

Teach the Evidence Chain

Each lesson moves from analogy to biology to a bounded clinical decision.

Standard 45-minute lesson flow

Minutes	Teacher and student move
0-5	Carry forward the prior take-home and state today's question.
5-12	Show only the analogy panel. Ask the three observation questions.
12-18	Students write the three rules. Name where the analogy stops.
18-27	Reveal the biomedical panel. Map each rule onto the case.
27-38	Students read labeled evidence and make the concrete decision.
38-45	Reveal the strongest answer, write CER, and state the next unlock.

The Normal Lip and Palate, Part by Part

Label the parts of the normal lip, palate, and nasal floor, and explain that the roof of the mouth is a wall that separates the mouth (oral cavity)...

CARRY FORWARD

Mateo's strongest genetic story is multifactorial and evidence-bounded: IRF6 explains a pathway, not a proven individual cause.

10-YEAR TAKEAWAY

Anatomy becomes useful when each structure is tied to the job it performs.

Socratic launch

Show the analogy panel only: A two-room house needs a complete ceiling and floor. Do not name the biology yet.

- Which surfaces create two separate spaces?
- What changes if the barrier has a gap?
- Which part must stay rigid and which part must move?

Rules students should earn

- Name the structure and its boundary.
- Tie each part to a function.
- A working barrier can include rigid and movable regions.

Biology reveal and evidence

ID	Finding supplied in the case
ANA01-E1	The incisive foramen separates the primary palate in front from the secondary palate behind.
ANA01-E2	The hard palate is bony and the soft palate is muscular.
ANA01-E3	Mateo's composite file describes an opening from the lip through the palate.

Decision and answer guidance

Situation: A trainee labels the palate as one flat bone and cannot explain Mateo's feeding problem.

Strongest option: Correct the map to include primary palate, hard palate, soft palate, and two cavities.

Evidence required: ANA01-E1 + ANA01-E2

Claim ceiling: You may map normal structures and the barrier function. You may not classify Mateo's cleft until its full extent is supplied.

Next handoff: We have a clean map of the normal lip and palate. But a lip and a palate are not just static shapes; they have...

The Muscles That Make a Lip and Palate Work

Describe the orbicularis oris as a ring that seals the lips and the levator veli palatini as a sling that lifts the soft palate, and explain why fiber...

CARRY FORWARD
Anatomy becomes useful when each structure is tied to the job it performs.

10-YEAR TAKEAWAY
Muscle function depends on fiber direction, attachment, and continuity, not merely on muscle presence.

Socratic launch

Show the analogy panel only: A drawstring and a lifting sling only work when their cords run correctly. Do not name the biology yet.

- How does the cord direction control the motion?
- What happens if the cord ends are not connected?
- Why would the same amount of cord fail when attached in the wrong place?

Rules students should earn

- Read fiber direction before predicting motion.
- Check where each muscle begins and ends.
- Continuity lets force travel across the structure.

Biology reveal and evidence

ID	Finding supplied in the case
ANA02-E1	Orbicularis oris fibers normally form a continuous ring around the mouth.
ANA02-E2	Levator veli palatini fibers normally form a transverse sling across the soft palate.
ANA02-E3	Fiber direction predicts the line of pull.

Decision and answer guidance

Situation: A diagram shows both muscles but leaves out fiber direction and attachments.

Strongest option: Add direction, attachment, and continuity before predicting function.

Evidence required: ANA02-E1 + ANA02-E2

Claim ceiling: You may predict normal lines of pull. You may not infer Mateo's exact muscle displacement before viewing cleft anatomy.

Next handoff: We know the normal muscle plan and the rule that direction and continuity decide function. But we have not yet looked closely at Mateo....

The Anatomy of the Cleft, What Is Actually Interrupted

Explain that a cleft is a gap where tissue failed to join, and that the muscles insert abnormally and pull the wrong way (displaced orbicularis oris in the...

CARRY FORWARD
Muscle function depends on fiber direction, attachment, and continuity, not merely on muscle presence.

10-YEAR TAKEAWAY
A cleft is not only a visible gap; it also redirects muscles and changes the forces they produce.

Socratic launch

Show the analogy panel only: A torn tent seam changes both the opening and the pull of its ropes. Do not name the biology yet.

- What is visibly missing at the seam?
- Where do the ropes pull after the tear?
- Why would closing only the fabric leave the force problem?

Rules students should earn

- Identify the tissue discontinuity.
- Trace displaced attachments on both sides.
- Repair must restore geometry and force direction.

Biology reveal and evidence

ID	Finding supplied in the case
ANA03-E1	Mateo's left lip, alveolus, and palate are discontinuous in the composite examination.
ANA03-E2	Orbicularis fibers insert along the cleft margins rather than completing a ring.
ANA03-E3	Levator fibers run more front-to-back and attach abnormally near the posterior hard palate.

Decision and answer guidance

Situation: The proposed plan says only close the skin and mucosa because both muscles are present.

Strongest option: Reject it and require muscle identification and reconstruction.

Evidence required: ANA03-E1 + ANA03-E2

Claim ceiling: You may describe the supplied structural displacement. You may not choose a specific surgical technique yet.

Next handoff: We know exactly what is interrupted in Mateo and that the muscles are displaced. But we keep describing his cleft in long sentences. How...

Saying It Precisely, How Surgeons Classify a Cleft

Use the Veau, LAHSHAL, and Kernahan striped-Y systems to classify a cleft, and place Mateo as a complete unilateral left cleft of lip, alveolus, and palate (Veau III).

CARRY FORWARD
A cleft is not only a visible gap; it also redirects muscles and changes the forces they produce.

10-YEAR TAKEAWAY
A useful cleft label records side, completeness, and anatomical extent without replacing the examination.

Socratic launch

Show the analogy panel only: A precise address compresses a route into shared coordinates. Do not name the biology yet.

- Which details let two people find the same place?
- What would be lost by writing only city?
- Why must the map still be checked after reading the address?

Rules students should earn

- State left, right, or bilateral.
- State complete or incomplete.
- Name the structures and use a system only within its scope.

Biology reveal and evidence

ID	Finding supplied in the case
ANA04-E1	The opening is on Mateo's left side.
ANA04-E2	The cleft extends through the lip and alveolus into both hard and soft palate.
ANA04-E3	Veau III describes a unilateral complete cleft involving the soft and hard palate and continuing through the alveolus on one side.

Decision and answer guidance

Situation: Three labels are offered for the same composite examination.

Strongest option: Complete unilateral left cleft lip, alveolus, and palate; Veau III.

Evidence required: ANA04-E1 + ANA04-E2

Claim ceiling: You may classify the supplied anatomy. You may not use the label to claim a genetic cause or predict outcome.

Next handoff: We can now name Mateo's cleft precisely: Veau III, a complete unilateral left CL/P. But his is only one shape out of many. Some...

One Cleft, Many Shapes, The Cleft Spectrum

Distinguish clefts along three axes (unilateral vs bilateral, complete vs incomplete, overt vs submucous) and place Mateo within that spectrum.

CARRY FORWARD
A useful cleft label records side, completeness, and anatomical extent without replacing the examination.

10-YEAR TAKEAWAY
Clefts vary along several independent axes, so one familiar example cannot stand for the whole spectrum.

Socratic launch

Show the analogy panel only: A library sorts books by more than one shelf label. Do not name the biology yet.

- Can two items share one feature but differ on another?
- Which feature could be hidden from a quick look?
- Why would one shelf label be insufficient?

Rules students should earn

- Separate laterality from completeness.
- Separate visible surface from hidden muscle and bone.
- Use multiple axes before comparing cases.

Biology reveal and evidence

ID	Finding supplied in the case
ANA05-E1	One case card shows a cleft on both sides of the lip and alveolus.
ANA05-E2	Another stops before reaching the nostril floor.
ANA05-E3	A third has intact oral mucosa but a notched hard palate and separated soft-palate muscles.

Decision and answer guidance

Situation: A teammate wants to call every cleft that is less visible incomplete.

Strongest option: Classify each card on separate side, extent, and surface axes.

Evidence required: ANA05-E1 + ANA05-E2

Claim ceiling: You may describe the supplied anatomy. You may not infer function from appearance alone.

Next handoff: We have pinned Mateo to the spectrum: unilateral, complete, overt. But describing his cleft does not solve his most urgent problem. His open cleft...

Why Feeding Fails, and What Helps Right Now

Explain why an open cleft prevents an infant from generating suction, and recommend feeding interventions that compensate, using Mateo's anatomy.

CARRY FORWARD

Clefts vary along several independent axes, so one familiar example cannot stand for the whole spectrum.

10-YEAR TAKEAWAY

A cleft palate limits suction because the mouth cannot seal from the nose, so feeding support changes flow rather than blaming effort.

Socratic launch

Show the analogy panel only: A drinking straw cannot pull fluid through an open side port. Do not name the biology yet.

- Where does air enter when the side port is open?
- Why does stronger sucking not fix the leak?
- Which change could move fluid without requiring a sealed tube?

Rules students should earn

- Check whether a pressure chamber can seal.
- Match support to the failed mechanism.
- Track intake, time, breathing, and growth rather than bottle brand alone.

Biology reveal and evidence

ID	Finding supplied in the case
ANA06-E1	Mateo has a complete cleft palate connecting the oral and nasal spaces.
ANA06-E2	He coordinates swallowing and breathing but tires during long feeds.
ANA06-E3	The team can provide an assisted-flow bottle, upright positioning, pacing, and weight monitoring.

Decision and answer guidance

Situation: Mateo takes 42 minutes per feed, has nasal milk escape, and is falling off his weight curve without cough or color change.

Strongest option: Start assisted-flow feeding education and close growth follow-up.

Evidence required: ANA06-E1 + ANA06-E2

Claim ceiling: You may recommend the supplied educational support plan. You may not rule out swallowing or airway disease if new safety signs appear.

Next handoff: We can keep Mateo fed today by working around the gap. But the gap is wide, and the wider it is, the harder the...

Shaping the Gap Before Surgery

Explain how nasoalveolar molding narrows the alveolar gap and improves nasal symmetry before lip repair, and weigh the strength of the evidence behind it.

CARRY FORWARD
A cleft palate limits suction because the mouth cannot seal from the nose, so feeding support changes flow rather than blaming effort.

10-YEAR TAKEAWAY
Presurgical molding changes the starting geometry before repair; it does not fuse tissue, and long-term benefits remain uncertain.

Socratic launch

Show the analogy panel only: A guide jig aligns pieces before they are permanently joined. Do not name the biology yet.

- Does the guide permanently join the pieces?
- Which measurements change before fastening?
- What evidence would be needed to know whether the early change lasts?

Rules students should earn

- Distinguish positioning from closure.
- Measure the preoperative change.
- Separate short-term geometry from long-term function and appearance.

Biology reveal and evidence

ID	Finding supplied in the case
ANA07-E1	The supplied model shows Mateo's alveolar gap narrowing during monitored appliance use.
ANA07-E2	The appliance does not create tissue fusion or replace surgery.
ANA07-E3	Systematic reviews report low or very low certainty for many long-term outcomes.

Decision and answer guidance

Situation: The family can attend frequent visits but was told molding will permanently fix the cleft and prevent all later surgery.

Strongest option: Offer it as an optional positioning tool with workload and evidence limits explained.

Evidence required: ANA07-E1 + ANA07-E2

Claim ceiling: You may describe short-term positioning evidence. You may not guarantee long-term appearance, function, or fewer operations.

Next handoff: We have shaped Mateo's cleft into a better starting position and kept him feeding. The gap is narrower, but it is still open. How...

Rebuilding the Lip

Explain that cleft lip repair reconstructs the interrupted orbicularis oris ring, and compare how three named techniques solve that same problem.

CARRY FORWARD
Presurgical molding changes the starting geometry before repair; it does not fuse tissue, and long-term benefits remain uncertain.

10-YEAR TAKEAWAY
Lip repair restores a continuous orbicularis ring and aligned lip landmarks, not merely a closed skin line.

Socratic launch

Show the analogy panel only: Repair a circular conveyor belt and its outer cover together. Do not name the biology yet.

- Which hidden moving part must reconnect?
- Which surface landmarks must meet?
- Why could the cover look closed while the machine still pulls unevenly?

Rules students should earn

- Find and release displaced muscle.
- Rebuild a continuous functional ring.
- Align skin, vermillion, mucosa, and nasal base without assuming one universal cut pattern.

Biology reveal and evidence

ID	Finding supplied in the case
ANA08-E1	Mateo's orbicularis fibers insert along the cleft margins.
ANA08-E2	The philtral column, cutaneous roll, vermillion, and mucosa are misaligned.
ANA08-E3	ACPA lists orbicularis reconstruction and balanced nasolabial form as primary principles while recognizing multiple protocols.

Decision and answer guidance

Situation: Plan A closes skin only. Plan B identifies muscle, reconnects the ring, and aligns each lip layer and nasal base.

Strongest option: Choose Plan B and explain the functional layer.

Evidence required: ANA08-E1 + ANA08-E2

Claim ceiling: You may identify reconstruction goals. You may not prescribe one technique as universally best.

Next handoff: We rebuilt the lip and its muscle ring, but the lip was the easier door to close. The roof of the mouth is deeper...

Rebuilding the Roof of the Mouth

Explain that palatoplasty must do two jobs at once (close the oronasal communication and reconstruct the levator sling), and compare how named techniques achieve them.

CARRY FORWARD

Lip repair restores a continuous orbicularis ring and aligned lip landmarks, not merely a closed skin line.

10-YEAR TAKEAWAY

Palate repair must close the oral-nasal opening and rebuild the levator sling while protecting blood supply and growth.

Socratic launch

Show the analogy panel only: A drawbridge needs both a sealed deck and correctly placed lift cables. Do not name the biology yet.

- What happens if the deck closes but the cables remain misdirected?
- Which parts must move after repair?
- Why must the repair protect its supply lines?

Rules students should earn

- Close the tissue layers without tension.
- Reorient the levator into a transverse sling.
- Protect blood supply, airway, and later growth.

Biology reveal and evidence

ID	Finding supplied in the case
ANA09-E1	Mateo's cleft opens through hard and soft palate.
ANA09-E2	His levator fibers are abnormally oriented along the cleft margins.
ANA09-E3	Palate surgery can risk bleeding, tissue injury, airway obstruction, fistula, and later growth effects.

Decision and answer guidance

Situation: One plan closes lining only. The other closes layers, rebuilds the levator sling, preserves vascular supply, and includes airway monitoring.

Strongest option: Choose the functional layered plan.

Evidence required: ANA09-E1 + ANA09-E2

Claim ceiling: You may identify required goals and risks. You may not name one palatoplasty technique as best for every patient.

Next handoff: We closed Mateo's palate and rebuilt the levator sling. But two children can have the very same closed palate, repaired the very same way...

When to Repair, and Why the Calendar Matters

Explain why lip repair happens at about 3 months and palate repair at about 9 to 12 months, and justify the timing as a balance between safety, growth...

CARRY FORWARD

Palate repair must close the oral-nasal opening and rebuild the levator sling while protecting blood supply and growth.

10-YEAR TAKEAWAY

Cleft surgery timing balances present safety, early function, future growth, and family readiness rather than following one magic date.

Socratic launch

Show the analogy panel only: Repair a busy bridge during the safest useful window. Do not name the biology yet.

- Why not repair at the first possible minute?
- What is lost by waiting too long?
- Which conditions make the window individual?

Rules students should earn

- Define the function that needs protection.
- Check medical and family readiness.
- Use a window and team protocol, not a universal birthday.

Biology reveal and evidence

ID	Finding supplied in the case
ANA10-E1	ACPA states that primary lip repair is often initiated within the first six months for healthy infants.
ANA10-E2	ACPA states that primary palate repair often occurs at 9 to 14 months and ideally by 18 months.
ANA10-E3	Mateo is medically stable in the composite file, but care is shared with the family and center team.

Decision and answer guidance

Situation: A handout says every infant must have lip repair on the exact 90th day and palate repair on the exact first birthday.

Strongest option: Replace exact dates with evidence-based windows and readiness gates.

Evidence required: ANA10-E1 + ANA10-E2

Claim ceiling: You may propose an educational sequence for the stable composite case. You may not schedule real surgery or override the treating team.

Next handoff: We set Mateo's calendar: his lip repaired around three months, his palate before his first words land. We argued that the timing itself helps...

How Palate Repair Lets a Child Speak

Explain how the velopharynx works as a valve and why a repaired levator sling decides between clear speech and velopharyngeal insufficiency (VPI).

CARRY FORWARD

Cleft surgery timing balances present safety, early function, future growth, and family readiness rather than following one magic date.

10-YEAR TAKEAWAY

Clear oral speech needs a moving velopharyngeal valve that closes the nasal path for pressure sounds and opens it for nasal sounds.

Socratic launch

Show the analogy panel only: A railway switch sends airflow down the correct track. Do not name the biology yet.

- When must one route close?
- Why should the other route remain available sometimes?
- What signal would reveal a leaky switch?

Rules students should earn

- Speech uses controlled airflow, not complete permanent closure.
- Pressure consonants need oral pressure.
- Resonance and nasal emission reveal valve performance.

Biology reveal and evidence

ID	Finding supplied in the case
ANA11-E1	Mateo's repaired soft palate contains a reconstructed levator sling.
ANA11-E2	A speech sample shows pressure consonants with no consistent nasal emission.
ANA11-E3	Speech assessment includes resonance, nasal emission, articulation, and intelligibility.

Decision and answer guidance

Situation: Mateo produces clear pressure consonants but a trainee says the nose should be sealed for every sound.

Strongest option: Explain controlled closure for oral sounds and opening for nasal sounds.

Evidence required: ANA11-E1 + ANA11-E2

Claim ceiling: You may interpret the supplied educational speech sample. You may not diagnose a real child's resonance without a complete evaluation.

Next handoff: We answered why palate repair decides clear speech. But here is a new clue: the muscles that move Mateo's soft palate are anchored near...

Why Cleft Children Get So Many Ear Infections

Trace how abnormal palate muscles fail to open the Eustachian tube, causing acquired middle-ear fluid, and explain why this threatens hearing during the language-learning years.

CARRY FORWARD
Clear oral speech needs a moving velopharyngeal valve that closes the nasal path for pressure sounds and opens it for nasal sounds.

10-YEAR TAKEAWAY
Cleft-palate muscle anatomy can impair Eustachian tube opening, so hearing needs repeated surveillance even after a normal newborn screen.

Socratic launch

Show the analogy panel only: A room needs a working pressure-equalizing vent. Do not name the biology yet.

- What happens when the vent cannot open?
- Why might a first inspection look normal?
- Which repeated measurements would reveal the problem?

Rules students should earn

- Connect the tube to the muscle that helps open it.
- Separate newborn screening from later middle-ear status.
- Monitor hearing and middle-ear function over time.

Biology reveal and evidence

ID	Finding supplied in the case
ANA12-E1	Children with cleft palate have increased risk for Eustachian tube dysfunction and middle-ear disease.
ANA12-E2	Mateo passed a newborn hearing screen.
ANA12-E3	ACPA recommends regular ear examination and ongoing audiology surveillance, with tube decisions based on clinical evaluation.

Decision and answer guidance

Situation: Mateo passed his newborn screen, but at nine months has flat tympanograms and persistent middle-ear fluid.

Strongest option: Refer for coordinated ENT and audiology management and continue surveillance.

Evidence required: ANA12-E1 + ANA12-E2

Claim ceiling: You may identify surveillance and referral needs. You may not prescribe tubes or antibiotics without the treating clinicians' evaluation.

Next handoff: We followed the cleft into speech and now into the ears, and each time the same abnormal muscles explain the trouble. But Mateo's cleft...

The Cleft Runs Through the Teeth

Explain why a cleft through the alveolus disrupts the developing dentition, why the maxillary lateral incisor is the most affected tooth, and how cleft extent predicts hypodontia.

CARRY FORWARD
Cleft-palate muscle anatomy can impair Eustachian tube opening, so hearing needs repeated surveillance even after a normal newborn screen.

10-YEAR TAKEAWAY
An alveolar cleft interrupts bone where teeth develop, so tooth position, shape, number, and eruption must be followed over time.

Socratic launch

Show the analogy panel only: A missing section of garden bed changes where plants can root and emerge. Do not name the biology yet.

- Which seeds sit closest to the missing soil?
- How could the gap change position as well as number?
- Why must the gardener wait to see how growth unfolds?

Rules students should earn

- Locate teeth relative to the cleft.
- Track development and eruption over time.
- Do not predict one tooth outcome from cleft width alone.

Biology reveal and evidence

ID	Finding supplied in the case
ANA13-E1	Mateo's cleft crosses the left alveolar ridge between anterior tooth regions.
ANA13-E2	The supplied dental image shows an absent or malformed lateral incisor beside the cleft.
ANA13-E3	The permanent canine is developing above the cleft region.

Decision and answer guidance

Situation: A parent asks whether the missing lateral incisor means the canine will definitely fail to erupt.

Strongest option: Explain the observed tooth finding and continue imaging-based eruption planning.

Evidence required: ANA13-E1 + ANA13-E2

Claim ceiling: You may describe supplied tooth development. You may not predict an individual eruption outcome without serial clinical imaging.

Next handoff: We found that the cleft leaves a gap in the bone of the gum ridge and disturbs the teeth there. But a tooth needs...

Filling the Bony Gap in the Gum Ridge

Explain why, when, and how an alveolar bone graft fills the cleft in the gum ridge, and use real outcome data to defend grafting before age 9.

CARRY FORWARD

An alveolar cleft interrupts bone where teeth develop, so tooth position, shape, number, and eruption must be followed over time.

10-YEAR TAKEAWAY

Alveolar graft timing follows dental development, usually before the adjacent permanent canine erupts, so living bone can support tooth movement.

Socratic launch

Show the analogy panel only: Build a soil bridge before roots need to cross it. Do not name the biology yet.

- Why must the bridge exist before the roots arrive?
- What evidence shows the plant is ready?
- Why is a calendar age only an estimate?

Rules students should earn

- Use developmental stage as the trigger.
- Provide living bone continuity before tooth movement.
- Coordinate orthodontics, surgery, and oral hygiene.

Biology reveal and evidence

ID	Finding supplied in the case
ANA14-E1	Mateo's alveolar cleft remains open after primary lip and palate repair.
ANA14-E2	His adjacent canine has not erupted and its root is developing on the supplied image.
ANA14-E3	ACPA states that graft timing should be based on dental development with orthodontist input, commonly before permanent teeth in the cleft region erupt.

Decision and answer guidance

Situation: Mateo is eight, has completed pre-graft expansion, has good oral hygiene, and the adjacent canine is unerupted with developing root.

Strongest option: Advance to team evaluation for secondary alveolar bone grafting now.

Evidence required: ANA14-E1 + ANA14-E2

Claim ceiling: You may choose the educational planning window. You may not schedule or select a donor site for a real patient.

Next handoff: We rebuilt the bone of Mateo's gum ridge and gave his canine a home. But the graft reminded us of something bigger: its timing...

Why the Repaired Midface Grows Backward

Explain how a repaired cleft maxilla grows poorly forward, why palate scar adds a restraining effect, and how this produces a flat midface and a Class III (underbite)...

CARRY FORWARD

Alveolar graft timing follows dental development, usually before the adjacent permanent canine erupts, so living bone can support tooth movement.

10-YEAR TAKEAWAY

Cleft-related midface undergrowth can reflect both underlying anatomy and treatment history, so scar alone should not be treated as a proven single cause.

Socratic launch

Show the analogy panel only: A young tree's shape reflects both its starting form and the ties placed around it. Do not name the biology yet.

- Which feature existed before the ties?
- How could the ties change later direction?
- What comparison would separate the two influences?

Rules students should earn

- Separate baseline anatomy from treatment exposure.
- Measure growth over time.
- Use cautious language when evidence cannot isolate one cause.

Biology reveal and evidence

ID	Finding supplied in the case
ANA15-E1	Mateo's serial records show the maxilla falling behind the mandible during growth.
ANA15-E2	Cleft anatomy and primary surgery both precede the later growth pattern.
ANA15-E3	Systematic reviews find conflicting or limited evidence that one palate-repair technique determines facial growth.

Decision and answer guidance

Situation: A teammate says the palate scar alone definitely caused every millimeter of maxillary retrusion.

Strongest option: Report the observed growth pattern and identify both intrinsic and treatment-related contributors.

Evidence required: ANA15-E1 + ANA15-E2

Claim ceiling: You may describe association and plausible contributors. You may not assign a single cause from this composite record.

Next handoff: We found out why Mateo's midface grows backward and ends up flat, leaving an underbite as a teenager. We can name the problem, but...

Correcting the Bite and the Midface

Explain how orthodontics, Le Fort I advancement, and distraction osteogenesis correct a retruded cleft midface, and why these are done near skeletal maturity.

CARRY FORWARD

Cleft-related midface undergrowth can reflect both underlying anatomy and treatment history, so scar alone should not be treated as a proven single cause.

10-YEAR TAKEAWAY

Severe maxillary retrusion may require moving the upper jaw, but the choice between methods depends on severity, growth, stability, burden, airway, and speech.

Socratic launch

Show the analogy panel only: Reposition a heavy platform in one move or advance it in small steps. Do not name the biology yet.

- Which method completes movement at once?
- Which method spreads change over time?
- What tradeoffs must be compared besides distance?

Rules students should earn

- Match method to severity and growth status.
- Compare stability and patient burden.
- Recheck airway and velopharyngeal speech before and after movement.

Biology reveal and evidence

ID	Finding supplied in the case
ANA16-E1	Mateo's adolescent records show a significant anterior crossbite and maxillary retrusion not corrected by orthodontics alone.
ANA16-E2	He is near skeletal maturity in the composite scenario.
ANA16-E3	Advancing the maxilla can change velopharyngeal relationships and hypernasality risk; comparative evidence does not establish one best method for every cleft patient.

Decision and answer guidance

Situation: Mateo needs a 7 mm maxillary advancement, has stable airway testing, and has a history of repaired VPI that is currently controlled.

Strongest option: Compare conventional advancement and distraction with orthodontic, speech, and airway input.

Evidence required: ANA16-E1 + ANA16-E2

Claim ceiling: You may identify decision variables. You may not select a real operation without full imaging, examination, and shared decision-making.

Next handoff: We answered how the bite and midface are corrected. But the nose sits on that midface, and even after the jaw moves forward, Mateo's...

The Cleft Nose and Its Repair

Describe the cleft nasal deformity (asymmetric ala, short or deviated columella, deviated septum) and explain why definitive rhinoplasty is timed to nasal growth.

CARRY FORWARD
Severe maxillary retrusion may require moving the upper jaw, but the choice between methods depends on severity, growth, stability, burden, airway, and speech.

10-YEAR TAKEAWAY
A unilateral cleft can distort nasal cartilage, base, and septum, so nose care addresses breathing and symmetry across growth.

Socratic launch

Show the analogy panel only: A doorway can look uneven and also narrow the path through it. Do not name the biology yet.

- Which problem changes appearance?
- Which problem limits passage?
- Why might changing the wall below alter the doorway above?

Rules students should earn

- Assess external form and internal airway separately.
- Coordinate nasal and jaw sequence.
- Reserve definitive reshaping until growth and major jaw movement are settled.

Biology reveal and evidence

ID	Finding supplied in the case
ANA17-E1	Mateo's left alar base is displaced and the nostrils are asymmetric.
ANA17-E2	The supplied nasal examination shows septal deviation and greater resistance on one side.
ANA17-E3	ACPA recommends waiting until skeletal maturity for definitive septorhinoplasty and usually completing indicated orthognathic surgery first.

Decision and answer guidance

Situation: Mateo requests definitive nasal surgery but is also scheduled for maxillary advancement next year.

Strongest option: Treat urgent airway needs as indicated and plan definitive septorhinoplasty after jaw surgery and skeletal maturity.

Evidence required: ANA17-E1 + ANA17-E2

Claim ceiling: You may explain the educational sequence. You may not decide a real patient's nasal procedure or timing.

Next handoff: We have now repaired lip, palate, bite, and nose. But some repairs do not fully hold. A hole can reopen in the roof of...

When a Repair Falls Short: Fistula and VPI Revision

Explain palatal fistula (and how its rate rises with Veau class) and velopharyngeal insufficiency, and compare pharyngeal flap versus sphincter pharyngoplasty as revisions.

CARRY FORWARD
A unilateral cleft can distort nasal cartilage, base, and septum, so nose care addresses breathing and symmetry across growth.

10-YEAR TAKEAWAY
A fistula is a tissue opening, while velopharyngeal insufficiency is a moving-valve problem; each needs different evidence and treatment planning.

Socratic launch

Show the analogy panel only: A room can leak through a hole or through a door that does not close. Do not name the biology yet.

- Which leak is visible when nothing moves?
- Which leak appears only during door action?
- Why would patching the wrong site fail?

Rules students should earn

- Distinguish a static opening from dynamic closure failure.
- Measure symptoms and function before revision.
- Balance speech improvement against added scar and airway risk.

Biology reveal and evidence

ID	Finding supplied in the case
ANA18-E1	Case A has a visible opening in the repaired hard palate and liquid escape through the nose.
ANA18-E2	Case B has no palatal hole but consistent hypernasality and a gap during speech endoscopy.
ANA18-E3	Secondary surgery can add scar and affect airway; speech surgery does not erase learned compensatory articulation.

Decision and answer guidance

Situation: One student wants to give the same patch procedure to both case files.

Strongest option: Separate fistula closure planning from VPI evaluation and airway-aware speech planning.

Evidence required: ANA18-E1 + ANA18-E2

Claim ceiling: You may distinguish the supplied mechanisms and next evaluations. You may not select a real revision procedure.

Next handoff: We answered what goes wrong after repair and how it is fixed. But Mateo has now seen the surgeon, the orthodontist, the speech-language pathologist...

Who Does What, and When: Mateo's Care Timeline

Build a staged, age-ordered multidisciplinary care timeline for a child with complete unilateral CL/P, naming who acts, when, and why each step is timed to growth and development.

CARRY FORWARD
A fistula is a tissue opening, while velopharyngeal insufficiency is a moving-valve problem; each needs different evidence and treatment planning.

10-YEAR TAKEAWAY
Cleft care is a coordinated timeline because each specialty acts when anatomy, function, and development make its decision useful.

Socratic launch

Show the analogy panel only: An orchestra follows one score, but different sections enter at different times. Do not name the biology yet.

- Why do all sections need the same score?
- What happens if one section enters too early?
- Which signals tell a section when to act?

Rules students should earn

- Coordinate around the patient's developmental stage.
- Assign each decision to the right discipline.
- Keep surveillance running between procedures.

Biology reveal and evidence

ID	Finding supplied in the case
ANA19-E1	Mateo needs feeding and hearing support in infancy before definitive dental or jaw procedures.
ANA19-E2	Lip and palate repair, speech review, grafting, orthodontics, jaw, and nasal decisions have different developmental triggers.
ANA19-E3	ACPA recommends interdisciplinary coordination, family participation, and long-term outcome monitoring.

Decision and answer guidance

Situation: A new family receives six separate specialty plans with conflicting dates and no owner for surveillance.

Strongest option: Create one shared timeline with responsible roles, triggers, and follow-up measures.

Evidence required: ANA19-E1 + ANA19-E2

Claim ceiling: You may build the composite educational timeline. You may not imply that every patient needs every procedure.

Next handoff: We can now lay every step out in order. But putting them in order means we have assembled the entire anatomical and surgical picture...

Mateo's Complete Anatomical and Surgical Story

Synthesize the anatomical domain into one form-repair-consequence account of Mateo's case and reason from the assembled evidence to the diagnosis of an isolated, nonsyndromic complete unilateral CL/P (Veau...

CARRY FORWARD
Cleft care is a coordinated timeline because each specialty acts when anatomy, function, and development make its decision useful.

10-YEAR TAKEAWAY
A complete anatomical story can define structures, functions, repairs, and uncertainties while leaving treatment comparisons open to experiment.

Socratic launch

Show the analogy panel only: A final systems report separates verified faults, completed repairs, and tests still needed. Do not name the biology yet.

- Which statements are direct observations?
- Which outcomes were measured after repair?
- Which choices still need comparison data?

Rules students should earn

- Separate observed anatomy from inferred cause.
- Link each repair to a functional target and measured outcome.
- Name remaining uncertainties as researchable questions.

Biology reveal and evidence

ID	Finding supplied in the case
ANA20-E1	The composite anatomy supports a complete unilateral left cleft lip, alveolus, and palate with a Veau III palate component.
ANA20-E2	No supplied extra-anatomical pattern establishes a syndrome, and Genetics did not provide a patient-specific molecular cause.
ANA20-E3	Several care choices still have competing techniques or uncertain long-term outcomes, including molding, palate protocols, VPI revision, and jaw advancement.

Decision and answer guidance

Situation: The team must choose between a confident but overclaimed summary and an evidence-bounded report with open research questions.

Strongest option: Present the supported anatomy, functional consequences, staged care, and named uncertainties.

Evidence required: ANA20-E1 + ANA20-E2

Claim ceiling: You may synthesize the complete supplied anatomical story. You may not add a syndrome, molecular diagnosis, guaranteed outcome, or universal best operation.

Next handoff: The anatomical and surgical team has finished its report. But isolated and nonsyndromic is the anatomy's verdict, not the whole answer. The clinical team...