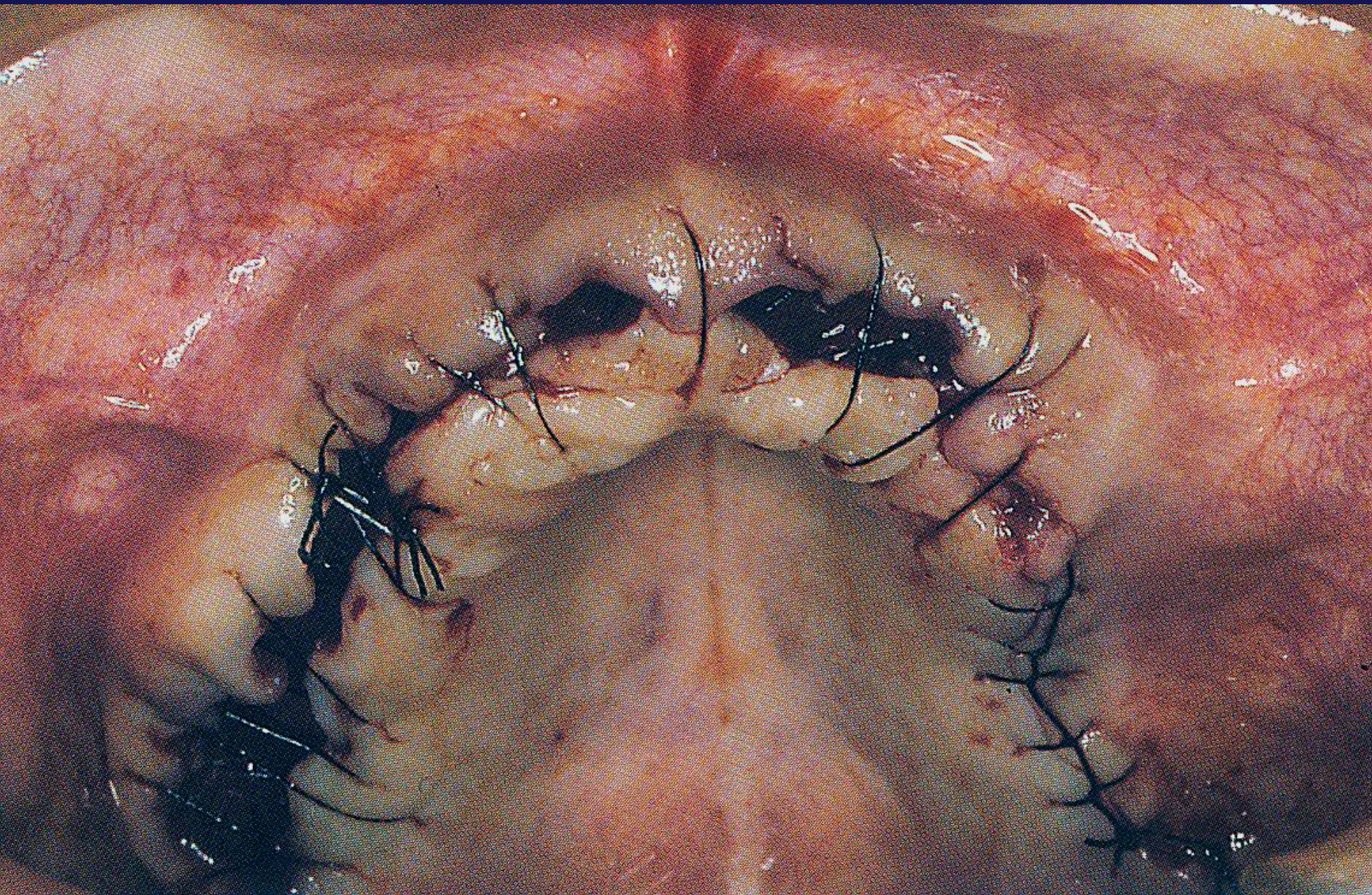
Use of the forceps



Curettage of the wound



Wound closure



Use of the forceps at the removal of lower tooth