

Parotid Region

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).

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.

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:**
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- 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.

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).

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.

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 **6th 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**.

?? Clinicoanatomical Problems

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**.

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).

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**.

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

5. The facial nerve leaves the skull through —

- A. Stylomastoid foramen
- B. Jugular foramen
- C. Foramen ovale
- D. Foramen spinosum

? **Answer:** A. Stylomastoid foramen

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

7. The secretion of the parotid gland is —

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

? **Answer:** A. Serous

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

9. The stylomandibular ligament is derived from —

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

?

Answer:

D.

Parotid

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**.

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.

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.

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

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

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

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

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**.

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

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

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).