SFORL GUIDELINES

Pediatric tonsillectomy: Clinical practice guidelines


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KEYWORDS
Sleep apnea obstructive; Surgery; Child; France; Otolaryngology; Practice guidelines; Medical societies; Tonsillectomy

Summary
Objective: This article presents the Clinical Practice Guidelines for Pediatric Tonsillectomy of the French Society of ENT and Head and Neck Surgery (SFORL), entitled “Amygdalectomie de l’enfant: Recommandation pour la pratique clinique” (SFORL, 2009). Method: The French Society of ENT (SFORL), in partnership with the French Association for Ambulatory Surgery (AFCA) and French Society for Anaesthesia and Intensive Care (SFAR), set up a representative panel in the fields of anaesthesiology, ENT and head-and-neck surgery, pediatrics, sleep medicine and general medicine. Following the literature analysis reported in the Presentation of the Guidelines, recommendations were drawn up taking account of risk/benefit ratios, levels of evidence, feasibility in pediatric tonsillectomy and baseline risk assessment in the relevant population. Results: Around 50,000 pediatric tonsillectomies, with or without associated adenoidectomy, are performed in France each year. Postoperative morbidity and mortality are non-negligible, despite progress in peri-operative management. The present guidelines address the following questions: 1) What are the indications for tonsillectomy, notably in case of obstructive sleep disorder; 2) What pre-operative assessment is required? 3) What are the technical principles involved? 4) What are the selection criteria for ambulatory tonsillectomy? 5) How should postoperative follow-up be organized? 6) How should complications be managed? Conclusion: The present Clinical Practice Guidelines for pediatric tonsillectomy in France should improve clinical and organizational practices to enhance patient safety. They seek to ensure optimal conditions of care for all children undergoing tonsillectomy. © 2012 Elsevier Masson SAS. All rights reserved.

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10.1016/j.anorl.2012.03.003
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Method

A computerized literature search of the Embase and PubMed data-bases for the period 2005—2009, using the descriptors: ambulatory care, outpatients, surgery, child, ambulatory surgical procedure, tonsillectomy, post-operative complications, and obstructive apnea syndrome/polysomnography, retrieved 726 references. A reference list of abstracts, supplemented by recent articles from the Cochrane Library, was sent on a CD to the Working Group members, each of whom could add further articles from his or her own research (Medline, reference journals).

The Working Group adopted the system used by the GRADE group for critical analysis of the literature described in the presentation of their Clinical Practice Guidelines. The present guidelines were drawn up on the principles laid out below.

The general principles consisted in determining the following levels of quality of evidence (Oxman et al. Grading quality of evidence and strength of recommendations. BMJ. 2004; 328: 1490-9):

- high: further research is very unlikely to change our confidence in the estimate of effect;
- moderate: further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate;
- low: further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate;
- very low: any estimate of effect is very uncertain.

The attribution criteria for levels of evidence were as follows:

- the quality of the data, studies and available documentation is graded according to study design, study quality, consistency, and directness. Types of evidence are categorized as: randomized study=high level of evidence; observational study=low level of evidence; any other type =very low level of evidence;
- grades may be decreased if a serious [−1] or very serious [−2] limitation to study quality, or important inconsistency [−1].

The present guidelines take into account: risk/benefit ratio, level of evidence, recommendation applicability in the context of pediatric tonsillectomy, and baseline risk assessment in the population concerned.

Recommendation

About 50,000 pediatric tonsillectomies, with or without associated adenoidectomy, are performed in France each year (French medical record-keeping program: PMSI, 2008). Postoperative morbidity and mortality remain non-negligible despite progress in peri-operative management.

The present guidelines seek to address the following questions:
• Question 1: What are the indications for tonsillectomy, notably in case of obstructive sleep disorder?
• Question 2: What pre-operative assessment is needed?
• Question 3: What are the technical principles?
• Question 4: What are the selection criteria for ambulatory management?
• Question 5: How should follow-up be organized?
• Question 6: How should complications be managed?

Certain aspects have been deliberately left out here: guidelines for anesthesiological and analgesic management and for the specificities of the roles of the various tonsillectomy procedures have already been published.

Question 1: What are the indications for tonsillectomy?

The two main indications are symptomatic tonsillar hypertrophy and recurrent tonsil infection.

Tonsillar hypertrophy

Tonsillar hypertrophy inducing respiratory sleep disorder. Tonsillectomy (usually associated to adenoidectomy) is the reference attitude to upper airway (UA) obstruction during sleep in children. Respiratory sleep disorder induced by UA obstruction accounts for two-thirds of indications for tonsillectomy. The most severe form is known as obstructive sleep apnea hypopnea syndrome (OSAHS) and usually concerns under-5 year-olds.

The possible implication of tonsillar hypertrophy in the onset of sleep disorder should be assessed on clinical examination: tonsil volume and cranio-facial and UA morphology (high level of evidence).

Positive clinical examination should find hypertrophy of the pharyngeal lymphoid tissue and of the palatine tonsils.

Parents should be interviewed about any nocturnal and/or diurnal signs (Table 1), which may indicate respiratory disorder (moderate level of evidence).

When several such signs are present, other UA obstruction factors and severity criteria should be investigated (high level of evidence).

NB: Snoring unaccompanied by any other signs listed in Table 1 is not an indication for tonsillectomy.

### Table 1 | Signs of respiratory disorder in case of tonsillar hypertrophy (in bold: the most discriminative signs).

<table>
<thead>
<tr>
<th>Nocturnal signs</th>
<th>Signs in awake state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snoring</td>
<td>Difficulty in waking</td>
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<tr>
<td>Respiratory pauses</td>
<td>Irritability on awakening,</td>
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<tr>
<td>Night sweats</td>
<td>hyperactivity, attention and</td>
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<tr>
<td>Enuresis</td>
<td>memory disorder</td>
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<tr>
<td>Parasomnia</td>
<td>Asthenia on awakening,</td>
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<tr>
<td>Agitated sleep</td>
<td>daytime sleepiness</td>
</tr>
<tr>
<td>Abnormal sleep</td>
<td>Morning headache or vomiting</td>
</tr>
<tr>
<td>(head in hyperextension)</td>
<td>Breakfast anorexia</td>
</tr>
<tr>
<td></td>
<td>Mouth breathing</td>
</tr>
<tr>
<td></td>
<td>Late growth disorder</td>
</tr>
</tbody>
</table>

Symptomatic tonsillar hypertrophy without sleep disorder. Tonsillectomy is recommended in bilateral tonsillar hypertrophy with associated oropharyngeal obstruction showing one or more of the following signs (low level of evidence):

- swallowing disorder (dysphagia for lumps);
- phonatory disorder (oropharyngeal voice).

Tonsillectomy may exceptionally be indicated for orofacial developmental abnormality with associated severe low retrobasinguillar tonsillar hypertrophy in under-6 year-olds (low level of evidence).

Infection

Recurrent acute tonsillitis. Tonsillectomy may be considered for:

- recurrent acute tonsillitis: ≥ 3 episodes of infection per year over a 3-year period or 5 over 2 years (French Agency for Health Product Safety (AFSSAPS) recommendations);
- chronic tonsillitis: local (pharyngeal pain, halitosis, inflammatory aspect of the tonsils) and regional (cervical adenopathy) inflammatory signs for ≥ 3 months and resisting medical treatment (low level of evidence);
- recurrent peri-tonsillar abscess (low level of evidence).

Recurrent pharyngitis. Recurrent pharyngitis is not an indication for tonsillectomy (high level of evidence).

Other infections. Tonsillectomy may be considered (low level of evidence) for:

- Marshall syndrome or periodic fever;
- post-streptococcal (group A) acute tonsillitis syndrome (except renal post-streptococcal pathology, in which the efficacy of tonsillectomy has not been proven);
- acute tonsillitis with dyspnea, secondary to infectious mononucleosis;
- Quinsy tonsillectomy associated to oral drainage in parapharyngeal abscess.

Other indications

Unilateral tonsil swelling. If malignancy is suspected (rapid evolution, associated cervical adenopathies, odynophagia), tonsillectomy should be performed urgently to enable the required histologic examinations (high level of evidence).

If the unilateral swelling is isolated, non-evolutive and without clinical signs of malignancy, tonsillectomy is not advised (high level of evidence).

Question 2: What pre-operative assessment is needed?

Assessment of hemorrhage risk

It is recommended that hemorrhage risk be assessed ahead of pediatric tonsillectomy (see the recommendations of the French Society for Anaesthesia and Intensive Care (SFAR) consensus conference, at www.sfar.org):

- pre-operative assessment of hemorrhage risk is founded on precise history-taking to detect individual or
familial history suggestive of hemostatic abnormality and on clinical examination for symptomatology of hemorrhage;
- in case of known or suspected individual or familial history of hemorrhage or if the pre-operative assessment cannot be considered reliable, especially for children under 3 years old, a hemostasis study is to be conducted. If the results of this initial study remain abnormal on checking, more extensive study is to be discussed with a hemostasis specialist;
- if further hemostasis study is advised, the most relevant tests are activated cephalin time and platelet count;
- systematic hemostasis analysis is not required in over-3 year-olds when pre-operative clinical assessment detects no abnormal risk of hemorrhage.

Assessment of respiratory risk
Clinical assessment of peri-operative respiratory risk. In tonsillectomy, especially for obstructive tonsillar hypertrophy, it is recommended to explore for signs of obstruction severity.

Tonsillectomy with or potentially with associated respiratory risk is defined by the presence of ≥ 1 of the following criteria:
- age < 3 years (high level of evidence);
- craniofacial or UA malformation (high level of evidence);
- neuromuscular disease with pharyngeal hypotonia (high level of evidence);
- signs of right heart failure and elevated pulmonary arterial pressure (high level of evidence);
- morbid obesity (high level of evidence);
- metabolic disease with UA submucosal conjunctive tissue infiltration (medium level of evidence);
- respiratory disease following recent upper or lower respiratory tract infection with bronchial hyper-reactivity (very low level of evidence).

Cardiopulmonary exploration (cardiac ECHO, pulmonary radiography) should be performed in case of suspected elevated pulmonary arterial pressure (high level of evidence). Sleep assessment. Analysis of the literature fails to determine the benefit of paraclinical sleep exploration for routine diagnosis of pharyngeal obstruction severity in children; obstructive sleep disorder related to tonsillar hypertrophy should therefore be screened for clinically.

Nevertheless, polysomnography (PSG), which is the reference paraclinical exploration technique, is recommended under the following circumstances:
- doubt as to the efficacy of tonsillectomy: children with morbid obesity, cranio-facial or UA malformation or neuromuscular disease (high level of evidence);
- failure of clinical examination to explain respiratory disorder: absence of tonsillar or adenoid obstacle (high level of evidence);
- elevated surgical risk: hemostasis disorder, cardiac abnormality (high level of evidence).

Abnormal exploration findings should be discussed with a pediatric PSG specialist, to determine the interest of:
- tonsillectomy;
- postoperative exploration.

The indications for and benefit of other sleep studies (nocturnal ventilation polygraphy, pulse oxymetry and pulse transit time) have not been validated in obstructive respiratory sleep disorder associated with tonsillar hypertrophy in children.


Flexible nasolaryngoscopy should be performed to assess the following situations:
- discordance between obstructive symptomatology and standard clinical examination findings;
- polymalformative syndrome;
- suspected multiple anatomic obstacles.

In such situations, CT or MRI imaging can complement UA nasolaryngoscopy.

Question 3: What are the technical principles?

Tonsillectomy
Total tonsillectomy is the usual attitude and may use various techniques: nonelectrical (cold) or finger dissection tonsillectomy (guillotine, cold steel instruments, comb dissector, scissors and snare), or electrocautery (hot) dissection tonsillectomy (mono- or bi-polar diathermy), coblation, laser or harmonic scalpel. In obstructive tonsillar hypertrophy, 1-step partial tonsillectomy removing the culprit part of the tonsils is an acceptable alternative (high level of evidence), and may be performed by electrosurgery, laser, radiofrequency surgery (harmonic scalpel or coblation) or microdebrider. The term "partial tonsillectomy" does not cover tonsillar reduction performed in several steps.

Histologic examination of the tonsils need not be systematic except in suspected malignancy (high level of evidence).

Anesthesia
Recommendations for anesthesia in pediatric tonsillectomy have been published previously (see SFAR consensus conference, at www.sfar.org).

For UA protection, it is recommended to:
- use balanced general anesthesia involving respiratory tract protection;
- ensure optimal control of the respiratory tract using by cuffed tracheal tubes;
- perform extubation in presence of an anesthesiologist after complete awakening (defined as eyes opening in response to request).

Question 4: What are the selection criteria for ambulatory management?

Recommendations previously published for the organization of pediatric ambulatory surgery and patient selection (see recommendations for ambulatory surgery in under-18 year-olds at www.adarpef.org) are presented here as adapted to
tonsillectomy by virtue of the predictability of postoperative course.

It is recommended that ambulatory management be preferred under the following conditions:

• medical and social context permitting;
• appropriate departmental organization;
• possible cross-over to conventional admission or postoperative re-admission in a pediatric environment available at any stage (the converse not being applicable, for reasons of organization and of prior information and informed consent) (very low level of evidence).

Management, whether ambulatory or on an in-patient basis, is to be organized at the anesthesiology consultation at the latest.

Medical criteria
Ambulatory tonsillectomy is feasible if the child:

• is aged more than 3 years;
• is ASA class I or II;
• is free of comorbidity liable to exacerbate the respiratory risks;
• is free of hemostasis abnormality.

In-patient admission is recommended in case of 1 or more of the following criteria:

• clinical criteria for peri-operative respiratory risk;
• hemostasis abnormality;
• respiratory difficulty on anesthesia induction or at awakening in the recovery room: cross-over from ambulatory to in-patient surgery is then recommended.

Social criteria
In case of ambulatory management, it is recommended to make sure that the family has properly understood and accepted the following requirements:

• surveillance at home;
• compliance with postoperative prescriptions;
• procedure in case of postoperative complications.

In case of ambulatory tonsillectomy, it must be ensured that the parents:

• have a translator present at the pre-operative consultation if they are not French-speaking: if there is any doubt as to their understanding, in-patient admission is to be preferred;
• have a telephone available so as to be able to call the emergency number (in France, 15) at any time and to be contacted under conditions allowing mutual understanding of information;
• understand and agree to ambulatory management; in case of categorical refusal or undue anxiety on the part of the parents, in-patient admission is to be preferred.

The child’s own consent should be sought in a manner appropriate to his/her level of understanding (verbal explanations, drawings, etc.). In older children, complete understanding and agreement should be obtained.

If a private car is going to be used at discharge from the out-patient department, the parents need to be told that the presence of a third person as well as the driver is necessary.

Organizational criteria
Recommendations have been previously published for the organization of facilities providing pediatric ambulatory surgery (see www.adarpef.org).

The various parties working in the structure should determine together:

• whether ambulatory tonsillectomy is within their sphere of competence;
• whether the organization in place meets requirements for pediatric ambulatory tonsillectomy.

It is to be borne in mind that there is no regulatory checklist for the performance of ambulatory care. Nor are there recommendations regarding distance from residence or time in care: these parameters are to be determined within each structure according to its existing organizational set-up. See the Formal Recommendations of the SFAR consensus conference (October 2009) at www.sfar.org/t/spip.php?article461.

The following recommendations apply to the organization of day surgery units performing pediatric tonsillectomy:

• consensus on postoperative course is to be reached between surgeon, anesthetist and parents: surveillance duration, complications and side-effects, resumption of oral feeding, and pain treatable at home;
• surgery should preferably be performed in the morning, on a schedule compatible with 6 hours’ surveillance and safe revision surgery if needed;
• anesthesia should take full account of preventing postoperative nausea and vomiting (PONV) and of preoperative planning of good postoperative analgesia;
• oral analgesia should be initiated before discharge;
• at discharge, the parents should be given an information document covering surveillance criteria, resumption of feeding, a round-the-clock contact number in case of problems, the analgesic prescription and the surgical report;
• the parents (or accompanying persons and/or reliable contact persons) must at any time be able to contact a surgery center able to manage the patient, even if this is not the center in which the tonsillectomy was performed;
• the center should, if at all possible, arrange for a phone call to be made on postoperative day one to assess any issues during the first 24 hours following surgery.

Question 5: How should follow-up be organized?

In the recovery room, surveillance unit and intensive care unit
On awakening, recovery room surveillance checks the following criteria:
unimpared ventilation;
• hemodynamic stability;
• normal consciousness;
• absence of pharyngeal bleeding;
• postoperative analgesia and management of PONV.

Discharge from the recovery room should be to a unit appropriate to the above observations (ambulatory department, surveillance or intensive care unit) with appropriate surveillance.

Patients with complications or showing any of the risk factors above should be referred to the surveillance or intensive care unit.

In the ambulatory department
Following tonsillectomy, at least six hours’ surveillance is recommended, to:

• check absence of pharyngeal bleeding;
• assess and treat postoperative pain;
• prevent and treat any PONV;
• ensure resumption of feeding.

Any adverse event observed during surveillance may lead to cross-over to conventional admission.

Before discharge, the parents should receive oral information from the surgeon and the anesthetist, with instructions regarding postoperative pain and the means of assessing and alleviating it. Certain practical details about food (which should be cold, smooth and non-spiced) and drink (which should be cold and non-acid) help avoid unnecessary pain. The importance of systematic scheduled administration of paracetamol and level II analgesics for at least a few days should be stressed. It is recommended not to prescribe NSAIs following tonsillectomy due a suspected elevation of hemorrhage risk.

This information should be backed up by a written document including:

• a prescription for analgesics and other drugs to be initiated at discharge;
• instructions regarding the return home (or equivalent), notably as concerns surveillance and resumption of feeding;
• a reminder of follow-up appointments with the surgeon and family doctor;
• a hospital or surgery and anesthesia report.

Discharge is to be signed by the surgeon and/or anesthetist at postoperative hour 6 if the following criteria are met:

• the tonsils are free of blood on pharyngeal examination;
• pain is under control;
• there is no PONV;
• temperature is < 38 °C
• the parents (or accompanying persons and/or reliable contact persons) have reliably understood the information about home surveillance.

In an in-patients unit
On recovery room discharge, in-patients unit surveillance should be adapted to the child’s health and respiratory status.

If respiratory status is satisfactory and there are no comorbidities entailing respiratory risk, postoperative surveillance has the same objectives as described above.

In case of ≥1 peri-operative respiratory risk factor, complementary continuous pulse oximetry surveillance should be undertaken for 24 hours.

Before discharge, the parents should receive oral information from the surgeon and the anesthetist and written documents, as above.

If complementary surveillance detects no significant episode of desaturation, discharge is to be signed as above.

At home
It is recommended that the prescribed analgesic treatment be continued for several days (high level of evidence): see AFSSAPS guidelines (June 2009).

In case of onset of hemorrhage, the emergency number (15) should be called; referral and transport to a suitable hospital structure will be arranged without delay.

Analysis of the literature provides no recommendations as to diet following tonsillectomy (low level of evidence). If, however, a specific diet is prescribed, it should favor cold liquids, blended foods and sweet foods and avoid acid and dry food (very low level of evidence).

Question 6: How should complications be managed?

Primary complications
The main primary complications are:

• respiratory complications;
• PONV;
• hemorrhage.

Management of respiratory complications and PONV follows the recommendations of the SFAR consensus conference (www.sfar.org).

Hemorrhage is the most common immediate complication, whatever the tonsillectomy technique (high level of evidence).

It should be borne in mind that early bleeding usually occurs within the first 6 hours: i.e., the minimum surveillance time recommended following ambulatory surgery.

The risk of bleeding requires extended continuous attention in the form of repeated careful examination of the tonsil recesses (high level of evidence).

Hemorrhage requires in-patient surgical revision without delay.

In severe forms, ligation of the external carotid axis is to be considered on a case-by-case basis (high level of evidence). If facilities permit, embolization is an alternative.

Secondary complications
The main secondary complications are:

• late hemorrhage;
• painful dysphagia inducing risk of dehydration;
• persistent respiratory obstruction.

Late hemorrhage
Onset of late hemorrhage requires rapid re-admission to an appropriately equipped center:

• previous bleeding is hard to quantify: general health assessment and pulse taking are essential; blood pressure and hemoglobinemia (which can be measured automatically in a matter of minutes) are useful for monitoring evolution, but drop too late to serve as alarms;
• bloody sputum is to be interpreted according to context and requires rapid ENT examination and in-hospital surveillance, usually for 24 hours when not associated with bleeding and fall in erythrocyte count;
• any clot filling the tonsil should be removed to explore for bleeding;
• transfusion or iron supplementation may be required.

In case of bleeding, surgical revision should not be delayed, taking account of the following risks:

• anesthesia induction on a full stomach;
• possible anemia-hypovolemia.

Peripharyngeal arterial bleeding is exceptional but life-threatening. Alarm signs are:

• peroperative perforation of the pharyngeal wall;
• onset of severe pharyngeal bleeding;
• hematoma at the base of the tongue, roof of the mouth, soft palate or lateral pharyngeal wall;
• failure of one or more re-operations;
• bleeding later than day 12-15 despite the tonsils being nearly healed.

In such cases, hemostasis is achieved by ipsilateral cervicotomy and external carotid ligation downstream of the superior thyroid artery. The pharyngeal bleeding should then cease; if not, the carotid bulb and internal carotid artery should be explored for some anatomic abnormality.

Painful dysphagia entailing risk of dehydration
Painful dysphagia, which is common even despite analgesia, usually induces refusal to feed and may lead to dehydration. Admission for rehydration and balanced analgesia is recommended.

Persistent respiratory obstruction
When tonsillectomy was performed for obstructive respiratory disorder, it is recommended that resolution be checked at later follow-up.

If respiratory signs persist:

• the cause of the obstruction should be explored for on clinical examination plus flexible nasolaryngoscopy;
• respiratory polysomnography should be considered, depending on the clinical findings.

Other complications
Other complications may follow tonsillectomy.

Whatever the onset mechanism, treatment (not detailed here) aims primarily to prevent:

• palatine uvula edema or trauma or pillar trauma;
• dental trauma, superficial burning (tongue or commissure of the lips), velar or velopharyngeal scarring;
• bronchopneumopathy and pulmonary abscess by inhalation;
• C1-C2 subluxation (or Grisel’s syndrome) by forced neck extension;
• subcutaneous cervical emphysema due to pharyngeal mucosal wound;
• altered voice, transitory or definitive velar insufficiency;
• dysgeusia,
• velopharyngeal stenosis.

Conclusion—perspectives

The present guidelines for clinical practice in pediatric tonsillectomy in France, drawn up on the basis of the methodological recommendations of the French health authorities (Haute Autorité de la Santé), are intended to improve professional and organizational practices oriented toward the safety of the child patient.

They aim to ensure optimal conditions of management for all children undergoing tonsillectomy.

Some issues remain, as the literature does not provide a consensus on all of the questions raised: notably, the benefit associated with polysomnography ahead of tonsillectomy in children and the evidence for alternatives.

Future clinical studies should contribute to the assessment of other simple non-invasive specific explorations that can be applied on an ambulatory basis. If studied in a cohort representative of the pediatric population routinely undergoing tonsillectomy, they could improve the study of obstructive sleep disorder in children.

A hospital-based clinical research program to validate an interview score predictive of the severity of obstructive disorder associated with tonsillar hypertrophy in children is an interesting research perspective.