

Oral Surgery 2 — extraction complications, space infections and jaw cysts

Lecture 14 • Dr Reham Ragab (DDS Cairo, MJDF/MFD) • CoNnect International Academy • source deck: 40 slides

EXAM-DAY SUMMARY

everything on this page → detail in §§ overleaf

BONE FRACTURE AT EXTRACTION → §1

- Alveolar, extracted tooth → remove segment + suture
- Alveolar, other teeth → trans-alveolar extraction + splint
- Basal bone → **ORIF**

TUBEROSITY FRACTURE → §1

- Upper 8; tear distal to 8 + whole segment moves + bleeding
- Minimal: extirpate pulp, out of occlusion, **splint to 6 & 7 for 4 weeks** → then trans-alveolar removal
- Great mobility: flap → dissect tuberosity → primary closure → OAC instructions

OAC — DIAGNOSIS → §2

- Upper 6, 7, 8 extraction
- Nasal fluid reflux; blood from nose; air bubbles on Valsalva
- **Valsalva no longer recommended** — can open a closed defect

OAC — AT EXTRACTION → §2

- STOP; retrieve root: under lining → trans-alveolar + LA
- Above lining → **Caldwell-Luc under GA**
- Dry + magnify → measure defect

OAC — BY SIZE → §2

- **< 4 mm no flap · > 4 mm suture first** (buccal advancement / palatal rotational)
- Both then get the same 6: saline clean · gauze + instructions · oxymetazoline · steam · no smoking/nose blowing · saline mouthwash
- Late (≥ 2 days): same by size, review 2 weeks

ORO-ANTRAL FISTULA → §2

- Not closed at 2 weeks = fistula
- **Fistulectomy first**, then buccal advancement · palatal rotational · buccal pad of fat

CRYO- AND PIEZOSURGERY → §3

- Cryo: liquid nitrogen → necrosis + dehydration; vascular lesions (haemangioma)
- Side effects: oedema; **lesion destroyed → no histopathology**
- Piezo: vibrating tip, cuts hard tissue only — sinus lift, mental nerve, IAN, buccal artery

ABSCESS VS CELLULITIS → §4

- Abscess: pus, **isolated from circulation → drain, no antibiotics**
- Cellulitis: intra/intercellular oedema, good blood supply → antibiotics

RULES OF SPREAD → §4

- Determined by bone thickness over apex + apex vs muscle attachment
- Before attachment → vestibular abscess; beyond → facial space
- Maxilla buccal *except* palatal roots of molars + curved lateral incisors
- Mandible lingual **except premolars, rarely canines**

MAXILLARY SPACES → §5

- Central → labial · lateral → palatal
- Canine → infraorbital: cheek/lid/lip swelling, **eye closure**, dropped mouth angle
- Premolars + molars → buccal; → submasseteric = trismus; temporal = dumb-bell
- Upper 8 → infratemporal: tuberosity + sigmoid notch swelling; cavernous sinus via pterygoid venous plexus

MANDIBULAR SPACES → §6

- Incisors/canines → submental (chin)
- Premolars/canines → buccal
- First molar + premolars → sublingual: raised floor, tongue up, dysphagia
- 2nd + 3rd molars → **submandibular** (apices below mylohyoid line)

PTERYGOMANDIBULAR + LUDWIG'S → §6

- Pterygomandibular: trismus · dysphagia · uvula deviates to other side · **no extraoral swelling**
- Communicates with submasseteric space via sigmoid notch
- Ludwig's: bilateral submandibular + sublingual, tongue elevated, drooling, trismus, airway obstruction

SPACE INFECTION — MANAGEMENT → §7

- **Airway → I&D → culture & sensitivity → antibiotic → supportive**
- Antibiotic alone, without drainage, is the wrong answer

JAW CYSTS → §8

- Epithelium-lined cavity; **pus only if infected**; painless buccal swelling / chance radiolucency
- Vitality test + DPT and periapical
- Inflammatory 3: periapical · residual · paradental. Developmental 8: dentigerous, eruption, calcifying, lateral periodontal, gingival, OKC, orthokeratinizing, glandular

CYST TREATMENT → §8

- **Enucleation + primary closure = treatment of choice** (± apicectomy)
- Enucleation + pack (Whitehead's varnish / BIPP) if badly infected or very large
- Primary bone graft rarely useful · marsupialisation to allow eruption or if enucleation C/I
- Always send lining for histopathology

§1 Extraction complications — bone fractures

KEY POINTS

Every intra-operative complication starts the same way: **stop the procedure and reassess**. Fractured alveolar bone → remove or splint. Fractured basal bone → ORIF. Fractured tuberosity → decide by **mobility**, not by size.

1.1 Alveolar and basal bone fracture

- **Alveolar bone, socket of the extracted tooth:** remove the fractured segment → suture
- **Alveolar bone, segment carrying other teeth:** abandon forceps → extract the target tooth by **trans-alveolar (surgical) procedure** → splint the other teeth in the segment
- **Basal bone fracture:** ★ **open reduction + internal fixation (ORIF)** — no longer a chairside problem

1.2 Tuberosity fracture

- **Context:** relatively common complication of **maxillary third molar** extraction
- **Signs — the triad:**
 - large **mucosal tear** over the buccal plate and distal to the upper 8
 - **abnormal movement of the whole segment** — upper 8 + tuberosity feel fused and move together ★ **(the diagnostic sign)**
 - **excessive bleeding** from the site
- **First move:** stop the procedure · establish where you are before anything else
- **Decision point:** degree of mobility → conservative splinting vs dissection out

Table 1 — Fractured tuberosity: management by degree of mobility

	Minimal movement	Great mobility
Aim	Save the tuberosity, delay the extraction	Remove tuberosity with the tooth, close primarily
Steps	1 stop · 2 pulp extirpation + relieve tooth from occlusion · 3 splint to 6 and 7 · 4 at 4 weeks remove splint + trans-alveolar extraction (surgical guttering, atraumatic removal of 8)	1 raise flap · 2 careful dissection of the tuberosity · 3 primary wound closure · 4 same six post-op instructions as OAC
Splint period	★ 4 weeks	n/a
Antral care	Not automatically	Yes — treat as an OAC (see §2)

★ EXAM PEARL

Two traps in one slide. **Pulp extirpation** is done because the segment is splinted for weeks with a devitalising blood supply — not for pain. And a **mobile tuberosity is a communication with the antrum until proved otherwise**: the great-mobility route ends in the OAC instruction set, which is why it is examined alongside OAC.

§2 Oro-antral communication and fistula

- **Definition and site:** communication between mouth and maxillary antrum · common complication of maxillary ★ **6, 7 and 8** extraction
- **Terminology:** **communication** = the fresh defect · **fistula (OAF)** = epithelialised tract, i.e. a communication that has failed to close

2.1 Diagnosis

- **Reflux:** nasal fluids pass into the socket post-extraction
- **Bleeding pattern:** minor nose bleeding — blood appearing from the extraction site
- **Air bubbles:** through the socket when the patient blows against a closed nose = **Valsalva manoeuvre**
- **Valsalva caution:** ★ **no longer recommended** → may itself tear open a communication that is not yet open
- **Sizing the defect:** dry the socket · use magnification · then measure — size drives everything that follows

2.2 Scenario 1 — diagnosed at the time of extraction

1. **STOP THE PROCEDURE** — as in any complication

2. Retrieve displaced roots or teeth

- **under the antral lining** → trans-alveolar approach, under LA
- **above the lining (in the sinus)** → ★ **Caldwell-Luc approach, under GA**

3. Examine the size of the communication → < 4 mm or > 4 mm

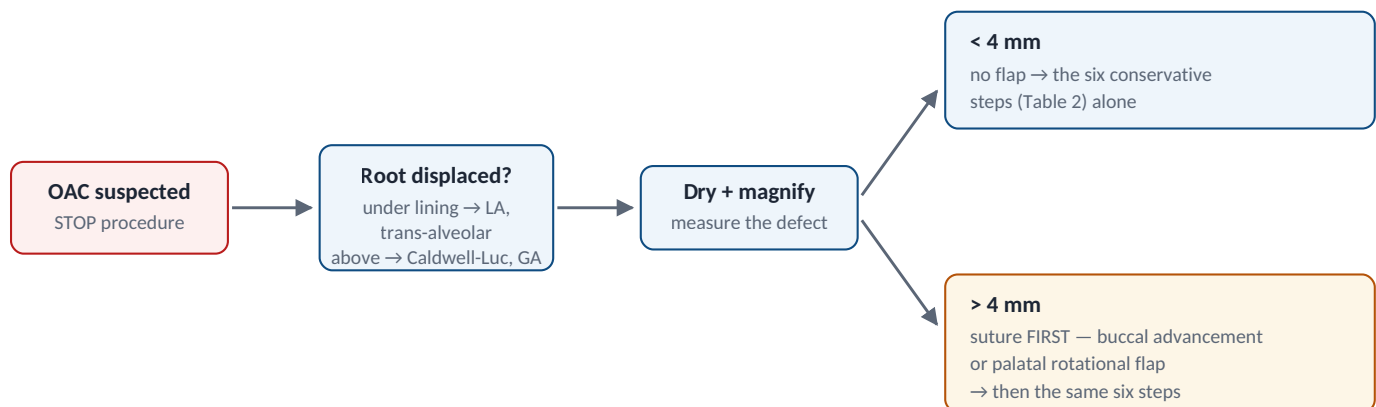


Diagram 1 — Oro-antral communication diagnosed at the time of extraction: stop → retrieve → size → treat.

Table 2 — OAC management by size (the six steps are identical in both columns)

	< 4 mm	> 4 mm
Closure	None — allow to heal	Suture first: buccal advancement flap or palatal rotational flap
Then	1 clean with warm saline, no sharp edges or bony remnants · 2 treat as an extraction wound — sterile gauze + post-op instructions · 3 nasal decongestant {oxymetazoline} · 4 steam inhalation · 5 avoid smoking or nose blowing · 6 warm saline mouthwash	

2.3 Scenario 2 — diagnosed two or more days after the extraction

- **Same management:** treat according to size exactly as above
- **Review at 2 weeks:** many will have closed spontaneously
- **If still open** → a **fistula** has formed → surgical repair:
 - 1 **fistulectomy** (excise the epithelialised tract) · 2 buccal advancement flap · 3 palatal rotational flap · 4 **buccal pad of fat** flap
- **Why fistulectomy first:** epithelium lining the tract will not heal to epithelium → excise before flap closure

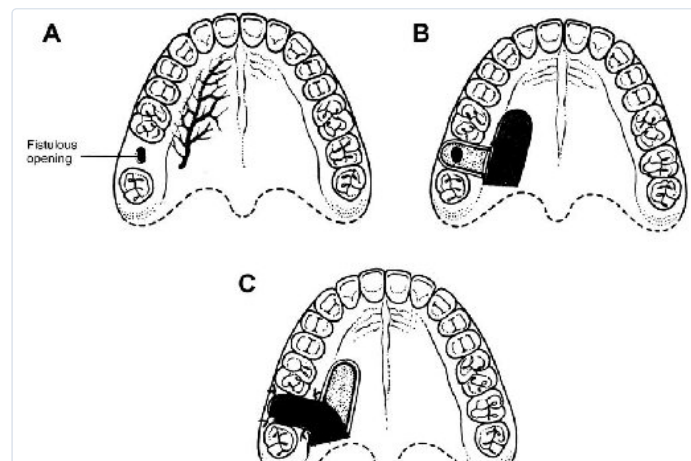


Fig. 1 — Palatal rotation flap. **A** fistulous opening in the 7/8 region with the greater palatine vessels outlined · **B** full-thickness palatal flap raised on the greater palatine artery · **C** flap rotated laterally to cover the defect; donor site granulates.

CAUTION

Nose blowing, smoking and drinking through a straw all generate the pressure gradient that reopens a repair. Antral instrumentation without a definite plan pushes roots further into the sinus — a root above the lining is a **Caldwell-Luc under GA** problem, not a chairside one.

★ EXAM PEARL

This lecture's cut-off is **4 mm**. Other standard texts quote < 2 mm as reliably self-healing and > 5 mm as requiring definite flap closure. In this exam, answer with **4 mm**; be aware of the alternative figures if the stem uses them. Also note the direction of the logic: size dictates *whether you suture*, never *whether you give the six steps* — those are given in every case.

§3 Specialised surgical techniques

Cryosurgery

Application of extreme cold {**liquid nitrogen**} → cell necrosis and dehydration. Used for **vascular lesions such as haemangioma**, where conventional excision bleeding cannot be controlled.

Piezosurgery

Vibrating cutting tip that **selectively cuts hard tissue** → soft tissue (nerves, vessels) is not cut.

- **Cryosurgery — side effects:**
 - 1 post-operative **oedema**
 - 2 ★ **destruction of the excised lesion** → **cannot be used for histopathological biopsy**
- **Piezosurgery — indications:** sinus lifting · surgery near the **mental nerve, inferior alveolar nerve (IAN)**, buccal artery

★ EXAM PEARL

The cryosurgery slide is garbled — read it as: cryosurgery is chosen *because* bleeding from a vascular lesion cannot be controlled by conventional means. The examinable point is the trade-off: **no bleeding, but no specimen**. If a lesion needs a histological diagnosis, cryosurgery is the wrong tool. Piezosurgery's examinable point is the mirror image: **selectivity** — it cuts bone and spares nerve.

§4 Odontogenic infection — abscess, cellulitis and the rules of spread

Table 3 — Abscess vs cellulitis

	Abscess	Cellulitis
Nature	Localised collection of pus	Intra- and intercellular oedema from inflammatory exudate
Blood supply	Isolated from the circulation	Good blood supply
Treatment	★ Drainage — antibiotics not needed	★ Antibiotics

★ EXAM PEARL

The reasoning, not the list, is what is tested: an abscess is walled off from the circulation, so a systemic antibiotic cannot reach it — **pus must be drained**. Cellulitis is perfused, so an antibiotic does reach it. Caveat for real practice (and for a well-written stem): antibiotics *are* added to drainage where there is systemic upset, spreading infection, or immunocompromise — "no antibiotics" applies to a localised abscess in a well patient.

4.1 What decides where an infection goes

- **Determinant 1: thickness of the bone overlying the apex** → dictates which cortical plate perforates
- **Determinant 2: relationship of the site of perforation to the muscle attachment** (maxilla and mandible)
 - root tip **before** (coronal to) the attachment → infection stays in the vestibule = ★ **vestibular abscess**
 - root tip **after** (beyond) the attachment → infection enters a **facial space**

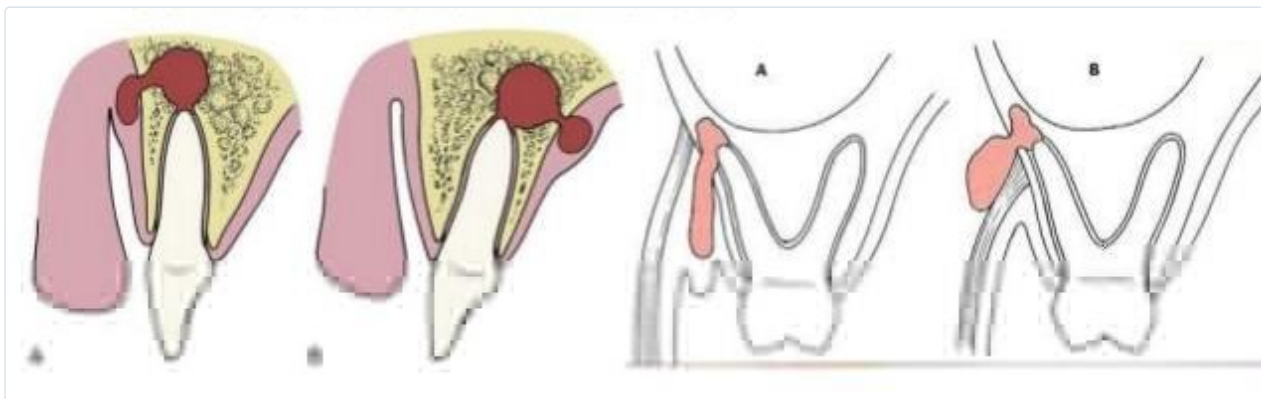


Fig. 2 — The two determinants. Left pair: apex perforating the thin buccal plate. Right pair: **A** perforation coronal to the muscle attachment → vestibular abscess; **B** perforation beyond the attachment → the infection tracks into the fascial space.

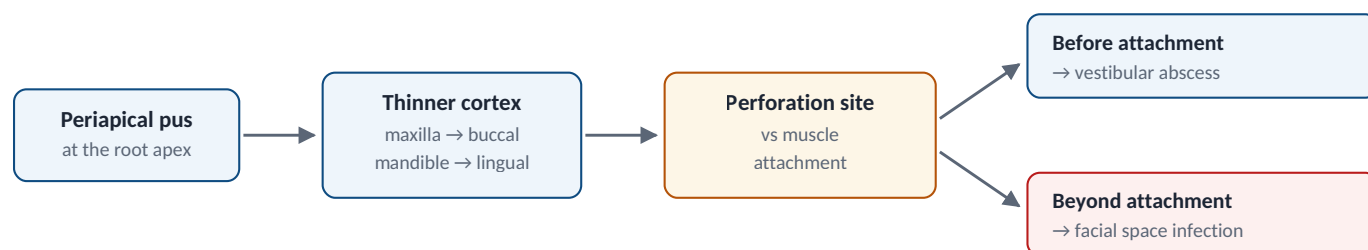


Diagram 2 — The two-step logic that generates every space in §§5–6: cortical thickness sets the *direction*, muscle attachment sets the *destination*.

Table 4 — Which plate perforates

	Maxilla	Mandible
Thinner plate	Buccal (buccal < palatal)	Lingual (lingual < buccal)
Default spread	All maxillary teeth spread buccally	All mandibular teeth spread lingually
Exceptions	★ Palatal roots of maxillary molars · lateral incisors with curved root tips → palatal	★ Premolars, and rarely canines → buccal

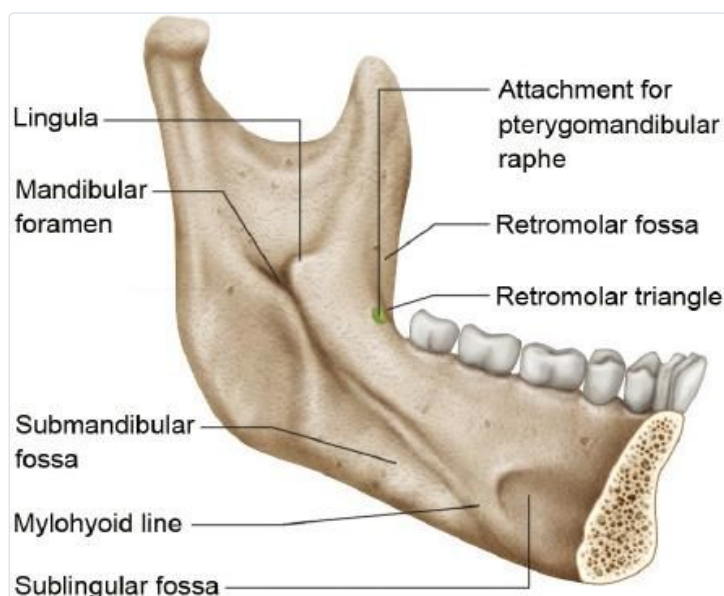


Fig. 3 — Mandible, medial surface: lingula and mandibular foramen · **mylohyoid line** running down and forwards · submandibular fossa below it · sublingual fossa above it · retromolar fossa and triangle, and the attachment of the pterygomandibular raphe. The mylohyoid line is the single landmark that separates sublingual from submandibular space (§6).

§5 Maxillary tooth infections → facial spaces

Table 5 — Maxillary teeth: destination and clinical picture

Tooth	Space / site	Features
Central incisor	Labial	Labial swelling
Lateral incisor	Palatal	Palatal swelling (curved root tip)
Canine	Canine space = infraorbital space	1 swelling of cheek, lower eyelid and upper lip · 2 eye closure · 3 dropping of the angle of the mouth
Premolars + molars (and mandibular premolars)	Buccal space	1 swelling of cheek and corner of mouth · 2 may spread to submasseteric space → trismus · 3 spread to temporal space (upper 8) → ★ "dumb-bell" appearance
Third molar	Buccal or infratemporal space	1 swelling both intraorally (tuberosity area) and extraorally (over the sigmoid notch) · 2 spread to temporal space, or to the cavernous sinus via the pterygoid venous plexus



Fig. 4 — Canine (infraorbital) space infection: cheek, lower lid and upper lip swollen, eye closed, angle of mouth dropped.



Fig. 5 — Infratemporal space infection from an upper 8: swelling extending over the sigmoid notch and up towards the temporal region.



Fig. 6 — Buccal space infection: swelling of the cheek and corner of the mouth, bounded below by the lower border of the mandible.

CAUTION

Cavernous sinus thrombosis is the reason the canine and infratemporal spaces are singled out: the pterygoid venous plexus (upper 8) and the valveless angular/ophthalmic veins (canine space) both drain intracranially. Rapidly progressive periorbital swelling with eye signs is a same-day referral, not a review appointment.

★ EXAM PEARL

Note the overlap deliberately built into the lecture: **mandibular premolars appear twice** — buccal space (buccal perforation, Table 4 exception) and sublingual space (apex above mylohyoid, §6). The stem decides which by telling you where the swelling is, not which tooth it is.

§6 Mandibular tooth infections → facial spaces

Table 6 — Mandibular teeth: destination and clinical picture

Tooth	Space	Features
Incisors + canines	Submental	Chin swelling
Premolars + canines	Buccal	Cheek and mouth-corner swelling
First molar + premolars	Sublingual	Intraoral swelling · tongue elevation · difficulty swallowing
Second + third molars	Submandibular	Extraoral swelling at the ramus, correlating with the offending tooth
Molars (spread)	Pterygomandibular	1 trismus · 2 difficulty swallowing · 3 deviation of the uvula to the other side · 4 ★ no extraoral swelling

- **The dividing landmark:** apices **above** the mylohyoid line → sublingual · apices **below** it → submandibular
 - mandibular 2nd and 3rd molar apices lie below the line → submandibular
- **Onward communication:** ★ **pterygomandibular space communicates with the submasseteric space via the sigmoid notch**
- **Why the uvula deviates:** the swollen pterygomandibular space pushes the lateral pharyngeal wall and soft palate medially → uvula shifts to the **contralateral** side

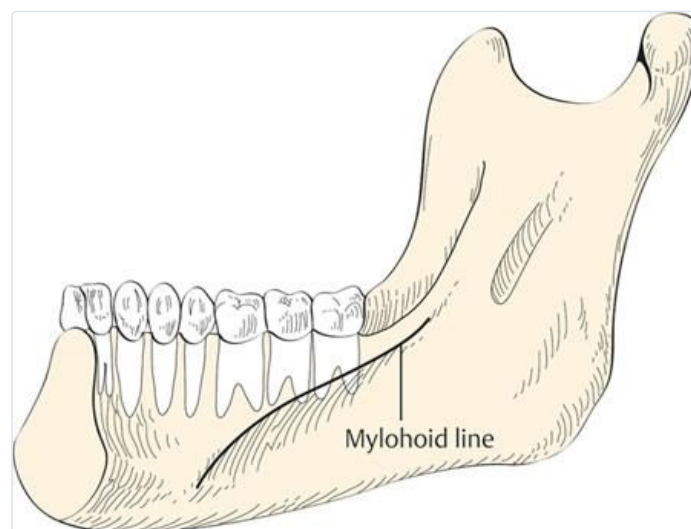


Fig. 7 — The mylohyoid line crossing obliquely beneath the molar apices: anterior teeth and first molar apices sit above it (sublingual space), second and third molar apices below it (submandibular space). The sublingual and submandibular spaces communicate freely round the posterior free border of mylohyoid.



Fig. 8 — Submandibular space: extraoral swelling below the lower border, obliterating the submandibular triangle.



Fig. 9 — Sublingual space: raised, tense floor of mouth with the tongue displaced upwards — no extraoral swelling.

Table 7 — Discriminating the three deep mandibular spaces

	Sublingual	Submandibular	Pterygomandibular
Source teeth	Premolars, first molar	2nd, 3rd molars	Molars, by spread
Extraoral swelling	No	Yes	No
Intraoral sign	Raised floor, tongue elevated	Little	Uvula deviated to other side
Trismus	No	No	Yes
Swallowing	Difficult	—	Difficult

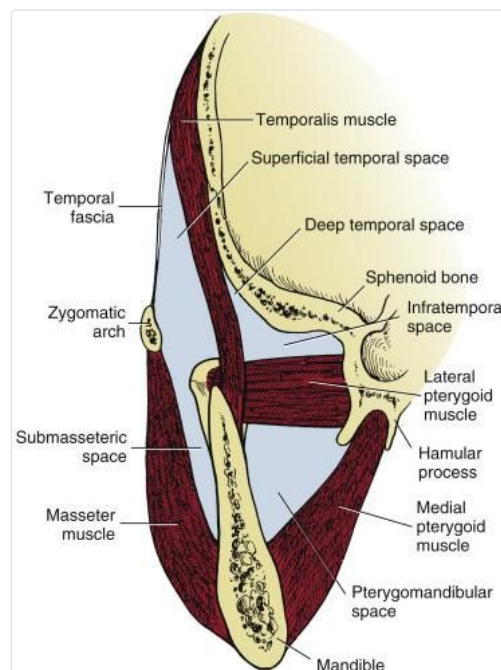


Fig. 10 — Coronal section through the masticator spaces: temporalis with superficial and deep temporal spaces above the zygomatic arch, submasseteric space deep to masseter, pterygomandibular space between medial pterygoid and the ramus, and the infratemporal space medial to the coronoid. Pus tracks between all of these round the sigmoid notch.

6.1 Ludwig's angina

CAUTION

Ludwig's angina = bilateral involvement of **both submandibular and sublingual spaces**. Signs: **elevation of the tongue** · drooling of saliva · trismus · ★**airway obstruction**. This is an airway emergency — secure the airway before anything else.

★ EXAM PEARL

The lecture defines Ludwig's as bilateral submandibular + sublingual; most standard texts add the **submental** space, giving **five spaces bilaterally**. Either wording earns the mark provided you say **bilateral** and name the airway. The discriminator against a simple submandibular abscess is the **raised tongue and drooling** — pointing to the floor of mouth, not the neck.

§7 Management of space infections

1. **Airway protection** — always first
2. **Incision and drainage** — remove the pus that antibiotics cannot reach
3. **Culture and sensitivity test** — take the specimen at drainage, before the antibiotic changes the flora
4. **Selection of appropriate antibiotic** — empirical first, then guided by sensitivities
5. **Medical and supportive therapy** — fluids, analgesia, nutrition, control of systemic disease

KEY POINTS

The order is the answer. **Airway** → **drainage** → **culture** → **antibiotic** → **support**, and remove the cause (extract or open the tooth). An antibiotic prescription without drainage is the commonest wrong option in a space-infection stem.

§8 Cysts of the jaws

- **Definition:** abnormal **epithelium-lined cavity**, often containing fluid — ★ **contains pus only if it becomes infected**
- **Presentation:**
 - many are asymptomatic **radiolucencies** found incidentally on X-ray
 - others present as **painless swellings, almost always of the buccal cortex**
 - infected cyst → pain, swelling and discharge
- **Assessment:** **vitality test** the associated teeth — separates an inflammatory (non-vital) from a developmental (vital) cyst
- **Imaging:** ★ **DPT plus a periapical film where possible** → screens for size and for coexisting pathology

Table 8 — Classification of odontogenic cysts

Inflammatory (3)	Developmental (8)
1 Periapical (radicular) cyst 2 Residual cyst 3 Paradental cyst (inflammatory periodontal cyst)	1 Dentigerous cyst · 2 Eruption cyst · 3 Calcifying odontogenic cyst · 4 Lateral periodontal cyst · 5 Gingival cyst · 6 Odontogenic keratocyst (OKC) · 7 Orthokeratinizing odontogenic cyst · 8 Glandular odontogenic cyst

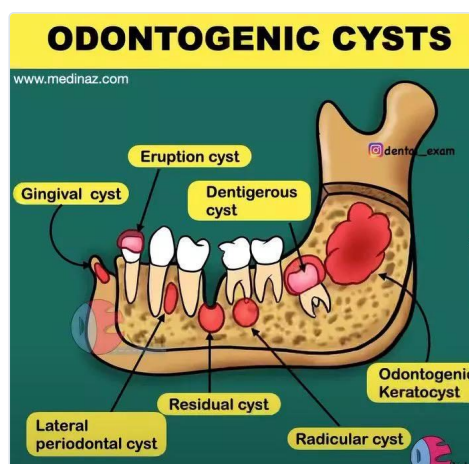


Fig. 11 — Where each odontogenic cyst sits: gingival cyst in soft tissue · eruption cyst over an erupting crown · dentigerous cyst around the crown of an unerupted tooth · lateral periodontal cyst on the lateral root surface · radicular cyst at an apex · residual cyst at the apex of an extracted tooth · OKC expanding along the ramus.



Fig. 12 — Periapical (radicular) cyst: well-defined corticated radiolucency continuous with the apex of a non-vital tooth (star).

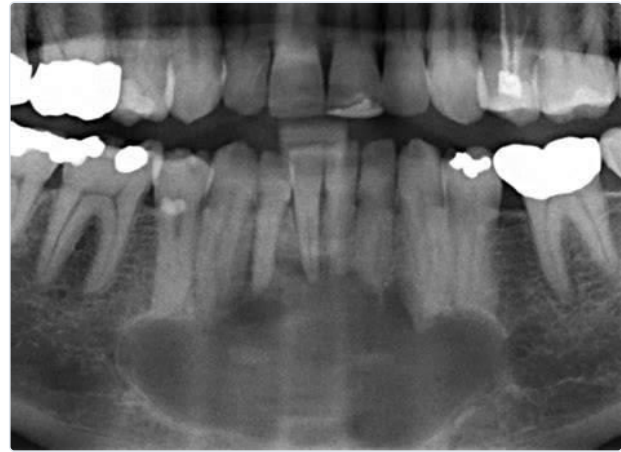


Fig. 13 — DPT: large well-corticated radiolucency of the anterior mandible — the incidental finding described above.

8.1 Treatment

Table 9 — Surgical options for jaw cysts

Option	What it is	When
Enucleation + primary closure	Remove the cyst lining from the bony walls → reposition the access flap; treat relevant dental pathology at the same time, e.g. apicectomy	★ Commonest and generally the treatment of choice
Enucleation + packing, delayed closure	Pack the cavity with Whitehead's varnish or BIPP	Badly infected cysts, particularly very large ones, unsuitable for primary closure
Enucleation + primary bone graft	Graft the cavity at the time of enucleation	Rarely useful
Marsupialisation	Open the cyst into continuity with the oral mucosa; healing slower than enucleation and a cavity persists for some time	To allow tooth eruption through the cyst , or where enucleation is contraindicated

- **Universal rule:** ★ **always submit the cyst lining for histopathology** — the radiographic diagnosis is provisional

★ EXAM PEARL

Two reliable discriminators. First, **marsupialisation is chosen for a reason, not for size alone** — an unerupted tooth you want to save, or a cyst whose enucleation would fracture the jaw or devitalise adjacent teeth. Second, "always send the lining" exists because an OKC or an ameloblastoma can look exactly like a radicular cyst on a DPT; skipping histology is the trap in a stem that ends with recurrence.

§9 Lecture scope and Odell cases

- **Covered in this deck:** tuberosity fracture · oro-antral communication · space infections · cysts of the jaws
- **Set as study list but not covered in these slides** — read separately: **TMJ** (Odell Case 8) · **secondary survey and basics of trauma management**
- **Odell cases to work through:**
 - Case 15 — dry socket · Case 18 — OAC · Cases 32 & 49 — space infection · Case 8 — TMJ