



Changes and consistencies in the epidemiology of pediatric adenotonsillar surgery, 1996-2006

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ABSTRACT

Objective: Determine changes in rates for pediatric adenotonsillar procedures over time with attention to infectious indications.

Study Design: Historical cohort study.

Methods: The National Survey of Ambulatory Surgery (NSAS) and the National Hospital Discharge Survey (NHDS) 1996 and 2006 releases were examined, extracting all cases of pediatric tonsillectomy, adenotonsillectomy, and adenoidectomy. The aggregate numbers and rates of adenotonsillar procedures performed overall and specifically for chronic infectious etiologies were determined. These procedure rates were then compared to determine differences in performance rates between 1996 and 2006.

Results: In 1996, an estimated 441,870 ± 23,315 children underwent some form of adenotonsillar surgery in the ambulatory and inpatient settings (60,034 ± 6,994 tonsillectomies, 255,217 ± 18,960 adenotonsillectomies and 126,619 ± 11,627 adenoidectomies), while in 2006, the total rose to 695,029 ± 36,979 children (58,111 ± 9,645 tonsillectomies, 506,778 ± 32,054 adenotonsillectomies and 129,540 ± 15,714 adenoidectomies). However, when examined according to infectious indications, a notable decline in the population rate of tonsillectomy from 0.62 per 1,000 children in 1996 to 0.53 per 1,000 in 2006 was found (p=0.252). Moreover, the larger decline in the rate of adenotonsillectomy for infectious indications from 2.20 per 1000 to 1.46 per 1000 was significant (p=0.003). There was no significant change adenoidectomy rates for chronic infectious etiologies (0.25 versus 0.21 per 1000, p=0.326).

Conclusion: Although there was an overall increase in the rate of performance of adenotonsillar surgery, population adjusted performance rates of these procedures specifically for infectious indications declined from 1996 to 2006.

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INTRODUCTION

- Throughout the 2,000 year history of adenotonsillar surgery, controversy has surrounded the procedures' indications, efficacy and impact on patients' quality of life.¹⁻³
- Statements made at a 2009 United States presidential press conference on national health care reform carried the implication that currently physicians are more inclined to pursue courses of action based not on the best interests of the patient but rather on the financial incentives and rewards.
- The process of physician's clinical decision-making for a hypothetical child is stated as "[looking] at the reimbursement system and [saying] to himself: you know what? I make a lot more money if I take this kid's tonsils out."
- Given that there may be a public misconception about the evolving indications for adenotonsillar surgery and the paucity of data on the rates of adenotonsillar surgery in the United States, we sought to quantify incidence and indications for various tonsil and adenoid procedures on a national level.
- Additionally, we aimed to address the statements that suggested that surgeons may have been preferentially selecting tonsillectomy for children with chronic tonsillitis.
- If indeed physicians have recently been over-performing poorly-indicated adenotonsillar surgery based on financial motivations, this should be reflected in the comparative trend data for rates of adenotonsillar surgery done for infectious indications over time.

METHODS

- Four data sets served as the data sources for the patient populations. Data for year 1996 were obtained from both the NSAS and the NHDS, 1996 releases. Similarly, data for year 2006 were obtained from the analogous NSAS and NHDS data sets, 2006 releases.
- Estimates of the rates and characteristics for both inpatient and outpatient pediatric (<18.0 years) tonsillectomy, adenotonsillectomy and adenoidectomy procedures were obtained.
- From this population of pediatric patients, the numbers of cases of tonsillectomy, adenotonsillectomy and adenoidectomy were determined using the appropriate complex samples algorithm. The rate for each procedure for each year was determined by adjusting the procedural frequency for the US Census pediatric population for the corresponding year.
- To determine the diagnostic indications for adenotonsillar surgeries, International Classification of Diseases version 9 (ICD-9) diagnosis codes were assessed.
- Patients were considered to be undergoing adenotonsillar surgery for infectious reasons (or at least partly infectious reasons) if *any one* of the patients' corresponding ICD-9 codes were for a corresponding diagnosis of chronic adenotonsillitis.

- The raw number of cases and rates (per 1000 children) of pediatric tonsillectomy, adenotonsillectomy and adenoidectomy according to an infectious diagnosis were determined.
- The rates of each surgical procedure according to infectious indication were then compared with student's t-test to determine if differences in performance rates occurred between 1996 and 2006. Statistical significance was set at p<0.05.

RESULTS

- In 1996, an estimated 417,043 (mean age, 6.8 years, 49.8% male) and 24,827 children (6.1 years, 58.3% male) underwent adenotonsillar surgery in the ambulatory and inpatient settings, respectively.
- In 2006, an estimated 682,598 (6.3 years, 51.8% male) and 34,573 (7.3 years; 65.8% male) children underwent adenotonsillar surgery in the ambulatory and inpatient settings, respectively.
- Table 1** demonstrates the overall estimates of adenotonsillar procedures performed for all indications in the ambulatory and inpatient settings as well as aggregate estimates.

Table 1
Overall estimates of procedures performed, 1996 versus 2006, all indications

Procedure	1996	2006
	Aggregate, n (SE)	Aggregate, n (SE)
Procedure		
Tonsillectomy	60,034 (6994)	58,711 (9645)
Adenotonsillectomy	255,217 (18,960)	506,788 (32,054)
Adenoidectomy	126,619 (11,627)	129,540 (15,714)
Total	441,870 (23,315)	695,029 (36,979)
Rate (per 1000 children)*		
Tonsillectomy	0.62 (0.08)	0.53 (0.11)
Adenotonsillectomy	2.20 (0.19)	1.46 (0.19)
Adenoidectomy	1.83 (0.17)	1.76 (0.21)

SE, standard error.
*Adjusted for U.S. Census estimates for 1996 or 2006 as appropriate.

- Figure 1** presents the relative changes in the percentage of ambulatory versus inpatient adenotonsillar procedures between the two study years.
- Table 2** demonstrates the number and rate of adenotonsillar procedures performed for infectious indications, comparing 1996 to 2006.
- Though there was a notable decline in the aggregate rate of tonsillectomy from 1996 to 2006, from 0.62 per 1000 children to 0.53 per 1000, this was not statistically significant (p=0.252). However, the decline in adenotonsillectomy for infectious indications from 2.2 per 1000 to 1.46 per 1000 was significant (p=0.003).
- There was no statistically significant change in the rate of adenoidectomy for infectious indications (p=0.326).

- In summary, although there was an overall increase in the rate of performance of tonsil and adenoid procedures overall, the population adjusted rates of performance of these procedures for infectious indications declined from 1996 to 2006, with a statistically significant decline in adenotonsillectomy for infectious indications.

Table 2
Number and rate of procedures performed for a chronic **INFECTIOUS** indication, 1996 and 2006

Procedure	1996	2006
	Aggregate, n (SE)	Aggregate, n (SE)
Tonsillectomy	42,756 (5686)	39,060 (7790)
Adenotonsillectomy	151,970 (13,006)	107,673 (13,865)
Adenoidectomy	NA (NA)	15,500 (5490)
Rate (per 1000 children)*		
Tonsillectomy	0.62 (0.08)	0.53 (0.11)
Adenotonsillectomy	2.20 (0.19)	1.46 (0.19)
Adenoidectomy	NA (NA)	0.21 (0.07)

SE, standard error; NA, no adenoidectomy alone procedures were sampled.
*Adjusted for U.S. Census estimates for 1996 or 2006 as appropriate.

DISCUSSION

- Accurate data on the incidence of adenotonsillar procedures have historically been difficult to collect. It has been suggested in the American medical literature that the incidence has dramatically decreased in the past half century since its peak in 1959, when as many as 1.4 million such procedures were performed.⁴⁻⁶
- The inclusion of both NSAS and NHDS data provides not only the most recent information on several of the most frequently performed otolaryngologic procedures nationally, but also incorporates both inpatient and outpatient datasets, which to our knowledge has not been previously reported for adenotonsillar surgery.
- The hypothetical scenario of the pediatric tonsillitis patient introduced at the presidential press conference highlighted yet another controversial aspect of pediatric tonsillectomy specifically for infectious indications: reimbursement.

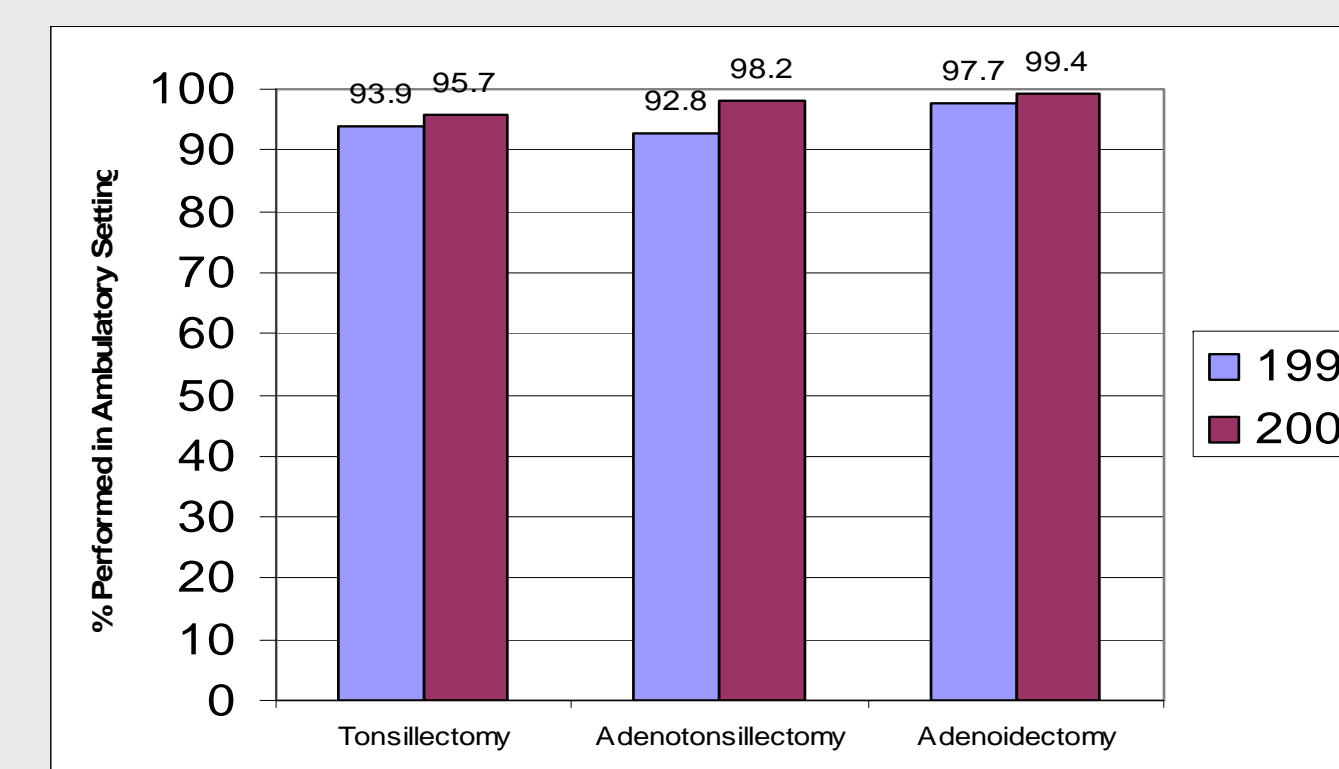


Figure 1. Percentages of ambulatory (relative to inpatient) adenotonsillar surgery in 1996 and 2006.

- These remarks emphasize some of the misconceptions held by the politicians and policymakers with regard to clinical decision-making by otolaryngologists both on an individual case-by-case basis and broadly as a specialty.
- The assertion that a revamped healthcare system would provide incentive for doctors "[to make] those decisions just based on whether you really need your kid's tonsils out or whether it might make more sense just to change – maybe they have allergies" implies that physicians are making recommendations based not on evidence-based algorithms but rather on the financial gains of each option. Accordingly, if profit were the motive, one would expect increasing rates of adenotonsillar procedures for infectious indications over time.
- However, we found that while the total aggregate numbers of adenotonsillar procedures have increased from 1996 to 2006, the rates and incidence of adenotonsillar surgery for chronic infectious etiologies have in contradistinction actually *decreased*. Moreover, the aggregate rate of adenotonsillectomy for chronic infectious indications significantly declined in the ten year period, indicating that otolaryngologists are in fact currently *less likely* to operate on a child for chronic throat infections compared to the previous decade.
- These data argue against assertions that that care providers are less inclined to pursue medical therapeutic options for chronic adenotonsillitis in favor of potentially more lucrative surgical interventions. Rather, otolaryngologists have displayed consistency and restraint with regard to the management of chronic throat infections in children over the past ten to fifteen years.
- In contrast to the relative stability of the incidence of tonsillectomy from 1996 to 2006, we found that pediatric adenotonsillectomy incidence nearly doubled. This is likely due in large part to the recent recognition of the morbidity of obstructive sleep apnea and sleep disordered breathing,⁴ as previously shown.⁷
- In the current era of rapidly changing healthcare environment with compelling momentum shifts to evidence-based medicine, cost containment and healthcare reform, it is more important than ever to elaborate and rely upon factual data when estimating procedure performance rates and indications for procedures. The current data demonstrate a consistent rate of performance of pediatric adenotonsillar procedures over time for infectious indications with, in keeping with the evidence base, a slight decline in the application of adenotonsillar procedures for purely infectious indications.

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