Framework structures of nose: osseous dorsum; cartilage framework; tip structures; no discrete location of internal and external valves (intimately related); obstruction may persist after septoplasty if anatomic location of constriction or area of dynamic valvular collapse missed

**Evaluation:** acoustic rhinometry (infrequently used); computed tomography (CT) useful after significant revision surgery or severe osseous deformities (review previous CTs); anterior rhinoscopy; modified Cottle test — use cerumen curette or other suitable instrument to support external valve under ala; note if support helps breathing when patient inspires (may also stent internal valve with small cotton-tipped swab)

Internal nasal valve collapse: usually only seen if patient breathing with force, or during exercise; occurs due to pressure drop between lateral wall of nose, turbinate, and septum; examine by observation without speculum; internal valve — bordered by anterior edge of inferior turbinate, septum, and upper lateral cartilage (ULC); subtle curve can be shaped during septal surgery with submucous resection (SMR), morcellizing cartilage, or swinging-door technique to improve airflow by moving septum small amount; simple septoplasty usually effective, but results difficult to predict; causes — primary collapse usually due to narrow dorsum or weak ULCs; secondary collapse due to surgery (usually hump reductions) when no reconstruction of internal nasal valve performed; trauma

External nasal valve collapse: alar collapse on inspiration; etiologies — ptotic tip; weak lower lateral cartilages (LLCs); excessive resections of LLC; facial paralysis; geometry and curvature of LLCs; narrow nasal tip; wide footplate (narrowing effective for treatment); hypertrophy of depressor septi muscle additional cause (treatable with botulinum toxin); placing suture through flared or broad medial crural footplate another treatment

**Treatment of internal valve:** stents and prosthetics — first-line treatment for patients unable to have, or who refuse, surgical therapy (stents can be custom-made); spreader grafts — expand nasal valve area; fit between ULC and septum and stretch ULC (also widen narrow dorsum); compensate for weakness of ULC; able to straighten curved dorsal septum; spreader grafts placed, then sutured in; grafts ≥5 mm long; extend from keystone area (where ULC meets nasal bone) to area of ULC termination (15-16 mm in all patients); contraindications include severe nasal scarring and excessively wide middle vault

**Treatment of external valve:** alar batten grafts — useful in patients with facial paralysis; transmit forces acting on ULC or lateral lobule to piriform aperture; place in area where collapse seen; ensure batten positioned on piriform; procedure can make nose larger; lateral crural strut grafts — structurally integrated to LLC; require dissection under and suturing to LLC, and extending out to piriform; rim grafts — stabilize external nasal valve; easy to put in place; turnover/turnd-under graft — uses LLC as auto-strut graft; partial-thickness cut made through LLC; undermine vestibular skin from it and turn it over onto itself; Gunter study — flap turned up and placed next to skin; eliminates distraction under vestibular skin (possibly visible if skin thin)

**Lateral crural tensing:** open structural rhinoplasty focused on rigid fixation of structure, reinforcement of framework, stabilization of internal structure, resisting gravity and contraction, and reliance on large grafts; current approach uses structural mechanics; goal of balancing forces using concept of ties and trusses; LCT corrects lateral lobule by treating lateral-wall collapse (part of functional rhinoplasty) and convexity; caudal-septal extension graft resists force placed on lateral crus; treats collapsed convex alar cartilage by pushing septum upward and projecting tip; create tension by stealing, excising, or stretching lower lateral crus; (only 1-2 mm needed to correct and tighten convexity); caudal-septal extension graft acts as stable center point; alar lobule tightened and strengthened with lateral crural steal or medial crural advancement; bullosity removed (cleftic trim not needed); tension across lobule

**Kotler nasal airway:** prevents painful or traumatic extubations; patients can breathe through nose right after surgery; similar to nasal trumpet

**Facial Nerve Paralysis**

**George T. Hashisaki, MD, Associate Professor, Department of Otolaryngology-Head and Neck Surgery, University of Virginia Health System, Charlottesville**

**Anatomy:** intracranial — corticobulbar fibers descend from precentral gyrus motor strip; in region of genu of internal capsule, they pass through cerebral peduncle down to brainstem, decussate, then descend to facial nucleus; upper face has bilateral cross-descending innervation; lower face with unilateral cross-descending innervations; patients with upper-motor lesions capable of movement of forehead muscles; lower-motor lesions affect entire face

**Evaluation:** history — sudden vs gradual onset; duration — if patient still paralyzed at time of visit; pain — presence and distribution; symptoms — altered taste; numbness of face; dry eye; dizziness; hearing loss; double vision (rule out involvement of other cranial nerves or brainstem); diabetes associated with

**Educational Objectives**

The goal of this program is to improve the management of patients with otolaryngologic conditions and diseases. After hearing and assimilating this program, the clinician will be better able to:

1. Select effective surgical techniques for patients who require functional rhinoplasty.
2. Explain the differences between lateral crural tensing and traditional open structural rhinoplasty.
3. Evaluate and treat patients with facial paralysis
4. Use the best available evidence in the care of adults and children with tracheostomies.
5. Consider the use of bevacizumab in children with aggressive recurrent respiratory papillomatosis.

**Faculty Disclosure**

In adherence to ACCME Standards for Commercial Support, Audio-Digest requires all faculty and members of the planning committee to disclose relevant financial relationships within the past 12 months that might create any personal conflicts of interest. Any identified conflicts were resolved to ensure that this educational activity promotes quality in health care and not a proprietary business or commercial interest. For this program, the faculty and planning committee reported nothing to disclose. In their lectures, Drs. Hashisaki and Rogers present information that is related to the off-label or investigational use of a therapy, product, or device.
increased risk for idiopathic facial paralysis; look for ongoing neurologic disease, previous surgery, and immunosuppression; examination — examine head and neck; look for signs of infection or other clue to paralysis, vesicles around ear or on palate, anomalies of ear (possible anomalous nerve course), scars on face, parotid masses; observe oral cavity for symmetric function of other cranial nerves, neck masses or adenopathy (infection); perform examination of cranial nerves, cerebellar function, and detailed facial examination; isolate each area to prevent muscle pull from contralateral side; testing — electromyography used for quantitative measures (compares compound motor action potential of paralyzed to nonparalyzed side); tympanometry with testing of stapedial reflex; audiometry recommended; Schirmer test and initial imaging not recommended; reserve imaging for suspicious head and neck examination, or no recovery at >3 mo.

Differential diagnosis: includes inflammation, ear surgery, tumors, neurologic conditions; infectious — largest category; includes Lyme disease, varicella-zoster; trauma or fracture of temporal bone — immediate onset of paralysis likely associated with crush, transection, or penetrating injury to facial nerve (timing of nerve repair less critical); however, delayed onset often time-critical because of ischemia (due to increasing edema in fallopian canal); idiopathic — Bell palsy; evidence indicates varicella-zoster as etiology; becomes intracellular and replicates, causing infection and inflammation

Treatment: eye care — prevent dryness (drops during day, lubricants at night); avoid taping unless patient skilled at placement; medical — 1 mg/kg prednisolone daily for 7 days recommended; consider antiviral for idiopathic facial paralysis or Ramsey Hunt syndrome; use dose recommended for varicella zoster (eg, acyclovir 800 mg 5 times per day); surgical — decompression and/or repair of facial nerve; eye procedures; 12-7 grafting; procedures for facial reanimation; nerve decompression in mastoid segment and from geniculate ganglion to fundus of internal auditory canal; Gantz study — patients whose electrical testing showed >90% degeneration of nerve on affected side; all patients received steroids and given choice of undergoing surgery; 91% of patients who elected surgery achieved House-Brackmann level 1 or 2 (significantly higher than similar patients who took steroids alone); Lambert study — perigeniculate area most common site of injury in patients with delayed-onset posttraumatic paralysis; electromyography helps to predict who may benefit from surgery; Peitersen study — >70% of patients with idiopathic facial paralysis had good to fair recovery; 50% of patients with herpes zoster oticus had poor recovery; decompression may benefit this group

Update on Tracheostomy Care

Lauren C. Anderson de Moreno, MD, Assistant Professor; Department of Otolaryngology-Head and Neck Surgery; University of Kentucky College of Medicine, Lexington

Consensus statement: developed by American Academy of Otolaryngology-Head and Neck Surgery (AAO-HNS) to improve care of patients with tracheostomy; tracheostomy care inconsistent across and within specialties and practices; goal to decrease complications due to lack of consistent practice

Evidence: paucity of well-controlled studies with high-quality evidence; current evidence does not support clinical practice guideline, but favors consensus of expert opinions; American Academy of Otolaryngology-Head and Neck Surgery survey study — ≥1000 catastrophic events annually (500 cause death or permanent disability) related to tracheostomy; many events involved potentially correctable deficits in family education, nursing, and home care, and other structural factors; consensus panel formed to review literature on pediatric and adult patients (using modified Delphi survey method); survey results opinions and suggestions (not recommendations)

Literature reviews: looked at clinical practice guidelines, systematic reviews and meta-analyses (through April 2011); randomized controlled trials, observational studies, and case reports (limited to after January 2011); 73 full-text articles retained based on relevancy and methodology, and distributed to members of panel

Statements: developed after qualitative survey of articles; 77 of 110 statements achieved consensus; panel members each chose 10 statements they believed would most influence tracheostomy care and most essential to improving care of; 13 statements achieved consensus

Consensus: tracheostomy education should begin before elective tracheostomy; experienced physician should be present at first tube change; use plastic tubes for initial placement, with continuous humidification in immediate postoperative period; consider multiple factors (eg, lung mechanics, upper airway resistance, communication needs, indications for procedure) to determine appropriate size of tube; tube should fit airway without undue pressure on tracheal wall and satisfy functional needs; use clean technique to replace tube if cuff broken, nonfunctional, or blockage of tube present (sterile technique not necessary and would not lead to reduction in infection); experienced clinicians should supervise tube changes until patient discharged; use humidification if patient requires ventilation or has history of thick secretions; suction if visible or audible secretions in airway, suspected obstruction, tube change, or deflation of cuff; clean inner cannula regularly; use tracheostomy ties (when suitable) to prevent accidental decannulation; do not discharge patients with tracheostomy tube sutures in place

Accepted statements: no use of speaking valve if cuff inflated; deflate cuff if patient off mechanical ventilation and has no aspiration; Bivona Aire-Cuff and Shiley cuffs should have only emergency supplies; contacts for healthcare providers, personnel, and supply company: hands-on teaching of when and how to suction, clean, and change tracheostomy tube, and in use of home equipment

Consensus on pediatric patients: patient should not require ventilator support for 3 mo before decannulation; excise granulation tissue noted on pre-decannulation bronchoscopy at time of procedure

Days to first tube change: different for open and percutaneous tracheostomies; early change on postoperative day 3 in patients with favorable anatomy to facilitate early teaching and discharge; however many felt that percutaneous tube should not be changed until day 10 to establish tract

Decannulation (adults): indications for placement resolved or significantly improved; patient tolerating decannulation cap, or uncuffed tube without stridor; adequate level of consciousness and laryngopharyngeal function to prevent aspiration; presence of effective cough while tube capped; completion of all procedures requiring general endotracheal anesthesia

Bevacizumab for Respiratory Papillomatosis in Children

Derek J. Rogers, MD, Pediatric Otolaryngology Clinical Fellow, Massachusetts Eye and Ear Infirmary, Harvard Medical School, Boston, MA

Recurrent respiratory papillomatosis (RRP): most common neoplasm in larynx; incidence 0.2 to 1.1 per 100,000 children per year in United States; usually associated with human
papillomavirus (HPV) types 6 and 11; symptoms of hoarseness or respiratory distress; rare malignant transformation reported

**Aggressive disease:** need for >4 surgical procedures in 1 yr; rapid regrowth of papillomas with compromise of airway; distal multisite spread of disease; may consider use of adjuvant therapy in these cases, but requires special informed consent

**Cidofovir:** best studied type of adjuvant therapy; cytosine nucleotide analog (guidelines available from RRP Task Force); patients and families may request additional therapy choices due to reports of carcinogenic effects or malignant transformation

**Bevacizumab (Avastin):** human monoclonal antibody; binds to and neutralizes vascular endothelial growth factor (VEGF) isoforms; *Rahbar et al study*—showed papillomas express VEGFA 1 and 2; *Zeitels study*—used bevacizumab and pulsed potassium titanyl phosphate (KTP) laser in adults with good results; however, not fully studied in pediatric population

**Pilot study:** prospective consecutive case series; intraliteral bevacizumab (0.5 mL, concentration of 2.5 mg/mL) for 3 consecutive injections; pulse KTP and microdebrider used as needed; time interval 2 to 3 wk; measures of primary outcome—time between surgeries (50% increase); number of surgeries per year (50% decrease); year leading up to first injection compared to year after third

**Results:** 10 children with wide age range treated; all had aggressive disease; even distribution of sex and type of HPV; 4 previously failed Cidofovir; all patients completed protocol; duration between treatments increased by 6 wk; treatments per year decreased by 4; improvement seen in secondary outcome measures

**Use of bevacizumab:** off-label; determine whether need for adjuvant therapy and whether patient and family desires adjuvant therapy; treat with cidofovir before use of bevacizumab; consider protocol if cidofovir refused or patient failed treatment; results possibly due to variability of disease, given small numbers; no known adverse effects seen with bevacizumab

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**Acknowledgements**

Dr. Wong was recorded at *Otolaryngology Updates*, held February 16-19, 2013, in Palm Springs, CA, and sponsored by University of California, Irvine, School of Medicine, Department of Otolaryngology-Head and Neck Surgery. For information about upcoming CME activities from UC Irvine, please visit meded.uci.edu/cme. Dr. Hashisaki was recorded at *13th Annual Charleston Magnolia Conference*, held May 31-June 1, 2013, in Charleston, SC, and sponsored by Medical University of South Carolina, School of Medicine, Department of Otolaryngology-Head and Neck Surgery. Information about upcoming conferences from the Medical University of South Carolina is listed at cme.musc.edu. Dr. Anderson de Moreno was recorded at the *Kentucky Society of Otolaryngology Annual Meeting*, held April 20, 2013, in Lexington, KY, and sponsored by the University of Kentucky, College of Medicine, Department of Otolaryngology-Head and Neck Surgery. For information about upcoming meetings from the University of Kentucky, please visit cecentral.com. Dr. Rogers was recorded at *ASPO Spring Meeting*, held April 26-28, 2013, in Arlington, VA, and sponsored by the American Society of Pediatric Otolaryngology. For information about next year’s American Society of Pediatric Otolaryngology Spring Meeting, visit their website, aspo.us. The Audio-Digest Foundation thanks the speakers and the sponsors for their cooperation in the production of this program.

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**Suggested Reading**


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1. Internal nasal valve collapse is:
   (A) Usually seen with relaxed or moderate breathing
   (B) Treatable by submucous resection or swinging-door technique
   (C) Usually caused by excessive resection of the lower lateral cartilage (LLC)
   (D) All of the above

2. The turnover/turn under graft:
   (A) Is most useful in patients with facial paralysis
   (B) Requires dissection under the LLC
   (C) Uses the LLC as an auto-strut graft
   (D) Makes the nose larger

3. Lateral crural tensing relies on ______; nasal bulbosity is treated with a ______ in this approach.
   (A) Large grafts; cephalic trim
   (B) Structural mechanics; cephalic trim
   (C) Large grafts; caudal septal extension graft
   (D) Structural mechanics; caudal septal extension graft

4. A patient who has facial paralysis but can raise her eyebrows likely has a lower motor lesion.
   (A) True
   (B) False

5. Which of the following tests are recommended for initial evaluation of facial paralysis?
   1. Imaging
   2. Tympanometry
   3. Schirmer test
   4. Audiometry
   5. Electroneuronography
   (A) 1,2
   (B) 3,4
   (C) 1,3,5
   (D) 2,4

6. Immediate onset of facial paralysis is usually associated with ______ the facial nerve; repair of the nerve is ______ time critical in patients with immediate onset of paralysis.
   (A) Trauma to; less
   (B) Inflammation of; less
   (C) Trauma to; more
   (D) Inflammation of; more

7. Which of the following statements is true about tracheostomy care?
   (A) It is fairly consistent across specialties and within practices
   (B) There are 300 catastrophic events per year related to tracheostomy
   (C) There is enough high-quality evidence to create practice guidelines and recommendations for tracheostomy care
   (D) None of the above

8. Consensus statements for tracheostomy care include all the following, except:
   (A) Use sterile technique to replace tube if the cuff is broken
   (B) Apply continuous humidification in the postoperative period
   (C) Do not discharge patients with tracheostomy sutures in place
   (D) Use tracheostomy ties, when feasible, to prevent accidental decannulation

9. Which of the following consensus statements about decannulation applies specifically to pediatric patients?
   (A) Presence of an effective cough while the tracheostomy tube is capped
   (B) Adequate level of consciousness to protect the airway
   (C) No use of the ventilator in the 3 mo before decannulation
   (D) Indications for placement resolved or significantly improved

10. Which of the following statements are true about use of bevacizumab in pediatric patients with recurrent respiratory papillomatosis?
    1. Recommended for both aggressive and nonaggressive disease
    2. Requires specific, separate informed consent
    3. Association with carcinogenic effect reported
    4. Was associated with increased duration of time between treatments
    5. Currently recommended for use before using cidofovir
    (A) 1,3
    (B) 2,4
    (C) 1,2,5
    (D) 3,4,5

Answers to Audio-Digest Otolaryngology Volume 46, Issue 23: 1-C, 2-A, 3-B, 4-B, 5-A, 6-C, 7-B, 8-D, 9-D, 10-A

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