Identification of High-risk Tonsillectomy and Adenoidectomy

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ABSTRACT

Objective: To identify children who were at risk to postoperative complications after tonsillectomy and/or adenoidectomy, and to propose a guideline for care giving of this group of patients.
Methods: Retrospective chart study of children who underwent tonsillectomy and/or adenoidectomy and required special postoperative care was performed from August 1999 to March 2005. All children were treated under supervision of the authors at the Department of Otolaryngology, Faculty of Medicine Siriraj Hospital, Mahidol University.
Results: One hundred and twenty-nine children were operated during the study period. One hundred and twenty-three charts were retrievable. Forty-seven children were included in the series. Four categories of patients, i.e., very young-age group, intensive care unit group, extended admission group, and postoperative bleeding group, were identified. Eleven children (23.4%) whose ages were less than 36 months were observed in post-anesthetic recovery unit (PACU) for 5-6 hours with oxygen saturation monitoring and oxygen supplementation. Fourteen children (29.8%) were admitted to pediatric intensive care unit (PICU) with the most common indication of morbid obesity (64.3%). Four children needed interventions, which were two intravenous dexamethasone injections and two temporary continuous positive airway pressure (CPAP) administrations in PICU. Twenty children (42.6%) had extended admission because of postoperative fever and inadequate oral intake. However, every one of them improved within 48 hours postoperatively. Two children (4.2%) had minor postoperative bleeding and one of them needed bleeding control.
Conclusion: Tonsillectomy and adenoidectomy are procedures of low morbidity in healthy children. However, very young patients and those with high-risk of co-morbidities are considered to have high chance of compromised airway and inadequate oral intake. Besides our routine admission, we suggest that children under the age of 36 months need close observation for 5-6 hours in PACU. Admission in PICU is probably necessary for children who have high-risk of co-morbidities such as morbid obesity, asthma, cardiac diseases, neuromuscular disorders, craniofacial anomalies. Adequate oral intake is needed before removing intravenous fluid line and a consideration of discharge. Extended admission is unnecessary for postoperative fever, which mostly disappears within 48 hours.
Keywords: Tonsillectomy; Adenoidectomy; high risk; Complication

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Tonsillectomy and adenoidectomy (T&A) have been the most common ENT procedures performed in children. In western countries, these procedures are preferred to be done as ambulatory surgery. However, the justification of outpatient care for all children undergo T&A remains questionable. At our institution, T&A have been essentially in-patient procedures by policy. Besides the regular postoperative care, there are some children who require special treatment such as close respiratory observation, intervention, and prolonged fluid supplement. To identify this group of children and create a guideline of treatment, we performed a retrospective chart review of our patients who underwent T&A and had adverse events postoperatively or required special treatment during hospitalization.

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MATERIALS AND METHODS

A retrospective chart review was performed on children who underwent tonsillectomy and/or adenoidectomy under supervision of the authors at the Department of Otolaryngology, Faculty of Medicine Siriraj Hospital, Mahidol University from August 1999 to March 2005. T&A were routinely performed as inpatient procedures with postoperative overnight observation. Normally, the patients would be observed in the post-anesthetic recovery unit (PACU) for 1-2 hours before transferred to ordinary wards. Majority of patients could be discharged the following morning after they had adequate oral intake. The children who deviated from routine clinical path or needed special interventions postoperatively were included in the study. Data collection included demographic information, details of the procedures, adverse events, interventions and final outcome of the treatment.

TABLE 1. Four groups of patients who were included in the study and needed special postoperative care.
(PICU= Pediatric intensive care unit)

Groups of patients	Number	%
Extended admission	20	42.6
PICU admission	14	29.8
Very young age (<3 years)	11	23.4
Postoperative bleeding	2	4.2
Total	47	100

RESULTS

One hundred and twenty-nine children underwent tonsillectomy and/or adenoidectomy during this six-year period. One hundred and twenty-three charts were retrieved. Forty-seven children were found to match our inclusion criteria; 44 of which undertook T&A and three received only adenoidectomy. They were divided into four groups, namely: very young age group, intensive care unit group, extended admission group, and postoperative bleeding group (Table 1). Eleven children (23.4%) were under prolonged observation period of 5-6 hours in Post Anesthetic Recovery Unit (PARU) because of their very young age (less than three years old), before being transferred to ordinary wards. These young children received monitoring and oxygen supplementation in PACU while waiting for the full recovery from general anesthesia. Observation period in PARU of these young children was uneventful. Fourteen children (29.8%) were admitted to Pediatric Intensive Care Unit (PICU) under the most common indication of morbid obesity (64.3%). The indications for PICU admission are shown in table 2. Of these 14 children, two had partial upper airway obstruction and temporary oxygen desaturation, which improved after oxygen supplementation and intravenous dexamethasone injections. Continuous positive airway pressure (CPAP) was temporarily administrated in two cases: one child with morbid obesity, and the other, a one-year and three-month old infant who had severe obstructive sleep apnea syndrome (OSAS). No intubation was done. Twenty children had their discharge delayed (42.6%): 10 cases (50%) with prolonged fever, 6 cases (30%) had inadequate oral intake, and 4 cases (20%) had both conditions.

All children who initially had poor oral intake could resume adequate diet within 48 hours. In every case, fever disappeared within 48 hours without any sequelae during the period of observation. Age, sex, procedures, and co-morbid conditions were not found to be risk factors of postoperative fever and poor oral intake. Postoperative bleeding was reported in two healthy cases with OSAS. The first case was a 5-year-old girl who had immediate bleeding at the lower pole of the right tonsil in the recovery room. The patient was then sent to the operating room for bleeding control under general anesthesia. Consequently, her postoperative observation was uneventful and she was discharged on the following day. The second case was 11-year-old girl who had only minor bleeding from right tonsillar wound on the 8th postoperative day, and it was spontaneously resolved without any intervention. Eventually, all children successfully recovered from these adverse events and were discharged from the hospital.

TABLE 2. Indications for admission in PICU

Indications for admission in PICU	Number	%
Morbid obesity	9	64.3
Asthma	2	14.3
Severe OSA and very young age (1y3m)	1	7.2
Cerebral palsy with tracheal stenosis	1	7.2
Atrial septal defect	1	7.2
Total	14	100

DISCUSSION

Tonsillectomy and adenoidectomy are procedures that have low morbidity. Conditioned by the coverage of health by insurance companies, in most western countries surgeons prefer to perform T&A as an outpatient surgery. Many studies showed the safety and cost-effectiveness of the outpatient procedures in healthy children.[1-4] However, not all children can be treated uneventfully on outpatient basis. Since the majority of our patients live far from the hospital and the cost of inpatient admission is much cheaper than that in western countries, our policy is therefore to admit all patients who undergo T&A for safety reasons. Nevertheless, some children need special care during hospitalization, such those with high chance of compromised airway or poor oral intake.

Nowadays, T&A are more frequently done in patients with obstructive sleep apnea syndrome (OSAS). Postoperative tissue edema and inadequate recovery from general anesthesia may result in compromised airway, which requires close respiratory monitoring and/or airway intervention. Normally, this complication does not occur except in high-risk group. This group of children has potential airway collapse from other OSAS contributing factors that still remain in spite of removal of tonsils and adenoids. Rosen GM and colleages[5] identified high-risk clinical criteria for the OSAS patients who underwent T&A as follows: aged less than two years, craniofacial anomalies affecting pharyngeal airway, failure to thrive, hypotonia, cor pulmonale, morbid obesity, and previous upper airway trauma or high risk polysomnography criterias. They suggested that patients with these high-risk criteria tend to have postoperative airway compromise and should have overnight observation and apnea monitoring.

Infantile OSAS due to obstructive adenoids and tonsils does occur in infants. Unique characteristics of OSAS in this age group include: male predominance, high incidence of preterm infants, failure to gain weight and high recurrence rate after surgery.[6] Because of their small size, these patients have little reserve to combat the effects of general anesthesia and surgery that simultaneously introduce the risks of airway compromise, dehydration and bleeding. Studies reported a higher incidence of postoperative complications, 7-8% requirement for airway intervention, 5-8.6% prolonged time to resume oral diet and dehydration, in children younger than three years of age.[7-9] Consequently, admission and a well-planned special post-operative care are highly recommended. For example, extention of postoperative observation in PARU for 5-6 hours before transferring patients to ordinary wards should be administrated. Oxygen supplementation and oxygen saturation monitoring could be provided to the patients in PARU while waiting for their full recovery from anesthesia and prompt to have airway intervention if needed. With this strategy in our series, all eleven young children had full and safe recovery from anesthesia without any airway intervention before transferring to ordinary wards.

The prevalence of obese children in Thailand has risen.[10,11] Obese children with OSAS who undergo T&A show a marked improvement in respiratory disturbance index and in quality of life with no change in BMI.[12,13] Therefore, T&A should be performed in obese children with OSAS without waiting for the effect of weight reduction. In our series, temporary CPAP was administered postoperatively because of temporary oxygen desaturation in one of the nine morbidly obese children observed in PICU. Spector A et al.[14] reported three cases of airway interventions, two BIPAPs and one intubation, in his fourteen morbidly obese children admitted to PICU. Althought those children might have higher chance for postoperative airway intervention than normal children, it was not as risky as many believed. They suggested that routine PICU admission was not warranted for most morbidly obese patients because most of airway interventions could be safely administered in a surgical floor bed of their institute.

Selection patient for admission in PICU depends on comorbid conditions, the background, and facilities of each institute. Ross AT et al.[8] reported that 44% of patients who needed treatment interventions did not have associated medical comorbidities to account for their respiratory compromise, and 41% of patients admitted in ICU did not require any special intervention. There were only four therapuetic interventions (28.6%) in our patients admitted to PICU (two dexamethasone injections and two CPAP). Identifying the patients who really need PICU is the key for effective postoperative care. Patients with comorbid conditions that reduce the size of the oropharyngeal airway (e.g., morbid obesity, hypotonia, craniofacial anomalies, very young age) or have other cardiopulmonary underlyings (e.g., asthma, cardiac diseases) are prone to have airway compromise and should be therefore considered to receive postoperative intensive care.

Background and facilities of an ordinary ward and a PICU are different and should be considered in each institute. Availability of equipment, such as oxygen supplementation, monitorings and airway intervention instruments and well-trained personnel for early detection and management of airway problem are crucial for postoperative intensive care especially in risky cases. If the facilities of the ordinary ward is limited and not well prepared for special situations, PICU admission may be needed.

Inadequate oral intake was found in ten cases and was responsible for 50% of the single and combined reasons for prolonged admission in our series. This finding is in agreement with the result of Ross AT et al.[8] that insufficient oral intake was the most common reason for extended admission (59%), and dehydration was also a major reason for readmission (3.1%).[8] Since young children have limited hemodynamic reserve, removal of intravenous fluid line should be withheld until they have adequate oral intake. In our series, all patients could have adequate oral intake within 48 hours and no readmission due to dehydration was reported. Postoperative fever was also common and being 70% (14 cases) of the single and combined reasons for extended admission. From our data, postoperative body temperature might elevate for 24-48 hours and then gradually decreased to normal level without any problem. Therefore, postoperative fever for 24-48 hours is predictable, and it is not necessary to extend the observation if there is no abnormality detected. No parameter of our patient was demonstrated to be a risk factor of extended admission from prolonged fever and inadequate oral intake.

In our series, post-operative bleeding was reported in two cases (1.6%) from 124 children and only needed one intervention for bleeding control. It was minor and easily managed. The incidence of postoperative bleeding has been reported about 1.5-4.1% and occurred mostly within the first 8 hours.[15,16] It occurred more common in adult group than in the pediatric group.[17] Coagulography may be performed to identify the risk of unnecessary bleeding but the benefit is questionable. The preoperative coagulation profile has been well studied, and numerous studies have shown that no additional information other than a bleeding history is necessary for the general pediatric population and that coagulography should be performed only in selected cases.[18,19] The preoperative coagulography has a low positive predictive value in detecting occult bleeding disorders and does not appear to be cost-effective.[20] Because of its low incidence and severity, bleeding problem seems not to be as important as airway compromise and inadequate oral intake. However, postoperative bleeding in small children may be fatal.

CONCLUSION

Very young age patients and patients with high-risk comorbidities were identifed to have potential risk of postoperative compromised airway and inadequate oral intake. Children younger than three years old should have extended period of close observation in PARU for 5-6 hours with oxygen supplementation, and monitored until they fully recover from general anesthesia. High-risk comorbidities such as morbid obesity, asthma, cardiac diseases, hypotonia, and craniofacial anomalies may need postoperative monitorings in PICU and possible airway interventions. Adequate oral intake must be achieved before removing intravenous fluid line and consideration of discharge especially in young children. Postoperative fever within 48 hours is predictable without any abnormality.

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บทคัดย่อ

การค้นหากลุ่มเสี่ยงในการผ่าตัดทอนซิลและอดีนอยด์ (ทอนซิลคอหอย)

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วัตถุประสงค์: เพื่อค้นหากลุ่มผู้ป่วยเด็กที่มีความเสี่ยงสูงที่จะเกิดผลแทรกซ้อนหลังการผ่าตัดทอนซิลและอดีนอยด์ (ทอนซิลคอหอย) และนำเสนอแนวทางในการดูแลรักษาผู้ป่วยเด็กกลุ่มนี้

วิธีการ: ทำการศึกษาย้อนหลัง ช่วงเวลาตั้งแต่ สิงหาคม 2542 จนถึงมีนาคม 2548 ในกลุ่มผู้ป่วยเด็กที่ได้รับการผ่าตัดทอนซิลและ/หรืออดีนอยด์ออกและได้รับการดูแลรักษาหลังผ่าตัดเป็นพิเศษโดยผู้ป่วยในกลุ่มศึกษาทั้งหมดอยู่ภายใต้การดูแลรักษาของผู้ประพันธ์ในภาควิชาโสต นาสิก ลาริงซ์วิทยา คณะแพทยศาสตร์ศิริราชพยาบาล มหาวิทยาลัยมหิดล

ผลการศึกษา: สามารถค้นพบแฟ้มประวัติได้จำนวน 123 แฟ้มจากผู้ป่วยเด็กทั้งหมดที่ได้รับการผ่าตัดในช่วงเวลาดังกล่าวจำนวน 129 ราย มีผู้ป่วยเด็กจำนวน 47 รายที่เข้าได้กับข้อกำหนดในการศึกษาครั้งนี้ โดยแบ่งผู้ป่วยเป็น 4 กลุ่มได้แก่ กลุ่มเด็กเล็ก กลุ่มรับไว้ในหออภิบาลผู้ป่วยวิกฤต กลุ่มนอนโรงพยาบาลนาน และกลุ่มที่มีเลือดออกหลังผ่าตัด กลุ่มเด็กเล็ก มี 11 รายคิดเป็นร้อยละ 23.4 ทั้งหมดอายุน้อยกว่า 36 เดือนได้รับการดูแลรักษาเป็นพิเศษเฝ้าดูอาการในห้องพักฟื้นหลังผ่าตัดนานขึ้นเป็นเวลา 5-6 ชั่วโมง โดยได้รับการตรวจวัดความเข้มข้นออกซิเจนในเลือดและให้ออกซิเจนในขณะเฝ้าดูอาการ กลุ่มรับไว้ในหออภิบาลผู้ป่วยวิกฤตมี 14 รายคิดเป็นร้อยละ 29.8 โดยมีปัญหาโรคอ้วนรุนแรงเป็นข้อบ่งชี้ที่พบบ่อยที่สุดจำนวนร้อยละ 64.3 ในหออภิบาลผู้ป่วยวิกฤตมีผู้ป่วย 4 รายที่จำเป็นต้องได้รับการรักษาเป็นพิเศษประกอบด้วยการให้ยา dexamethasone ฉีดเข้าเส้นเลือดจำนวน 2 ราย และใช้เครื่อง continuous positive airway pressure (CPAP) ชั่วคราวจำนวน 2 ราย กลุ่มนอนโรงพยาบาลนาน 20 รายคิดเป็นร้อยละ 42.6 จากข้อบ่งชี้หลักคือมีไข้หลังผ่าตัดและกินอาหารได้ไม่เพียงพอ อย่างไรก็ดีปัญหาดังกล่าวจะทุเลาภายใน 48 ชั่วโมง กลุ่มเลือดออกหลังผ่าตัดมี 2 รายคิดเป็นร้อยละ 4.2 โดยมีเพียง 1 รายที่จำเป็นต้องกลับไปทำการห้ามเลือดอีก

สรุป: การผ่าตัดทอนซิลและอดีนอยด์ในเด็กปกติมีผลแทรกซ้อนน้อย อย่างไรก็ดีในกลุ่มเด็กอายุน้อยมากและกลุ่มเด็กที่มีโรคร่วมซึ่งมีความเสี่ยงสูงมีโอกาสจะเกิดปัญหาทางเดินหายใจและการกินอาหารได้ไม่เพียงพอ ดังนั้นนอกจากการรับผู้ป่วยเด็กหลังการผ่าตัดเพื่อเฝ้าดูอาการในโรงพยาบาลแล้ว กลุ่มผู้ป่วยเด็กเล็กที่อายุน้อยกว่า 36 เดือนสมควรได้รับการเฝ้าดูอาการในห้องพักฟื้นหลังผ่าตัดนานขึ้นเป็นเวลา 5-6 ชั่วโมง กลุ่มผู้ป่วยเด็กที่มีโรคร่วมซึ่งมีความเสี่ยงสูง เช่น อ้วนรุนแรง หอบหืด โรคหัวใจ โรคกล้ามเนื้อและระบบประสาท และความผิดปกติของกะโหลกศีรษะและใบหน้าอาจจำเป็นต้องรับไว้ในหออภิบาลผู้ป่วยวิกฤต ก่อนถอดสายน้ำเกลือออกและพิจารณาให้กลับบ้านจะต้องแน่ใจว่าเด็กสามารถรับอาหารทางปากได้เพียงพอ ไข้หลังผ่าตัดมักหายได้เองภายใน 48 ชั่วโมงโดยไม่จำเป็นต้องเฝ้าดูอาการในโรงพยาบาล