



Pediatric adenoid surgery in Sweden 2004–2013: Incidence, indications and concomitant surgical procedures



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ABSTRACT

Objectives: To describe the incidence and indications of adenoid surgery and concomitantly performed ENT surgical procedures in a nationwide cohort covering several years of practice.

Methods: A retrospective study based on data from the National patient registry in Sweden. All children born from 1st of January 2004 to December 31st, 2013 who underwent adenoidectomy for the first time in Sweden during 2004–2013 were included in the study. Patient characteristics (age and gender), indications for surgery and performed ENT surgery were evaluated.

Results: 40,829 children underwent adenoid surgery during the studied period. Of these, 24,537 (60%) were boys. Mean and median age at surgery in the studied population was 4 years and 3.5 years respectively for both boys and girls. The most frequently performed surgical procedure was adenotonsillar surgery 43% (n = 17,434) followed by solitary adenoid surgery 26% (n = 10,749). The most frequent registered indication was hypertrophy 60% (n = 24,422) followed by hypertrophy and otitis media 21% (n = 8425). The highest age related incidence for all types of adenoid surgery taken together was 2–4 years of age for both genders. Boys had higher incidence rates than girls for all ages and all types of surgery except at eight years of age.

Conclusions: The main findings were that adenoidectomy most commonly was performed together with surgery of the tonsils on the indication hypertrophy, that adenoid- and adenoid related ENT surgery were most commonly performed between 2 and 5 years of age and that the incidence in surgical rates was higher for boys than girls. There seem to be large unwarranted variations between countries regarding incidence rates and we believe that there is a need for further studies in order to establish recommendations for best practice regarding adenoid and related ENT surgeries.

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1. Introduction

ENT surgery such as adenoid surgery, tonsil surgery, and tympanic tube insertion represents some of the most frequently performed surgical procedures in children. Due to their frequency there is an obvious need for both healthcare practitioners and health care funders to monitor current practice, trends and outcome in order to guarantee that medical practice in all aspects is efficient. In recent years the Swedish National Tonsil Surgery Register (SNTSR) has provided valuable data on the epidemiology,

outcome, trends, post-operative morbidity and complications of pediatric tonsil surgery in Sweden [1–3].

Another Swedish national registry for tympanic tube insertion is underway collecting similar data. Regarding adenoid surgery no such registry is in place. Despite the fact that thousands of children undergo adenoid surgery every year in Sweden we lack updated knowledge on important aspects of adenoid surgery such as incidence (especially related to age and gender), indications, outcome, postoperative morbidity and complications, concomitantly performed other ENT surgery, and trends. Studies with primary focus on adenoid surgery have been sparse. Most often aspects of adenoid surgery have been studied in relation to otitis media management or in relation to the management of tonsil related diseases.

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Large variations in adenoidectomy surgical rates have been reported, both between countries and ages [4–6] but these studies are not easily compared due to their different designs. Nevertheless, several studies have uniformly reported higher incidence for boys than girls [5–8]. Regarding indications for adenoid surgery the picture in previously published studies is divergent. In previous studies, the most common indications for adenoid surgery have been recurrent upper airway infections, otitis media [5,8] and hypertrophy [7]. Influential ENT textbooks describe several indications for adenoid surgery such as nasal congestion, mouth breathing, snoring, sleep apnea, chronic otitis media with effusion, recurrent otitis media, sinusitis, purulent rhinitis, adenoiditis and disturbed maxillofacial growth [9–11]. Some of these indications could be looked upon as experience-based with an uncertain effectiveness [12,13].

Sweden with its approx. 9.5 million inhabitants has both public and private ENT departments, both tax-funded. All permanent residents of Sweden have a unique personal identity number and all health care practitioners are obliged by law to register all operations by these identity numbers in a National Patient Registry (NPR). The NPR has been operational since 1964. The nature of data contained in the NPR allows assessment of medical practices for a total national population over time. The Swedish NPR is a unique source of data allowing studies on current practice and trends in medical practice.

Given that adenoid surgery is such a common surgical procedure and the lack of updated knowledge on several important aspects of its epidemiology, the aim of this study was to describe the incidence, indications and concomitantly performed ENT surgical procedures in a nationwide cohort covering several years of medical practice.

2. Methods

This is a retrospective cohort study based on data from the NPR. The NPR is managed and administered by The National Board of Health and Welfare, a government agency under the Ministry of Health and Social Affairs. The NPR contains individually based information on both in- and outpatient care. Surgical procedures are coded according to The Nordic Medico-Statistical Committee Classification of Surgical Procedures (NOMESCO) and the indications are coded according to the International Statistical Classification of Diseases (ICD). The registry is considered complete for both in- and outpatient care at least from 2004. Although completeness of the NPR for adenoid surgery specifically has not been studied, an analysis of the completeness regarding tonsil- and adenotonsillar surgery has shown that only 3% of these procedures were missing in the NPR in 2014 [14].

The initial data set retrieved from the NPR was limited to patients registered as having had any adenoid surgery from January the 1st 2004 to December the 31st 2013. Only data for the first adenoid surgery for each individual patient was kept in the data set. To minimize the risk that any patient in the study had had a non-registered adenoid surgery before 2004 only patients born from 1st January 2004 were included in the initial data set. Thus, all children born from 1st of January 2004 to December 31st, 2013 who underwent adenoidectomy in Sweden during 2004–2013 were included in the initial data set. Patients with an ICD code indicating a malignant disease were excluded. Population data was retrieved from Statistics Sweden (a government agency that coordinates the official statistics of Sweden and provides statistical information on the population) for calculation of incidence.

The data set was categorized with regard to both surgical procedures and indications. After all non- ENT surgical procedures and indications were left out of consideration, the data set still

contained >300 and > 600 unique- or combinations of surgical procedures and indications respectively. In the further analysis, data on surgical procedures and indications were categorized into groups based on frequencies (Table 1 and Table 2).

Only descriptive statistics were used in this study. Incidence was reported by age and the denominator used was the sum of the mid-year population estimates for each year and age category. The study was approved by the regional ethical review board in Linköping, Sweden (Dnr 2015/17-31).

3. Results

From Jan 1st, 2004 to Dec 31st, 2013, 40,829 children (born within the same dates) underwent solitary adenoid surgery or adenoid surgery together with other ENT surgery. Of these, 24,537 (60%) were boys. The age at surgery in the studied population was average 4 years (median value 3.5 years) for both boys and girls.

The most frequently performed surgical procedure was adenotonsillar surgery ($n = 17,434$) which represented almost half (43%) of all operations followed by solitary adenoid surgery ($n = 10,749$, 26%). The frequencies of surgical procedures by group are shown in Table 3. The most frequent registered (single) indication was hypertrophy $n = 24,422$ (60%) followed by hypertrophy and otitis media $n = 8425$ (21%). The frequencies of indications by surgical group are shown in Table 4. The highest incidence for all types of adenoid surgery taken together was at 3 years of age for both genders (Fig. 1 and Table 5). Boys had higher incidence rates than girls for all ages and all types of surgery except at 8 years of age (Fig. 1 and Table 5). Incidence by age, gender and surgical group is shown in Table 5.

Longitudinal incidence rates for the most frequently performed adenoid surgeries for years 2009–2013 indicate that the incidence for adenotonsillar surgery slightly increased while the incidence of solitary adenoidectomy and adenoidectomy with ear surgery was constant (Fig. 2).

4. Discussion

To the best of our knowledge the present study is the first epidemiologic study on adenoidectomy and all simultaneously performed ENT surgery in a national population. The data was collected from a national registry with a high degree of completeness which allows estimation of incidence rates with very close correlation to the true numbers.

Our study shows an adenoidectomy rate of 740 per 100,000 children < 10 years old. The incidence of primary adenoidectomy with or without other ENT surgery reached its peak at 3 years of age when 1460/100,000 children underwent ENT surgery including adenoidectomy. Very few children underwent adenoid surgery during their first year of life. Adenoidectomy performed as a single operation was the most commonly performed surgery in children <2 years while adenotonsillar surgery was the most commonly performed surgery in children >2 years.

There are several previous studies that can be used for comparison of incidence rates. However, different study designs and differences in the way data have been presented make comparisons challenging. In 2004, Schilder et al. [4] reported large variations between countries regarding the incidence of adenoidectomy in children aged 0–14 years. Finland and Belgium were reported to have the highest incidence with 1290/100,000 children and 1270/100,000 children per year respectively while the lowest incidence was reported from Canada with 170/100,000 children. Bhattacharyya et al. [15] reported US adenoidectomy rates of 176/100,000 children < 18 years in 2006, while Haapkylä et al. [6] reported adenoidectomy incidence rates of 1330/100,000 children in Finland

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