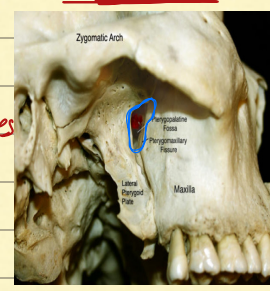


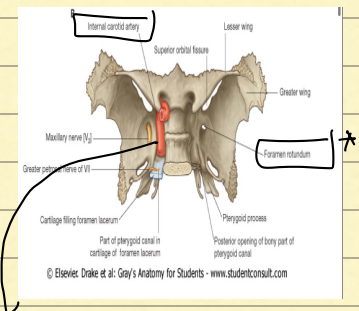
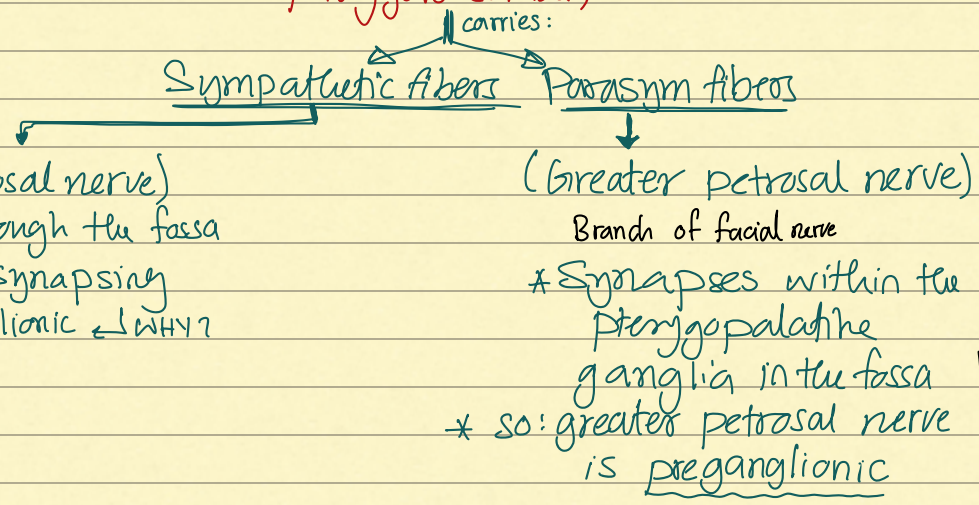
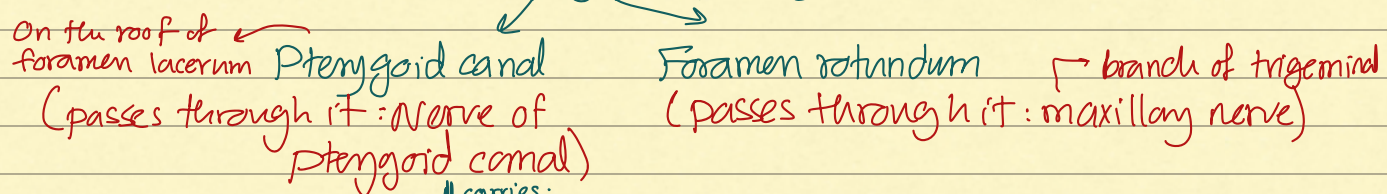
* The pterygopalatine fossa: (Part 1)

- it's a space → tear-drop in shape
- located between bones of the lateral side of the skull immediately posterior to the maxilla
- Between the sphenoid bone (lateral pterygoid plate) ⊕ the maxilla



- important structure: as it forms multiple connections with 6 imp communications the surrounding structures
- ① Orbit → through the inferior orbital fissure
 - ② Nasopharynx → through the palatovaginal canal
 - ③ Oral cavity → through the palatine canal
 - ④ Nose → through the sphenopalatine foramen
 - ⑤ Infratemporal fossa → through the pterygomaxillary fissure
 - ⑥ Middle cranial fossa → through 2 openings (on the sphenoid bone)

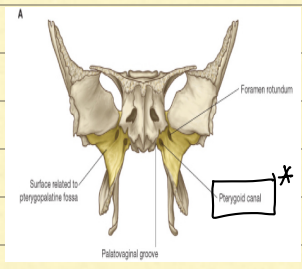
To deliver blood & nerve supply to these structures



internal carotid artery: on the roof of foramen lacerum

* Contents of the fossa:

- 1- Maxillary artery / 2- Maxillary nerve / 3- Pterygopalatine ganglia (parasympathetic ganglia)
 - ↳ inside it, we have the synapse of parasympathetic fibers coming from the pterygoid canal foramen
- From infratemporal fossa From middle cranial fossa through foramen rotundum



- 4- Nerve of the pterygoid canal (has sympathetic & parasympathetic fibers)
 - From the middle cranial fossa to the ganglion
- 5- Veins & lymphatics
 - run with the arteries (the veins: opposite in direction to the arteries)

* Walls of the pterygopalatine fossa :-

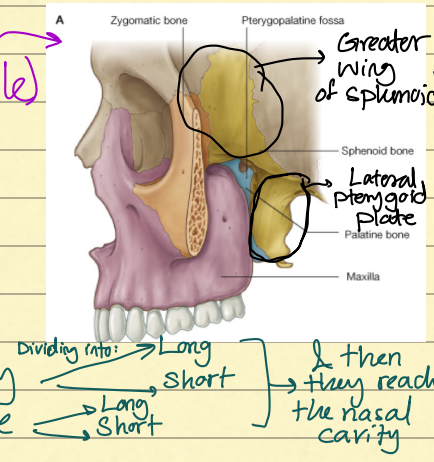
1- Anterior wall: Posterior surface of maxilla (purple)

2- Medial wall: palatine bone (blue)

↳ contains one foramen → sphenopalatine foramen

Passing through it:

- Sphenopalatine artery
- sphenopalatine nerve



3- Posterior wall: Sphenoid bone (Yellow)

↳ the lateral pterygoid plate

4- The roof: Sphenoid bone (Yellow)

↳ the greater wing

(So: bones surrounding this foramen: ① Maxillary / ② Palatine / ③ Sphenoid)

5- The lateral wall ?? → space → Leading to the infratemporal fossa
↳ through an opening:

Pterygomaxillary fissure

WHY? In order for the maxillary artery (branch of the ECA) which is passing through the infratemporal fossa to reach the pterygopalatine fossa to be one of its contents

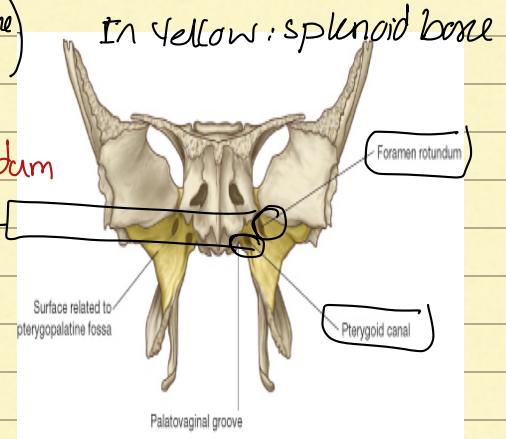
↳ completely the opposite: the maxillary nerve

* Maxillary nerve is a branch of the trigeminal nerve in the middle cranial fossa → so it reaches the pterygopalatine fossa through the: Foramen rotundum

(So: maxillary artery → from infratemporal fossa to pterygopalatine)
maxillary nerve → from pterygopalatine to infratemporal)

* These 2 openings in the sphenoid bone → Foramen rotundum
↳ Pterygoid canal

They link the middle cranial fossa with the pterygopalatine fossa



* Gateways of pterygopalatine fossa :-

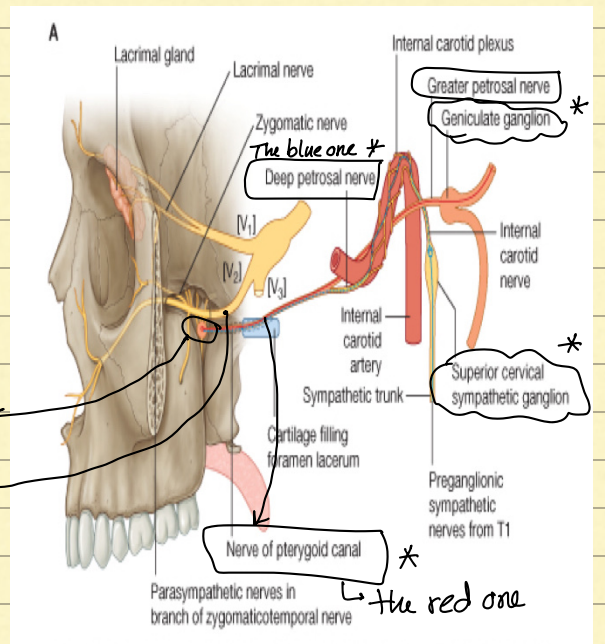
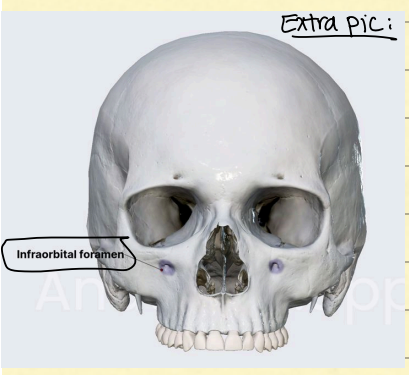
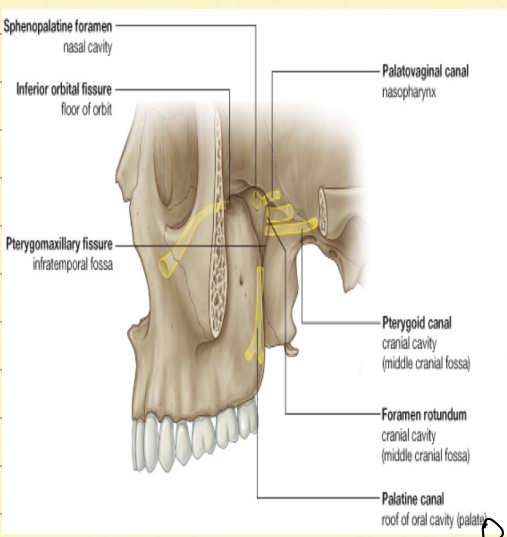
- Foramen rotundum } mentioned before
- Pterygoid canal } mentioned before
- Palatovaginal canal (above) → opens to the nasopharynx (delivering blood & nerve supply to the nasopharynx)
- Palatine canal → Passes through it: palatine artery (which divides into Greater & Lesser)
 - opens to the oral cavity
 - to the soft palate
 - to the hard palate
 - Then goes to the nasal cavity

- Sphenopalatine foramen → on the medial wall of the pterygopalatine fossa
 - opens to the nasal cavity
 - passes through it:
 - ① sphenopalatine artery → Long / short
 - ② sphenopalatine nerve → Long / short

- Pterygomaxillary fissure → opens to the infratemporal fossa
 - passes through it:
 - ① Maxillary artery (entering the pterygopalatine fossa)
 - ② Maxillary nerve (exiting the pterygopalatine fossa)

- Inferior orbital fissure → opens to the orbital cavity
 - passes through it: the ends of the
 - ① Maxillary artery
 - ② Maxillary nerve

Then they exit through the infraorbital foramen ←



Pterygopalatine ganglion
Maxillary nerve

* Nerves of pterygoid canal: (2 types of fibers: sym + parasym)

* Geniculate ganglion: is related to the facial nerve
 → passes through it: Greater petrosal nerve → then it crosses the pterygoid canal
 then → synapses at the ganglia then → its postganglionic fibers are distributed (so it's a preganglionic parasym. nerve) with the branches of the maxillary nerve & artery

* What about the sympathetic?

We have 3 sympathetic ganglia in the neck: superior + middle + inferior

The superior sympathetic ganglion (shown in the pic above) → gives the postganglionic sympathetic fibers

* What is the origin of the sympathetic nerves? Thoracolumbar, from the lateral horn of the spinal cord

then passes through the vertebral foramina → preganglionic to the superior sympathetic ganglion → then it gives the postganglionic fibers (The deep petrosal nerve) → passes with the internal carotid artery

↳ when it reaches the pterygopalatine ganglion → it doesn't synapse there (bc it's postganglionic!)

→ then it also distributes (like the parasymp) with the branches of maxillary artery & nerve

So: (greater petrosal nerve: preganglionic parasympathetic) / (*sympathetic → mainly go to BVs for constriction / parasymp → secretomotor to glands)
(deep petrosal nerve: postganglionic sympathetic)

* The ganglion has sensory fibers (sensation) → from the maxillary nerve

Parasymp + Symp. Nerve

receives twigs of nerves (2 branches)

* When the parasympathetic fibers exit the pterygopalatine ganglion, they go through the maxillary artery & nerve to different glands (secretomotor)

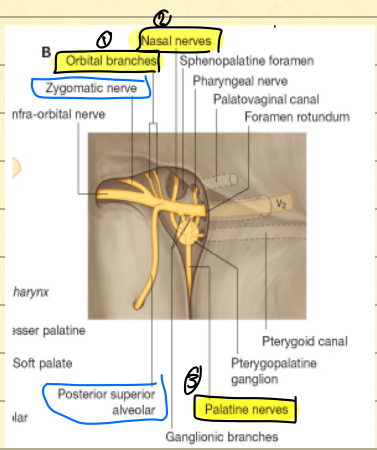
(Glands in the nose / palate / orbit / pharynx - esp. nasopharynx / lacrimal glands)

* Maxillary nerve branches: 1- Zygomatic Divides into:

- zygomaticotemporal
- zygomaticofacial

2- Posterior superior alveolar → sensory to the molar teeth

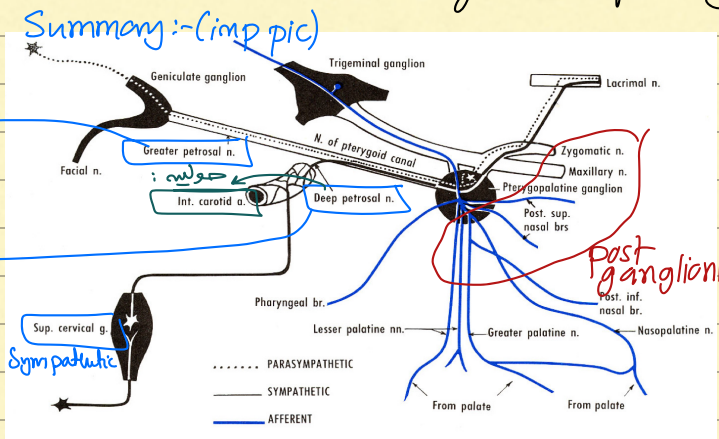
3- Ends as: Infra-orbital nerve



The ganglion gives - nasal branches, through: 3 sphenopalatine long & short
- orbital branches
- palatine, through: Lesser & greater palatine

(branches of the ganglia that have the same names as the artery & nerve passing through them)

Parasymp
Postganglionic Symp.



* Nerve to pterygoid canal: Deep petrosal + Great petrosal

↓ Sympathetic ↓ Parasymp

* Branches of the pterygopalatine ganglion :-

- Orbital branches → through the inferior orbital fissure → periosteum → lacrimal glands
 to ↓
 Sphenoidal & ethmoidal air sinuses

- Pharyngeal nerve → from the pterygopalatine ganglion
 → leaves through the palatovaginal canal
 → going to the mucosa of nasopharynx to supply it posteriorly

- Greater & lesser palatine
 to the nose + hard palate → to soft palate

- Nasal nerves → Long sphenopalatine (Nasopalatine) → to the septum
 → Short sphenopalatine → to the upper posterior quadrant of the nasal cavity

* Maxillary nerve → Branch of the trigeminal nerve
 In the middle cranial fossa
 From the trigeminal ganglion

Pure sensory nerve

* Trigeminal nerve → ophthalmic → pure sensory
 → maxillary → pure sensory
 → mandibular → mixed

→ Foramen rotundum → Pterygopalatine ganglion → branches in the pterygopalatine fossa
 (sensory & taste)

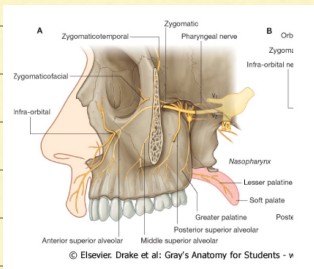
↓
 Ends at the infraorbital foramen

* Maxillary artery & nerve end as the infraorbital artery & nerve respectively and they both give the 3 branches (palpebral, nasal & labial)

Gives 3 branches: - palpebral → to the lower eyelid
 - Nasal → to the external nose
 - Labial → to the upper lip

Some branches: 1- Meningeal → to the meninges
 2- To the ganglia (twigs)
 3- Zygomatic → temporal
 → Facial

} sensory but the zygomaticotemporal carries the parasympathetic postganglionic to the lacrimal glands (through the lacrimal nerve)



Maxillary nerve

- Branches:
- Meningeal (before it enters the Fossa)
- Two ganglionic branches pass through the pterygopalatine ganglion (Postganglionic parasympathetic fibers and sensory).
- Zygomatic nerve
- Posterior superior alveolar nerve
- Infra-orbital

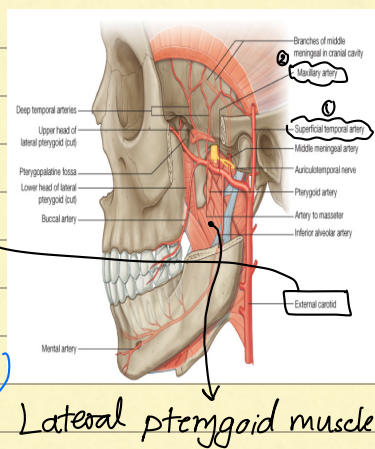
(Part 2) :-

The external carotid artery: Divides in the substance of the parotid gland

into:

- 1- Superficial temporal → to the skull
- 2- Maxillary artery → Divided into 3 parts by the lateral pterygoid muscle (usually this muscle is posterior to the artery but could be anterior sometimes)

→ 1st: Before the muscle
 2nd: Related to the muscle (Ant or Post)
 3rd: After the muscle (imp → this is the part that passes from the infratemporal fossa through the pterygomaxillary fissure to reach the pterygopalatine fossa) → opposite to the maxillary nerve



* When it's in the infratemporal fossa, it gives the posterior-superior alveolar artery

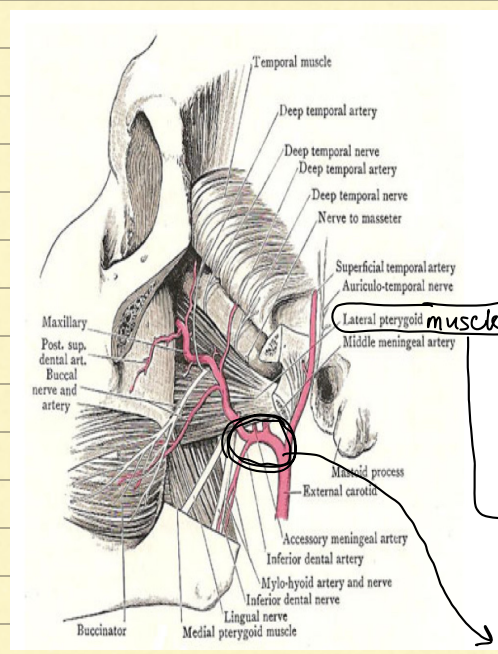
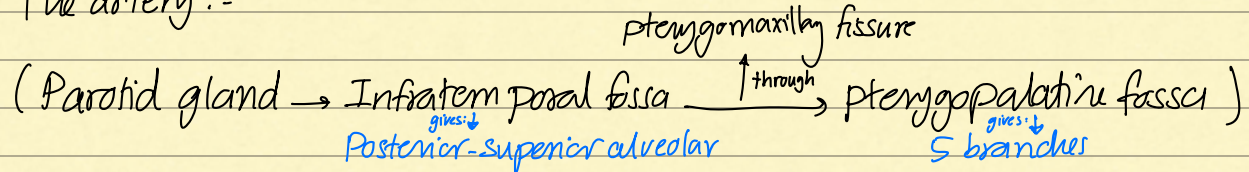
* Then when it reaches the pterygopalatine fossa, it gives 5 branches with the branches of the pterygopalatine ganglion along with the nerve branches

* While maxillary nerve comes from the middle cranial fossa & through the foramen rotundum to reach the pterygopalatine fossa, then it goes to the infratemporal fossa through the pterygomaxillary fissure.

سؤال هسه → to give: Posterior superior alveolar nerve → to the last 3 molars (so the artery & nerve meet at the pterygomaxillary fissure)

* Origin of the maxillary artery: At the level of the neck of mandible within the substance of the parotid gland

The artery :-



* First part of maxillary artery gives 5 branches (all branches pass through different foramina/openings)

1- Inferior alveolar artery → to the mandibular foramen → enters the mandible & gives branches to all the lower teeth (in the lower jaw)

While the sensory nerve running with it (inferior alveolar nerve) is a branch of mandibular nerve (upper jaw → maxillary nerve / lower jaw → mandibular nerve) (in nerves: ↑)

2- Middle meningeal artery → enters foramen spinosum to the cranial fossa

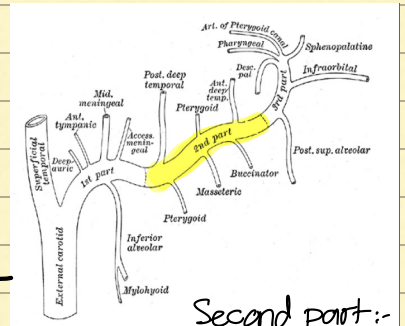
→ it's inserted in the neck of the mandible

First part of the maxillary artery before the muscle

3- Accessory middle meningeal artery → enters the foramen ovale → intracranium

4- Deep auricular
5- Anterior tympanic
→ enter the auricle (to the ear)

small branches

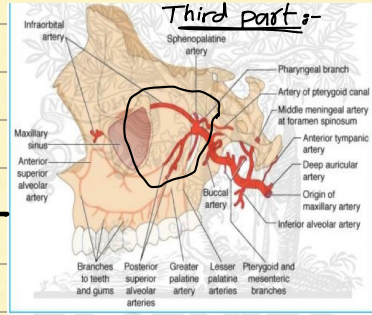


Second part:-

* Second part of maxillary artery :-

↳ Gives muscular branches → another 5 branches to the muscles of mastication :-

- 1- Temporalis muscle
- 2- Masseter muscle
- 3- Medial pterygoid
- 4- Lateral pterygoid
- 5- Buccal branch



Third part:-

* Third part of maxillary artery (terminal part)

↳ The part that enters the pterygopalatine fossa → gives also 5 branches distributed with the branches of the ganglion & with the branches of maxillary nerve

- 1- Palatine → Greater → passes in the palatine canal → to: oral cavity (hard palate)
↳ Lesser → incisive foramen → NOSE → Supplies the posterior inferior quadrant of lateral wall
- 2- Sphenopalatine → Long & short
- 3- Orbital branch → to the orbit → exiting as infraorbital artery
(first it passes through orbital canal → orbital groove → orbital foramen)
↳ Gives 3 branches after exiting the infraorbital foramen (on the face):
→ Palpebral
→ Nasal
→ Labial
* in the orbital canal / orbit : it also gives :-
- middle & anterior superior alveolar
- 4- Pharyngeal → through the palatovaginal foramen → to: the nasopharynx
- 5- Artery to pterygoid canal → supplies the canal & its structures → terminates in the mucosa of nasopharynx
- 6- Posterior-superior alveolar (in infratemporal fossa) → to the last upper 3 molars
↳ supplies the molars + premolars + maxillary sinus

Extra:-
* We said 5 branches in the pterygopalatine fossa → while the 6th: (post-superior alveolar) is from the infratemporal fossa

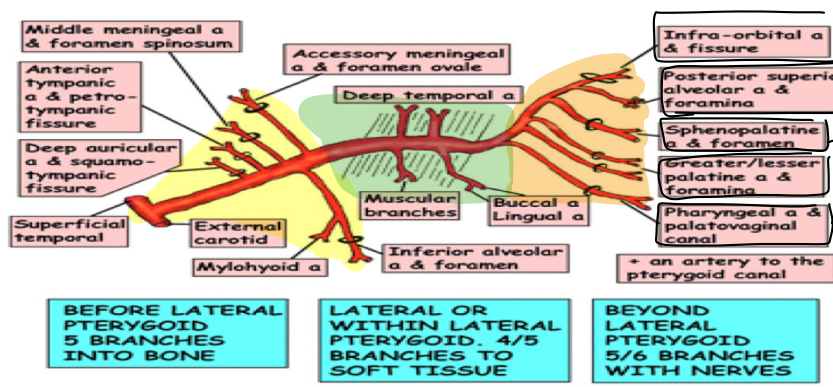
* All teeth of the upper jaw receive blood supply from branches of the maxillary artery
↳ before the orbit → it gives the posterior-superior alveolar artery
↳ in the orbit → gives the middle and anterior superior alveolar
→ superior = supplying the upper teeth
→ posterior → to the molars
→ middle → to premolars
→ anterior → canine & incisors

* So: the 3rd part gives blood supply to the:
Sinuses / oropharynx / orbit / nose / upper teeth

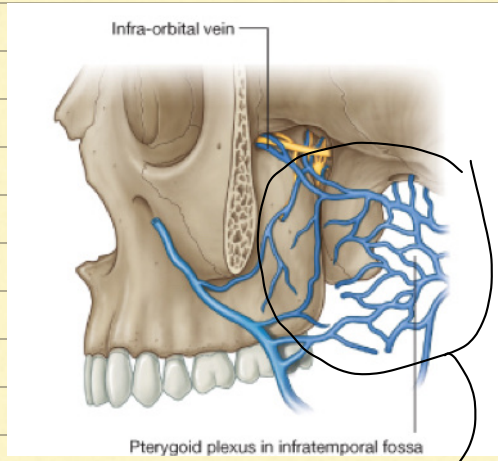
1st part
2nd part
3rd

MAXILLARY ARTERY

In infratemporal fossa, either within or lateral to the superficial head of lateral pterygoid muscle.
This muscle is shown below



→ The end artery
→ in infratemporal fossa
→ Long Short
→ to nasopharynx



Pterygoid plexus

* Veins of pterygopalatine fossa → arteries & vsc
 ↳ But they all meet in the pterygopalatine fossa posterior to pterygoid plexus of veins
 ↳ around the lateral pterygoid muscle
 ↳ This plexus then forms the maxillary vein
 ↓
 Ends in the parotid gland as it meets the superficial temporal vein
 ↓
 Forming the retromandibular vein
 * some veins of the plexus go with the infraorbital veins → & could reach the cavernous sinus

* Remember that the pterygoid plexus is connected to the cavernous sinus by emissary veins through: foramen spinosum & foramen ovale