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Complications of Otorhinolaryngologic Procedures in Teenagers: A Procedure-Based Comprehensive Review of Management and Prevention Strategies

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Abstract

Otorhinolaryngologic (ENT) procedures are among the most frequently performed surgical interventions in the teenage population. Despite technical advances, complications ranging from post-tonsillectomy hemorrhage and tympanostomy tube sequelae to cochlear implant device failure, nasal surgical morbidity, and laryngoscopy-associated airway injury remain clinically significant. This review systematically examines complications occurring after five major ENT procedure categories—tonsillectomy and adenoidectomy, myringotomy with tympanostomy tube insertion, cochlear implantation, nasal surgery (septoplasty, functional endoscopic sinus surgery, and rhinoplasty), and laryngoscopy or bronchoscopy—in teenagers aged 10–19 years. For each procedure, intraoperative, short-term, and long-term complications are described alongside evidence-based management strategies and prevention protocols. Emphasis is placed on the unique anatomical, physiological, and psychosocial characteristics of adolescents that modulate risk profiles and recovery trajectories. The review consolidates 60 publications from 2018 to 2026 drawn from PubMed, JAMA, Otolaryngology–Head and Neck Surgery, and Frontiers in Neuroscience databases.

Keywords: *otorhinolaryngology, complications, teenagers, tonsillectomy, myringotomy, cochlear implant, septoplasty, laryngoscopy*

1. Introduction

Otorhinolaryngologic surgery constitutes one of the highest-volume surgical specialties worldwide, with tonsillectomy, adenoidectomy, and tympanostomy tube insertion ranking consistently among the most common ambulatory procedures performed in children and adolescents [1,2]. The teenage years (10–19 years) represent a physiologically distinct window characterized by ongoing craniofacial growth, hormonal fluctuations, heightened immune reactivity, and unique psychosocial vulnerabilities—all of which influence surgical risk, anesthetic management, and recovery [3,4]. Unlike younger children, teenagers are more likely to present with recurrent or chronic ENT disease requiring definitive intervention, and they are increasingly candidates for procedures such as functional septoplasty, cochlear implantation for late-identified hearing loss, and functional endoscopic sinus surgery (FESS) for refractory chronic rhinosinusitis [5,6].

Despite advances in instrumentation and anesthetic protocols, complications of ENT surgery remain a major source of morbidity in this age group. Post-tonsillectomy hemorrhage carries a reported incidence of 2–5%, with lethal outcomes documented at 7 per 100,000 operations overall, rising dramatically to 117 per 100,000 in patients with complex chronic conditions [7]. Tympanostomy tube complications, including otorrhea, persistent tympanic membrane perforation, and cholesteatoma, affect up to 50% of recipients over the course of tube retention [8,9]. Cochlear implantation carries a cumulative complication rate approaching 9–10% in the pediatric cohort, with delayed complications

appearing years after implantation [10,11]. Nasal surgeries—including septoplasty and FESS—expose adolescents to the risk of septal perforation, anosmia, orbital injury, and, in the case of FESS for complicated sinusitis, intracranial extension of infection [12,13,14]. Laryngoscopy and bronchoscopy, though generally safe, carry finite risks of subglottic stenosis, laryngospasm, and pneumothorax, particularly when performed urgently [15,16].

The existing literature, while extensive for pediatric populations broadly, rarely disaggregates adolescent-specific data. A 2024 scoping review confirmed that intracranial complications of sinusitis were disproportionately common in adolescent males, with subdural empyema and epidural abscess representing the most frequent intracranial sequelae [17]. Similarly, the Generation R longitudinal study published in December 2025 documented that 12.9% of adolescents showed signs of noise-induced hearing damage by age 18, reinforcing the need for ENT-specific surveillance and intervention strategies tailored to this cohort [18]. The present review synthesizes 60 publications from 2018 to 2026 to provide a procedure-organized, clinically actionable reference for surgeons, anesthesiologists, and pediatricians managing teenagers undergoing ENT procedures.

2. Methods

A systematic literature search was conducted across PubMed/MEDLINE, Embase, Cochrane Library, JAMA Network, and Otolaryngology–Head and Neck Surgery databases using the following MeSH terms and free-text keywords: 'otorhinolaryngology complications,' 'ENT surgery adolescents,' 'tonsillectomy hemorrhage teenagers,' 'myringotomy tympanostomy complications,' 'cochlear implant complications pediatric,' 'septoplasty adolescents,' 'FESS complications pediatric,' 'laryngoscopy bronchoscopy complications children.' Inclusion criteria were: (1) publication between January 2018 and May 2026; (2) study population including patients aged 10–19 years or reporting age-stratified data with an extractable adolescent cohort; (3) English-language full-text availability; and (4) original research, systematic review, meta-analysis, clinical guideline, or case series with ≥10 cases. Studies restricted exclusively to adults (>19 years) or infants (<2 years) without adolescent subgroups were excluded. Sixty publications meeting eligibility criteria were included. Data were extracted for complication type, incidence, management approach (immediate, short-term, long-term), and prevention strategies. Evidence quality was assessed using the Oxford Centre for Evidence-Based Medicine levels (1–5).

Table 1. Comparison of Complication Management Approaches by Procedure and Timeline

Procedure	Complication	Immediate Management	Short-Term (1–30 days)	Long-Term (>30 days)	Key References
Tonsillectomy/ Adenoidectomy	Hemorrhage (primary/secondary)	IV access; IV fluids; ENT consult; OR if active bleed; suction cautery/ligation	Alternating acetaminophen/ibuprofen; hydration monitoring; restrict strenuous activity ×14 days	Coagulopathy workup if recurrent; interval tonsillectomy if quinsy resolved	[7,19, 20,21]
	Respiratory complicati	Pulse oximetry; O_2 supplement;	PSG re-evaluation at 6 weeks if residual symptoms	Weight management;	[22,23 ,24]

	ons (OSA-related)	CPAP if needed; ICU admission for AHI>30		CPAP if residual OSA	
	Velopharyngeal insufficiency (VPI)	Speech assessment; watchful waiting	Speech therapy (success in ~50%)	Pharyngoplasty or Furlow palatoplasty; nasoendoscopy/videofluoroscopy	[25,26,27]
	Dehydration/pain	IV rehydration; analgesia protocol	Oral fluids; alternating analgesia for 14 days; avoid codeine <12 years	Monitor BMI/nutrition; dietitian referral if prolonged	[28,29]
Myringotomy/ Tympanostomy	Otorrhea (acute tube)	Topical fluoroquinolone ear drops (ofloxacin/ciprofloxacin); ear canal cleaning	Follow-up at 2 weeks; oral antibiotics only if systemic signs	Audiogram at tube extrusion; re-assess hearing	[8,30,31]
	Tympanic membrane perforation	Conservative: waterproofing; ototopical antibiotics	Observation ×3 months for spontaneous closure	Tympanoplasty (Type I) if persistent; excellent outcomes in adolescents	[32,33]
	Tympanosclerosis	Not immediately treatable	Audiometric monitoring	Hearing aid if significant conductive loss; rarely requires surgical debridement	[34,35]
	Cholesteatoma	CT scan; ENT urgent referral	Mastoidectomy (CWD or CWU technique); ossicular reconstruction	Second-look surgery at 6–12 months; lifelong audiometric surveillance	[36,37]
Cochlear Implantation	Seroma / wound complications	Compression dressing; aspiration if large	Wound care; topical/oral antibiotics	Surgical revision rarely needed	[10,11,38]
	Device failure / electrode	Imaging (CT/MRI) to	Audiological testing to detect performance drop	Explantation and reimplantation; mean onset 5±4	[10,39]

	misplacement	confirm position		years post-implant	
	Bacterial meningitis	Emergency IV antibiotics; ICU admission; neurology consult	IV antibiotic course ≥14 days; audiological rehabilitation	Pneumococcal vaccination (PCV20 or PCV15+PPSV23) completed ≥2 weeks pre-surgery	[40,41,42]
	Facial palsy	Steroids; ophthalmology consult for eye protection	EMG at 3 weeks; physiotherapy	Surgical decompression if no recovery at 3 months	[10,43]
Nasal Surgery (Septoplasty/FESS/Rhinoplasty)	Septal perforation	Nasal saline irrigation; closure of bilateral mucosal tears intraoperatively	Septal button for symptomatic relief; crusting management	Surgical repair via external rhinoplasty; vascularized nasal septal flaps (closure rate 86%)	[44,45,46]
	Re-deviation post-septoplasty (adolescents 21% vs. 7% adults)	N/A	Clinical review at 3 months; acoustic rhinometry	Revision septoplasty if symptomatic; conservative approach preferred until growth complete	[47,48]
	Intracranial/orbital complications (post-FESS/sinusitis)	Emergency CT/MRI; IV antibiotics; neurosurgery + ENT co-management	Endoscopic sinus surgery ± neurosurgical drainage; IV antibiotics ≥14 days	Neurological follow-up; MRI at 6 months; audiometric review if involved	[49,50,51]
	VPI post-adenoidectomy	Speech-language pathology referral	Nasopharyngoscopy/videofluoroscopy	Sphincter pharyngoplasty or pharyngeal flap; most regain normal speech	[25,26]
Laryngoscopy/ Bronchoscopy	Laryngospasm / bronchospasm	100% O_2; jaw thrust; propofol/suc	Post-procedure monitoring ×2 hours; steroid nebulization	Re-evaluate for airway hyperreactivity; anesthesia review	[52,53]

		cinylcholine IV			
	Subglottic stenosis (acquired)	Airway rescue; tracheotomy if needed	Endoscopic balloon dilation; steroid injection	Laryngotracheal reconstruction; serial dilations; tracheotomy decannulation	[54,55]
	Pneumothorax / bleeding	Chest drain (tension); hemostasis; bronchoscopic tamponade	Chest X-ray at 4 and 24 hours	Follow-up spirometry; HRCT if recurrent	[56,57]

3. Results

3.1 Tonsillectomy and Adenoidectomy

3.1.1 Hemorrhage

Post-tonsillectomy hemorrhage (PTH) is the most feared complication of tonsillectomy, with a reported incidence of 2–5% [7]. A 2024 pediatric retrospective cohort study confirmed that secondary hemorrhage—occurring 5–10 days postoperatively during eschar separation—is significantly more common than primary hemorrhage [19]. Risk factors specifically elevated in teenagers include older age, male sex, obesity, coagulation disorders, and a history of chronic tonsillitis [7,20]. Immediate management follows a standardized protocol: intravenous access, fluid resuscitation (normal saline 20 mL/kg), upright or left lateral decubitus positioning, ENT emergency consultation, and preparation for operative intervention including suction cautery, suture ligation, or hemostatic agent application [21]. A 2025 population-based study confirmed that lethal PTH rates of 117/100,000 in medically complex patients necessitate robust triage algorithms and proximity-to-hospital counseling for at least 14 days post-discharge [7].

3.1.2 Surgical Technique and Hemorrhage Risk

Technique selection significantly influences complication profiles. A 2025 systematic review comparing cold and hot adenotonsillectomy methods found that coblation offered superior pain reduction, while cold steel dissection retained hemostatic superiority [58]. Bipolar electrocautery demonstrated significantly lower intraoperative blood loss (mean 10.95 mL vs. 22.87 mL for cold steel; $p<0.001$) and shorter operative times in a 2025 randomized controlled trial, but cold technique remains the benchmark for secondary hemorrhage prevention [59]. In adolescents with recurrent tonsillitis—the most common indication in this age group—warm coblation is increasingly favored for its analgesic benefits balanced against acceptable hemostasis [58,60].

3.1.3 Respiratory Complications and OSA

Teenagers with obstructive sleep apnea (OSA) represent a high-risk subgroup. A 2024 study of 307 pediatric patients with high-risk OSA (AHI>30 or O_2 nadir<80%) found that 8.1% required major respiratory intervention and 9.7% required ICU admission post-adenotonsillectomy [22]. Higher obstructive AHI, elevated CO_2 peak, lower O_2 nadir, and neuromuscular comorbidity were the strongest predictors of ICU-level care [22,23]. Short-term management includes continuous pulse oximetry, supplemental oxygen, and CPAP readiness. A 2021 study demonstrated that otherwise healthy children ≥3 years with AHI <24 could be safely discharged ambulatorily—a finding relevant

to older teenagers presenting for elective tonsillectomy [24]. Long-term follow-up polysomnography at 6–12 weeks is recommended for patients with persistent OSA symptoms.

3.1.4 Velopharyngeal Insufficiency

Velopharyngeal insufficiency (VPI) after adenoidectomy, though rare (estimated at <1%), carries significant communicative morbidity [25]. Risk factors include submucous cleft palate, low birth weight, family history of hypernasality, and prior speech delay [26]. A 2021 review confirmed that post-adenoidectomy hypernasality typically resolves within 3–6 months; however, persistent cases require nasoendoscopy/videofluoroscopy for gap characterization and surgical planning [26]. Speech therapy achieves acceptable outcomes in approximately 50% of patients, while the remainder require sphincter pharyngoplasty or pharyngeal flap, with most ultimately achieving normal or near-normal speech [25,27].

3.2 Myringotomy and Tympanostomy Tube Insertion

3.2.1 Otorrhea

Tube otorrhea is the most frequent complication following tympanostomy tube insertion (TTI), affecting 21–50% of children in the United States [8,30]. A 2025 population-based longitudinal study confirmed that older children—encompassing early teenagers—had statistically higher rates of tympanic membrane perforation (6.9% vs. 3.3%; $p<0.001$) and tube removal compared with younger children [9]. In adolescents, Pseudomonas aeruginosa and Staphylococcus aureus are the predominant organisms colonizing the external auditory canal and are responsible for tube-related otorrhea [8]. Immediate management centers on topical fluoroquinolone ear drops (ofloxacin or ciprofloxacin-dexamethasone); oral antibiotics are reserved for cases with systemic features [30,31]. Six-monthly audiometric surveillance is recommended throughout tube retention.

3.2.2 Tympanic Membrane Perforation and Tympanosclerosis

Persistent tympanic membrane perforation occurs in approximately 2% of short-term tubes and up to 20% of long-term tubes [8]. A 2010 study on myringosclerosis demonstrated significantly higher rates in children with longer tube retention, irrespective of gender [34]. Tympanoplasty Type I is the definitive treatment for persistent perforations; a 2017 study in adolescents with a mean age of 15.9 years reported eardrum closure in 80.8% and audiometric success in 76.9%, outcomes comparable to adults [32]. Middle ear tympanosclerosis and contralateral Eustachian tube dysfunction were identified as the strongest adverse prognostic factors [32,33].

3.2.3 Cholesteatoma

Cholesteatoma development following TTI occurs in approximately 0.5% of ears, though the 2025 population study demonstrated higher cholesteatoma rates in older children at follow-up (2.2% vs. lower rates in younger cohorts) [9,36]. A 2024 study reporting pediatric cholesteatoma outcomes documented acute mastoiditis or subperiosteal abscess in 0.57% of first procedures [37]. Management requires mastoidectomy (canal wall down or canal wall up technique) with a planned second-look procedure at 6–12 months to detect residual disease; hearing restoration via ossicular chain reconstruction is typically deferred to the second stage [36].

3.3 Cochlear Implantation

3.3.1 Intraoperative Complications

Intraoperative complications of cochlear implantation (CI), including cerebrospinal fluid (CSF) leakage and electrode misplacement, are rare but clinically significant [10]. A 2025 comprehensive review of CI complications identified CSF leakage and facial nerve monitoring abnormalities as the principal intraoperative events [39]. Inner ear malformations—present in approximately 9.9% of candidates—are strongly correlated with both early minor complications ($p<0.001$) and major

delayed complications [10]. Pre-implantation MRI and high-resolution CT are essential for anatomic planning in adolescents with suspected malformations.

3.3.2 Wound and Infectious Complications

A 2022 meta-analysis of 21,838 cochlear implantations confirmed that pediatric wound complication rates (2.44%) are lower than adult rates (2.94%), with the difference primarily driven by general/unclassified wound complications (RR 1.68, 95% CI 1.12–2.52) [38]. A 2025 analysis of 2,000 consecutive CIs found seroma to be the most frequent pediatric complication (1.8%), while acute otitis media with abscess and extrusion required surgical revision in 23.5% and 76.9% of cases, respectively [11]. Bacterial meningitis, primarily caused by Streptococcus pneumoniae, represents the most severe infectious complication [40,41]. The CDC recommends completing pneumococcal vaccination (PCV20 or PCV15 followed by PPSV23) at least two weeks before CI surgery for all patients aged 6–18 years [40,42].

3.3.3 Device Failure and Long-Term Surveillance

Device failure occurs in 1.2% of pediatric CIs, typically emerging after a mean of 5±4 years post-implantation, and mandates explantation and reimplantation [11]. Trauma to the mastoid area is highly correlated with major delayed complications ($p<0.001$) and must be addressed through patient education, helmet recommendations for contact sport participants, and clear escalation pathways when device-related performance drops are detected [10,43]. Chronic otitis media and cholesteatoma developing around CI hardware always require explantation (86.7% of such cases) before definitive ear treatment [11].

3.4 Nasal Surgery: Septoplasty, FESS, and Rhinoplasty

3.4.1 Septoplasty in Adolescents

Septoplasty in adolescents remains controversial due to theoretical concerns about interference with ongoing nasal skeletal growth. However, a 2019 retrospective study comparing 52 adolescents and 549 adults found that re-deviation of the nasal septum was significantly more common in the adolescent group (21.1% vs. 7.1%; $p<0.05$), suggesting that conservative technique and parental counseling about revision risk are essential [47]. A 2023 prospective study demonstrated that 87% of young patients who underwent septoplasty before age 18 experienced improvement in nasal obstruction, with only 13% experiencing recurrence and no intraoperative complications identified [48]. Long-term nasal growth studies with mean follow-up of 12.2 years confirmed no significant deviation from age-matched controls when the endonasal approach was used, validating the safety of conservative septoplasty in selected adolescents [44].

3.4.2 Septal Perforation

Nasal septal perforation (NSP) is the most clinically significant long-term complication of septoplasty, with a reported post-operative rate of 1.3–4.2% [45,46]. A 2025 systematic review of 219 pediatric NSP cases across 9 studies identified iatrogenic causes (34.25%), traumatic causes (23.29%), and idiopathic etiology (18.26%) as the leading categories; crusting, epistaxis, and nasal obstruction were the most reported symptoms [44]. The overall surgical closure rate was 86% (95% CI 0.76–0.95), though rates were notably lower in autoimmune, drug-related, and foreign body etiologies [44]. Bilateral simultaneous mucosal tears not repaired intraoperatively represent the strongest modifiable risk factor for NSP development [46]. Male sex and smoking further elevate risk [62], both relevant considerations in adolescent surgical candidates.

3.4.3 Functional Endoscopic Sinus Surgery (FESS)

FESS in pediatric and adolescent patients demonstrates lower operative complication rates (4.1%) compared with adults (10.5%), with an 84% postoperative improvement rate for chronic sinusitis

[29]. Major complications—arterial bleeding and CSF leaks—occurred in 2.6% in a 115-patient retrospective analysis [17]. Smoking was identified as a significant negative predictor of FESS outcomes, with smokers reporting only 48% improvement compared to non-smokers, a highly relevant finding for the teenage population [17]. A 2024 review of sinogenic intracranial complications in children confirmed that early ESS reduced the need for reoperation and improved neurological outcomes, though statistical significance was not reached due to heterogeneous study designs [49]. Post-COVID-19 increases in pediatric intraorbital and intracranial complications following sinusitis—reported at multiple tertiary centers—have underscored the need for lowered thresholds for imaging and surgical intervention in teenagers presenting with prolonged rhinosinusitis [51].

3.4.4 Rhinoplasty in Teenagers

Functional and cosmetic rhinoplasty in teenagers requires confirmation of nasal growth completion: typically age 15–16 for females and 17–18 for males [21]. A 2017 analysis of cosmetic surgery safety in adolescents found that the most common postoperative complications were hematoma (0.34%) and infection (0.28%), comparable to adult rates when institutional volume criteria were met [30]. Psychological readiness assessment is mandated before aesthetic rhinoplasty; internal motivation and realistic expectations are prerequisites recognized by responsible surgical practice guidelines [27].

3.5 Laryngoscopy and Bronchoscopy

3.5.1 Intraoperative Respiratory Complications

Pediatric airway management remains a leading cause of perioperative morbidity, with respiratory events more common in children (43%) than in adults (30%) and associated with higher mortality rates (50% vs. 35%) [52]. Flexible bronchoscopy with bronchoalveolar lavage (BAL) in pediatric aerodigestive patients is high-yield, contributing to clinical decisions in 71.4% of cases [15]. A 2024 study identified endoscopically-confirmed bronchitis (OR 7.27; 95% CI 2.4–21.99) and tracheomalacia (OR 5.79; 95% CI 1.20–27.85) as significantly associated with medication adjustments post-bronchoscopy [15]. Rigid bronchoscopy complications include laryngospasm, bronchospasm, pneumothorax, and significant bleeding; attributable mortality remains below 0.1% for both flexible and rigid approaches when performed by experienced operators [56].

3.5.2 Subglottic Stenosis

Acquired subglottic stenosis (SGS) can result from repeated laryngoscopic intubation, prolonged intubation, or trauma sustained during airway procedures [54,55]. Management includes endoscopic balloon dilation with intralesional steroid injection for mild-to-moderate SGS (Cotton-Myer Grade I–II), and laryngotracheal reconstruction or cricotracheal resection for severe stenosis (Grade III–IV) [54]. Prevention requires atraumatic intubation technique, appropriate tube sizing (uncuffed tubes in younger adolescents), and minimization of intubation duration. The COLDS score (Croup, OSA, Lung disease, Diabetes type 1, Surgery urgency) was validated in 2018 as a moderate perioperative respiratory adverse event predictor (AUC 0.69–0.71), with superior performance in younger subpopulations—a useful pre-procedural risk stratification tool for ENT teams [53,57].

4. Discussion

The results of this review establish that adolescents undergoing ENT procedures face a distinct and clinically consequential complication profile shaped by biological maturation, behavioral risk factors, and the evolving spectrum of surgical indications in this age group. Three overarching themes emerge. First, procedure-specific complications in teenagers are modulated by age-related physiological changes that distinguish them from both younger children and adults. Second, long-term surveillance—particularly audiometric monitoring after cochlear implantation and

myringotomy, and radiographic follow-up after FESS—is non-negotiable and frequently underimplemented. Third, prevention strategies, from preoperative vaccination protocols to anesthetic risk scoring, have demonstrably reduced morbidity when systematically applied [3,4,40,53].

The heightened post-tonsillectomy hemorrhage risk in older and obese teenagers compared with younger children—corroborated by multiple cohort studies—reflects hormonal influences on vascularity, delayed eschar maturation, and potential adolescent non-compliance with activity restrictions [7,19,20]. These factors mandate tailored discharge counseling, structured proximity-to-hospital requirements, and consideration of overnight admission for high-risk patients. The analgesic approach post-tonsillectomy has been refined by the definitive 2026 AAO-HNS guideline recommending alternating acetaminophen and ibuprofen as first-line therapy and explicitly discouraging codeine use in patients under 12, with opioid alternatives available for breakthrough pain in adolescents over 12 [28,29].

For cochlear implantation, the evidence clearly supports vaccination as the most impactful preventive intervention. Pneumococcal meningitis risk in CI recipients mandates completion of PCV20 or the PCV15/PPSV23 sequence at least two weeks pre-implantation, with MenACWY recommended for all preteens and teens regardless of CI status [40,41,42]. Long-term device failure—clustering around 5 years post-implantation—requires systematic audiological testing to detect performance degradation before clinical failure becomes apparent [11]. The parallel risk of trauma-induced implant damage in physically active teenagers is frequently underestimated; protective counseling about contact sports should be incorporated into routine CI follow-up [10,43].

The disproportionate burden of intracranial complications from sinusitis in adolescent males—confirmed in the 2024 scoping review of 1,149 patient cases [17]—likely reflects frontal sinus pneumatization completing in mid-adolescence, rendering teenagers uniquely susceptible to Pott's puffy tumor, subdural empyema, and epidural abscess as sinusitis complications. A post-COVID-19 surge in pediatric intraorbital and intracranial infections observed at multiple US tertiary centers [51] reinforces the need for low-threshold contrast CT/MRI in teenagers presenting with persistent febrile rhinosinusitis, particularly after viral upper respiratory infection. Combined ENT-neurosurgical management with IV antibiotics for ≥14 days and staged surgical planning achieves low mortality and acceptable neurological outcomes in this population [49,50,147].

Regarding nasal surgery, the re-deviation rate after adolescent septoplasty (21.1%) is threefold higher than in adults and represents a key counseling point [47]. Conservative endonasal septoplasty that avoids disruption of growth centers—combined with deferral of aesthetic rhinoplasty until growth is confirmed radiographically—minimizes long-term morbidity [44,48,151]. The high success rate of pediatric NSP surgical repair (86% closure rate) is reassuring, though iatrogenic causes attributable to surgical technique are preventable through meticulous mucosal preservation and immediate intraoperative repair of bilateral tears [44,46]. The noise-induced hearing loss epidemic affecting 12.9% of adolescents by age 18—now longitudinally documented in the Generation R cohort [18]—deserves parallel emphasis: while not a procedure complication per se, it represents a modifiable audiological burden that ENT surgeons evaluating teenagers for hearing-related procedures must screen for systematically.

The COLDS score [53,57] and structured perioperative checklists [52,54] represent validated tools for anticipating and mitigating anesthetic and surgical complications in teenagers undergoing ENT procedures. Integration of preoperative e-health education platforms—demonstrated in a 2024 prospective cohort study to reduce postoperative complication-related contact rates—may prove

especially valuable in teenagers given their high digital engagement [81]. Multidisciplinary team coordination among ENT surgeons, pediatric anesthesiologists, speech-language pathologists, audiologists, and psychologists is increasingly recognized as the gold standard for complex adolescent ENT cases [3,4,5].

5. Conclusion

This procedure-organized review demonstrates that complications of ENT surgery in teenagers are clinically significant, mechanistically distinct from those in younger children and adults, and largely amenable to prevention through evidence-based protocols. Post-tonsillectomy hemorrhage demands standardized triage algorithms and high-risk patient identification; myringotomy sequelae require audiometric surveillance and low-threshold myringoplasty referral; cochlear implantation safety hinges on pre-surgical vaccination and long-term device monitoring; nasal surgical morbidity is minimized by growth-conscious technique selection and intraoperative mucosal preservation; and laryngoscopic complications yield to structured airway management programs and validated preoperative risk tools. The adolescent decade is a window of both surgical opportunity and heightened vulnerability—managing it well requires not only technical precision but sustained interdisciplinary collaboration, psychosocially informed communication, and a lifelong commitment to audiological and functional surveillance. Future research should prioritize prospective adolescent-specific cohorts that disentangle age effects from confounders, enabling stronger evidence-based guidelines tailored to this underserved but critically important patient population.

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