

# Parotid Region

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## Parotid Region

### Introduction

- The **parotid region** is the area on the **lateral aspect of the face**, below the zygomatic arch, and anterior to the ear.
- It contains the **largest salivary gland** — the **parotid gland**, along with its **duct, facial nerve branches, external carotid artery, and retromandibular vein**.
- This region is of surgical importance due to the **complex relations of nerves and vessels** passing through the gland.

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## Salivary Glands

- Three pairs of major salivary glands:
  - **Parotid** (largest, purely serous)
  - **Submandibular** (mixed, mostly serous)
  - **Sublingual** (mixed, mostly mucous)
- Functions: secrete saliva ? aids digestion, lubricates food, maintains oral hygiene.

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## Parotid Gland

- **Shape and Location:**

- Irregular, wedge-shaped gland lying between **ramus of mandible** and **sternocleidomastoid (SCM)**.
- Situated **below and in front of the ear**.
- Extends from **zygomatic arch** above to the **angle of mandible** below.

- **Capsule:**

- **True capsule:** condensation of connective tissue of gland.
- **False capsule:** derived from **investing layer of deep cervical fascia**.
- The fascia forms **parotid sheath**, thickened at the upper border to form the **stylomandibular ligament** (separates it from submandibular gland).

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### Relations of the Parotid Gland

**Superficial (Lateral):** Skin, superficial fascia, great auricular nerve.

**Deep (Medial):** Styloid process and associated muscles (styloglossus, stylopharyngeus), internal carotid artery, internal jugular vein.

**Anterior:** Ramus of mandible, masseter, medial pterygoid.

**Posterior:** Mastoid process, SCM, posterior belly of digastric.

**Superior:** External acoustic meatus, temporomandibular joint (TMJ).

**Inferior:** Posterior belly of digastric, carotid sheath.

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### Structures Within the Gland (from superficial to deep)

**Mnemonic:** *F–V–A*

1. **Facial nerve** (divides into 5 terminal branches)
2. **Retromandibular vein**
3. **External carotid artery** (gives posterior auricular and divides into maxillary and superficial temporal arteries)

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## Dissection

- The gland is dissected after removal of skin and fascia from the lateral face.
- **Identify:**
  - Parotid duct (Stensen's duct) crossing masseter.
  - Facial nerve trunk emerging from **stylomastoid foramen** and dividing into **temporo-facial** and **cervico-facial** divisions.
  - Retromandibular vein and external carotid artery lying deep to it.

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## Clinical Anatomy

- **Parotid Abscess:**
  - Due to infection (often from mumps or suppurative parotitis).
  - Severe pain due to **unyielding fascia**; swelling pushes ear upward and outward.
- **Parotid Tumors:**

- Usually **pleomorphic adenoma** (benign, slow-growing).
- Surgery risky because of **facial nerve branches** passing through gland.

- **Frey's Syndrome (Auriculotemporal Syndrome):**
  - After parotidectomy, **misdirected regeneration** of auriculotemporal nerve causes **sweating while eating** (gustatory sweating).
- **Mumps:**
  - Viral infection causing painful swelling of parotid; may lead to **orchitis** in males.
- **Facial Nerve Injury:**
  - During surgery or trauma ? **Bell's palsy** (loss of facial expression on one side).

### Relations of the Parotid Gland

#### Superficial (Lateral) Surface

- **Skin** – thin and movable over gland.
- **Superficial fascia** – contains *great auricular nerve* (sensory to capsule) and *superficial parotid lymph nodes*.
- **Parotid fascia (false capsule)** – tough fibrous layer derived from investing cervical fascia; limits glandular expansion ? source of pain in swelling.

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#### Superior (Base)

- Lies against **zygomatic arch** and **external acoustic meatus**.
- Roof is crossed by branches of **temporal artery** and **auriculotemporal nerve**.

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### Inferior (Apex)

- Overlaps **posterior belly of digastric** and **stylohyoid**.
- Prolongs downward as the *facial process* between *mandible* and *sternocleidomastoid* (SCM).

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### Anterior (Marginal) Surface

- Related to **masseter muscle**.
- Gives rise to **parotid duct**, which emerges from anterior border.
- **Facial nerve branches** (temporal, zygomatic, buccal, marginal mandibular, cervical) radiate forward.

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### Posterior (Mastoid) Surface

- Lies over **mastoid process** and **SCM**.
- Related to **posterior belly of digastric**, **occipital artery**, and **great auricular nerve**.
- Deep within: **styloid process** with its attached muscles (*styloglossus*, *stylopharyngeus*, *stylohyoid*).

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### Medial (Deep) Surface

- Contacts **styloid apparatus** (styloid process + muscles + ligament), **internal jugular vein**, and **internal carotid artery**.
- Separated from pharyngeal wall by **retrostyloid space** containing *glossopharyngeal, vagus, accessory nerves*.

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## Structures Traversing the Gland

**Mnemonic:** “*Nerve – Vein – Artery*” (from superficial to deep)

1. **Facial nerve** – enters via *stylomastoid foramen*, divides within gland into temporofacial & cervicofacial trunks ? five terminal branches.
2. **Retromandibular vein** – formed within gland by union of superficial temporal + maxillary veins.
3. **External carotid artery** – enters from below, gives *posterior auricular branch* and divides into *maxillary & superficial temporal arteries*.

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## Parotid Duct (Stenson's Duct)

### Course

- ~ 5 cm long, emerges from **anterior border** of gland.
- Runs **over masseter**, parallel with **zygomatic arch** about 1 finger breadth below it.
- At **anterior border of masseter**, turns **medially**, pierces:
  1. **Buccal fat pad**

2. **Buccopharyngeal fascia**

3. **Buccinator muscle**

4. **Mucous membrane of cheek**

- Opens opposite the **upper second molar tooth** as a small papilla.

### Relations

- Lies midway between **zygomatic arch** and **angle of mandible**.
- Crossed by **buccal branches of facial nerve**.
- Accompanied by **transverse facial artery** (above) and **buccal fat pad** (below).

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### Clinical Anatomy

#### 1. Mumps

- Viral parotitis caused by *paramyxovirus*.
- Pain aggravated on chewing due to tough fascia.
- In males may cause *orchitis* and infertility.

#### 2. Parotid Abscess

- Bacterial infection producing pus under the un-yielding capsule ? severe pain.
- Swelling pushes ear up and out.

- Drain through small incision parallel to duct to avoid facial nerve injury.

### 3. Frey's Syndrome (Gustatory Sweating)

- After parotidectomy or trauma, parasympathetic fibers of *auriculotemporal nerve* join sweat glands ? sweating and flushing on chewing.

### 4. Parotid Tumors

- *Pleomorphic adenoma* = most common benign tumor.
- Surgical removal requires facial-nerve preservation.

### 5. Facial Nerve Palsy

- During surgery or fracture of mandible angle ? loss of facial expression on same side.

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#### Histology

- **Type:** Purely serous gland (tubulo-alveolar).
- **Secretory units:** Acini lined by pyramidal cells with round nuclei and basophilic cytoplasm.
- **Duct system:** Intercalated ? striated ? interlobular ducts.
- **Stroma:** Connective tissue septae divide gland into lobules; contain vessels and ducts.

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## Development

- Develops from **ectodermal buds** of the **oral epithelium** near the **angles of the stomodeum** around **6?? week of intra-uterine life**.
- Solid cords grow into mesenchyme, branch, and canalize to form ducts and acini.
- **Epithelial component** ? secretory tissue and ducts; **mesenchyme** ? capsule and stroma.
- Becomes functional by the end of foetal life but secretion begins after birth.

## Facts to Remember

1. **Largest salivary gland:** Parotid gland — purely **serous** in secretion.
2. **Structures within the gland (superficial ? deep):**
  - **Facial nerve**
  - **Retromandibular vein**
  - **External carotid artery**
3. **Fascia:**
  - The **false capsule** (parotid sheath) is derived from the *investing layer of deep cervical fascia*.
  - Its rigidity explains the **intense pain in mumps and abscess**.

4. **Stylomandibular ligament:**

- Thickened part of parotid fascia.
- Separates **parotid gland** from **submandibular gland**.

5. **Parotid duct (Stenson's duct):**

- 5 cm long, opens opposite **upper 2nd molar**.
- Pierces **buccinator**, not its muscle fibers — passes through a gap.

6. **Facial nerve within parotid:**

- Divides into **temporofacial** and **cervicofacial trunks**, giving five branches:  
Temporal – Zygomatic – Buccal – Marginal mandibular – Cervical (*mnemonic: To Zanzibar By Motor Car*).

7. **Parotid gland relations (surface marking):**

- Extends from **zygomatic arch** to **angle of mandible**.
- Covers posterior border of ramus of mandible.

8. **Parasympathetic supply:**

- From **glossopharyngeal nerve (IX)** ? tympanic branch ? lesser petrosal ? *otic ganglion* ? auriculotemporal nerve ? gland.
- Stimulation ? copious watery secretion.

9. **Sympathetic fibers:**

- From *superior cervical ganglion* via external carotid plexus ? vasoconstriction.

10. **Lymphatic drainage:**

- To **parotid lymph nodes**, then **deep cervical nodes**.

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### ?? Clinicoanatomical Problems

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1. Why is parotid swelling (in mumps) extremely painful?

- Because the gland is enclosed within a **dense, inelastic fascia (parotid sheath)**.
- Inflammation causes rapid **increase in pressure**, compressing sensory fibers of the **great auricular nerve**.

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2. A patient presents with loss of facial movements following parotid surgery. What is the cause?

- Injury to **facial nerve** or its branches within the gland.
- Leads to paralysis of **muscles of facial expression** (Bell's palsy type).

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3. After parotidectomy, a patient sweats over the cheek while eating. Explain.

- **Frey's syndrome (gustatory sweating):**
  - Aberrant regeneration of **parasympathetic fibers (auriculotemporal nerve)** to **sweat glands** instead of glandular tissue.

- Stimulation during eating causes **sweating and flushing** over parotid area.

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**4. A dentist notices pus discharging into the mouth near the 2nd upper molar. What is the source?**

- Infection of **parotid duct** ? **parotid abscess** or **sialadenitis**.
- Duct opens opposite 2nd molar; pus may drain here.

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**5. Why does parotid abscess displace the ear lobule upward and outward?**

- Because swelling occurs beneath the unyielding fascia, pushing the **pinna superolaterally**.

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**6. Why must parotid incisions be made parallel to facial nerve branches?**

- To avoid **iatrogenic facial paralysis**; the nerve lies superficial in the gland and radiates fan-wise forward.

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**7. What is the clinical importance of the parotid duct's course?**

- Can be **injured in facial lacerations** (esp. over masseter).
- Blockage by **calculi** ? painful swelling before meals (salivary colic).

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**8. Why does parotid enlargement sometimes cause trismus (restricted jaw opening)?**

- The gland lies **posterior to the ramus of mandible** and deep part contacts **masseter and medial pterygoid muscles**; inflammation irritates these ? spasm.

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## 9. What is the sensory nerve of the parotid fascia and overlying skin?

- **Great auricular nerve (C2, C3)** — branch of cervical plexus.

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## 10. Why may parotid swelling cause pain in the ear?

- Sensory fibers of the **auriculotemporal nerve** also supply the **external acoustic meatus**? *referred otalgia*.

### Frequently Asked Questions – Parotid Region

#### Q1. What are the boundaries of the parotid gland?

- **Superior:** Zygomatic arch.
- **Inferior:** Angle and posterior border of mandible.
- **Anterior:** Masseter muscle.
- **Posterior:** Sternocleidomastoid and mastoid process.

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#### Q2. Name the structures passing through the parotid gland.

From **superficial to deep**:

1. **Facial nerve** – divides into branches within gland.
2. **Retromandibular vein.**

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3. **External carotid artery** – gives terminal branches (superficial temporal & maxillary arteries).

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**Q3. What is the course and termination of the parotid duct (Stenson's duct)?**

- Length: ~5 cm.
- Emerges from **anterior border** of parotid gland.
- Runs **over masseter**, one finger breadth below zygomatic arch.
- Turns **medially**, pierces buccinator muscle, and opens into the mouth opposite the **upper second molar tooth**.

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**Q4. What is the sensory nerve supply of the parotid gland and fascia?**

- **Glandular tissue:** Auriculotemporal nerve (branch of mandibular nerve).
- **Fascia and overlying skin:** Great auricular nerve (C2, C3).

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**Q5. What is the parasympathetic pathway to the parotid gland?**

- **Preganglionic fibers:** Inferior salivatory nucleus ? Glossopharyngeal nerve ? Tympanic branch ? Lesser petrosal nerve ? Otic ganglion.
- **Postganglionic fibers:** Auriculotemporal nerve ? Parotid gland.

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**Q6. What is the sympathetic supply of the parotid gland?**

- From **superior cervical ganglion** via **external carotid plexus** ? controls vasoconstriction.

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#### **Q7. What is the venous drainage and lymphatic drainage of the parotid gland?**

- **Veins:** Retromandibular vein.
- **Lymphatics:** Parotid lymph nodes ? Deep cervical lymph nodes.

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#### **Q8. Why is parotitis (mumps) painful?**

- Because the gland is enclosed in a **dense, unyielding parotid fascia**.
- Inflammation increases internal pressure ? compresses **great auricular nerve**.

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#### **Q9. What is Frey's Syndrome?**

- **Gustatory sweating** over the parotid region after parotidectomy.
- Occurs due to misdirected regeneration of **parasympathetic fibers** to **sweat glands**.

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#### **Q10. What are the boundaries of the parotid bed?**

- **Anterior:** Ramus of mandible and masseter.
- **Posterior:** Mastoid process, sternocleidomastoid.
- **Medial:** Styloid process and its muscles.
- **Superior:** Zygomatic arch.

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- **Inferior:** Posterior belly of digastric.

### Multiple Choice Questions – Parotid Region

**1. The largest salivary gland is —**

- A. Submandibular gland
- B. Sublingual gland
- C. Parotid gland
- D. Buccal gland

? **Answer:** C. Parotid gland

**2. The parotid duct opens into the mouth opposite —**

- A. First molar tooth
- B. Second molar tooth
- C. Premolar tooth
- D. Canine tooth

? **Answer:** B. Second molar tooth

**3. The nerve supplying the parotid gland (secretomotor) is —**

- A. Facial nerve
- B. Trigeminal nerve
- C. Glossopharyngeal nerve
- D. Vagus nerve

? **Answer:** C. Glossopharyngeal nerve

**4. The parotid fascia is derived from —**

- A. Pretracheal fascia
- B. Prevertebral fascia
- C. Investing layer of deep cervical fascia
- D. Buccopharyngeal fascia

? **Answer:** C. Investing layer of deep cervical fascia

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**5. The facial nerve leaves the skull through —**

- A. Styломастоидное отверстие
- B. Jugular foramen
- C. Foramen ovale
- D. Foramen spinosum

**? Answer:** A. Styломастоидное отверстие

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**6. Frey's syndrome results from injury to —**

- A. Glossopharyngeal nerve
- B. Auriculotemporal nerve
- C. Buccal branch of facial nerve
- D. Mandibular nerve

**? Answer:** B. Auriculotemporal nerve

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**7. The secretion of the parotid gland is —**

- A. Serous
- B. Mucous
- C. Seromucous
- D. Mixed

**? Answer:** A. Serous

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**8. The parotid gland is crossed superficially by —**

- A. Facial vein
- B. Retromandibular vein
- C. Transverse facial artery
- D. Posterior auricular artery

**? Answer:** C. Transverse facial artery

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**9. The stylomandibular ligament is derived from —**

- A. Buccopharyngeal fascia
- B. Investing layer of deep cervical fascia
- C. Carotid sheath
- D. Parotid fascia

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**Answer:**

D.

Parotid

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**10. The facial nerve divides the parotid gland into —**

- A. Superficial and deep lobes
- B. Upper and lower lobes
- C. Medial and lateral lobes
- D. Anterior and posterior lobes

? **Answer:** A. Superficial and deep lobes

### **Viva Voce – Parotid Region**

**1. What is the location and extent of the parotid gland?**

- Lies **below** and in front of the ear.
- Extends from **zygomatic arch (above)** to **angle of mandible (below)**.
- Fills the **parotid bed**, between ramus of mandible and mastoid process.

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**2. Name the capsule layers of the parotid gland.**

- **True capsule:** Condensation of connective tissue of gland.
- **False capsule (parotid fascia):** Derived from **investing layer of deep cervical fascia**.

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**3. Why is parotid abscess extremely painful?**

Because the **parotid fascia is thick and unyielding** — inflammation increases pressure within, compressing sensory fibers of **great auricular nerve**.

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4. Name the nerve which passes through but does not supply the parotid gland.

- **Facial nerve (VII cranial nerve).**

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5. What are the structures passing through the gland from superficial to deep?

1. **Facial nerve**
2. **Retromandibular vein**
3. **External carotid artery**

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6. How is the facial nerve related to the parotid gland?

- Enters through **stylomastoid foramen** ? passes forward through gland ? divides into **temporofacial** and **cervicofacial trunks** ? gives five terminal branches.

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7. Name the five terminal branches of the facial nerve within the gland.

**Mnemonic:** *To Zanzibar By Motor Car*

? Temporal, Zygomatic, Buccal, Marginal Mandibular, Cervical.

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8. Which nerve carries the secretomotor fibers to the parotid gland?

- **Auriculotemporal nerve** (branch of mandibular nerve), carrying postganglionic fibers from **otic ganglion** (parasympathetic pathway of glossopharyngeal nerve).

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9. What is the arterial supply of the parotid gland?

- From **external carotid artery** and its terminal branches — *superficial temporal* and *maxillary arteries*.

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**10. What is the venous drainage of the gland?**

- By **retromandibular vein** formed within the gland.

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**11. What is the lymphatic drainage of the parotid gland?**

- **Superficial and deep parotid lymph nodes ? deep cervical lymph nodes.**

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**12. What is the histological type of the parotid gland?**

- **Purely serous**, compound tubuloalveolar gland.

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**13. What is the embryological origin of the parotid gland?**

- From **ectodermal buds** of oral epithelium near the angles of the stomodeum during **6?? week of development.**

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**14. What are the relations of the parotid duct (Stenson's duct)?**

- Runs **over masseter**, then **pierces buccinator** ? opens opposite **upper second molar tooth.**

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**15. What are the clinical conditions associated with the parotid gland?**

- **Mumps** – viral parotitis.
- **Frey's syndrome** – gustatory sweating post-surgery.
- **Parotid abscess** – painful swelling under fascia.

- **Pleomorphic adenoma** – benign tumor.
- **Facial nerve palsy** – due to surgery or infection.

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#### 16. What is the nerve supply of the parotid fascia?

- **Great auricular nerve** (C2, C3).

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#### 17. Why is Frey's syndrome called "gustatory sweating"?

- Because **parasympathetic fibers** destined for salivation regenerate abnormally to **sweat glands** ? sweating during eating.

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#### 18. What is the functional type of secretion of the parotid gland?

- **Purely serous**, watery secretion containing **amylase**.

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#### 19. Which space lies deep to the parotid gland?

- **Retrostyloid space**, containing *internal carotid artery*, *internal jugular vein*, and *cranial nerves IX, X, XI, XII*.

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#### 20. What is the nerve supply for pain from the parotid gland?

- **Auriculotemporal nerve**, branch of mandibular nerve (V3).

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