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Impact of tonsillectomy on health-related quality of life and healthcare costs in children and adolescents

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ABSTRACT

Background: Tonsillectomy is a common surgical intervention in children, but its efficacy is under debate. We studied whether tonsillectomy is a cost-effective intervention with a positive impact on health-related quality of life (HRQoL).
Methods: Children (aged 7–11 years) and adolescents (aged 12–15 years) undergoing tonsillectomy answered the 17D or 16D HRQoL questionnaires before tonsillectomy and at 6 and 12 months postoperatively. At the same time-points, data on the use of healthcare services and school absenteeism were collected by questionnaire.
Results: Altogether 49 children and 42 adolescents returned all HRQoL questionnaires. Tonsillectomy improved the mean total HRQoL score clinically and statistically significantly in both children (from 0.935 at baseline to 0.958 at 12 months, $p = 0.002$) and adolescents (from 0.930 to 0.957, $p = 0.004$). The mean direct self-reported healthcare service costs diminished after tonsillectomy in both groups. The mean number of days on sick leave due to oropharyngeal problems during the preceding 3 months decreased from the preoperative 4.6 days to postoperative 0.5 days ($p < 0.001$) in children, and from 4.9 days to 0.8 days ($p < 0.001$) in adolescents at 12 months.
Conclusions: Tonsillectomy improves HRQoL in both school-aged children and adolescents and reduces healthcare service needs and school absenteeism due to oropharyngeal symptoms.

1. Introduction

Tonsillectomy is a very common but costly surgical intervention. In children, the indications for tonsillectomy are most often either obstructive symptoms due to tonsillar hypertrophy or frequently recurring tonsillitis. However, these symptoms may resolve with time. It is not clear whether the benefits of the operation in reducing symptoms and healthcare costs outweigh the potential risks and costs of surgery.

Conflicting results of the cost-effectiveness of tonsillectomy in children have been reported. Buskens et al. [1] noted increased total health-related costs without significant clinical benefit, while other studies have found tonsillectomy to be cost-effective and clinically effective in children [2,3].

To assess the benefits of tonsillectomy for patients, the number of infections or days of sick leave is usually counted. In a Cochrane review, the numbers of sore throat episodes and days with sore throat were reduced by tonsillectomy [4]. Measuring changes in health-related quality of life (HRQoL) is considered a more subjective method for estimating the benefits of a certain intervention. Some studies exist of the impact of tonsillectomy on HRQoL in children; all report a positive effect [5–10]. However, in several studies the follow-up time has been very short and the children have been young, with the questionnaires filled in by the parents. The assessment has thus been parental, based on observation of the child's behavior. Studies with older children and adolescents offer the advantage that the questionnaires can be answered by the patients themselves.

In our previous study in adults we have shown that tonsillectomy has a positive impact on HRQoL and that it reduces the use of healthcare services [11]. The aim of this study was to

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compare the self-reported HRQoL in adolescents and children before and after tonsillectomy and to explore the effect of the operation on the use of healthcare services and ensuing costs as well as on sick leaves due to oropharyngeal symptoms.

2. Methods

Children from 7 to 11 years of age and adolescents from 12 to 16 years undergoing tonsillectomy at the Department of Otorhinolaryngology of Helsinki University Central Hospital between April 2008 and November 2012 were recruited to the study. The study patients were scheduled for tonsillectomy through normal clinical practice. Once the patients had been scheduled for surgery, they were recruited to the study. Indications for tonsillectomy were recurrent or chronic tonsillitis, snoring, and significant tonsillar hyperplasia. Children and adolescents with severe comorbidities (e.g., pulmonary or cardiac diseases) are not operated in the study hospital and therefore are not included in this study. The patients were asked to complete a HRQoL questionnaire and a questionnaire enquiring about the use of healthcare services and school absenteeism during the preceding 3 months. Parents were asked to assist in filling in the questionnaires if needed. At 6 and 12 months after the operation, follow-up questionnaires were mailed to patients who had returned the first questionnaire and the informed consent form. One reminder was sent to patients who had not returned the follow-up questionnaires.

HRQoL was measured by either the 17D (children) or 16D (adolescents). Both are generic, 17- or 16-dimensional, standardized HRQoL instruments. They can be used both as profile and single index utility score measures (http://www.15d-instrument.net/15d). The dimensions of the 17D questionnaire include mobility, vision, hearing, breathing, sleeping, eating, speech, excretion, school and hobbies, learning and memory, discomfort and symptoms, depression, distress, vitality, appearance, friends, and concentration. The dimensions of the 16D questionnaire include mobility, vision, hearing, breathing, sleeping, eating, speech, excretion, school and hobbies, mental function, discomfort and symptoms, depression, distress, vitality, appearance, and friends.

For each dimension, the respondent was asked to choose the level (on a scale of 1–5, with 1 indicating best level and 5 worst level) that best describes his/her current state of health The index scores (17D score/16D score) on a 0–1 scale represent the overall HRQoL (0 = being dead, 1 = no problems on any dimension) and are calculated from the health state descriptive system by using a set of population-based preference or utility weights, which have, in the case of the 17D, been elicited from parents of 8- to 11-year-old schoolchildren and in the case of the 16D, from a sample of 12- to 15-year-old adolescents from schools in the Helsinki metropolitan area. The valuation methodology employed is similar to that used for the adult version of the HRQoL instrument, the 15D, and is based on an application of the multi-attribute utility theory (http://www.15d-instrument.net/15d). The minimally important difference (MID) in the 15D score, i.e., the change a person can on average feel, has been estimated at 0.015 in adults.

The HRQoL of the patients was compared with the HRQoL of the general population. The comparison group of age- and gender-standardized schoolchildren came from four schools in the greater Helsinki area [12,13].

Costs related to the use of primary healthcare services (both public and private), hospital treatment, and laboratory services during the preceding 3 months were collected by a self-report questionnaire. The same questionnaire also included a question concerning the number of days spent on sick leave due to oropharyngeal symptoms. The use of services was converted into monetary units using Finnish data on the unit costs of healthcare-related services [14]. As the most recent data on unit costs dates back to the year 2006, the self-reported direct healthcare costs were multiplied by 1.1076 to bring them to the 2009 level, the year in which most of the hospital costs were incurred.

Hospital costs incurred in Helsinki University Hospital due to tonsillectomy and related oropharyngeal problems during a time span from 3 months preceding the operation to 12 months after the operation were obtained from the Ecomed® clinical patient administration system (Datawell Ltd., Espoo, Finland), where the data on hospital treatment costs of individual patients are stored. Included visits were tonsil-related oropharyngeal problems, tonsillectomy or its complications, and visits to other medical specialties if they were deemed to be related to tonsillectomy.

2.1. Ethical considerations

Informed consent was obtained from the parents of all participating children and adolescents. All patients received scheduled routine treatment. Other than being asked to fill in the questionnaires and to give a written informed consent, the patients were not approached. The study protocol was approved by the Ethics Committee of the Helsinki and Uusimaa Hospital District, Helsinki, Finland.

2.2. Statistical analysis

Data analysis was performed using the SPSS for Windows statistical software version 19.0 (SPSS, Inc., Chicago, IL, USA). The results are given as mean (standard error of mean, SEM). The significance of the difference between baseline and follow-up HRQoL scores and costs was analyzed with Student's paired sample *t*-test and between patients and the general population with the Mann–Whitney *U* test. *p*-values under 0.05 were considered statistically significant.

3. Results

3.1. Health-related quality of life

Of the patients asked to participate, 185 (96 children and 89 adolescents), 128 (69 children and 59 adolescents), and 108 (55 children and 56 adolescents) returned the HRQoL questionnaire at baseline and at 6 and 12 months after the tonsillectomy, respectively. Altogether 51% patients were operated because of recurrent or chronic tonsillitis, 40% because of tonsillar hypertrophy and 9% of the patients had both recurrent tonsillitis and symptoms because of tonsillar hypertrophy. In children, the mean (SEM) age at the time of the first questionnaire was 9.4 (0.1) years and 55% were female. The corresponding figures in adolescents were 13.9 (0.1) years and 51%. Sufficient self-reported data on the use of healthcare services and days on sick leave during the preceding 3 months were available for 185 (98 children and 87 adolescents), 124 (66 children and 58 adolescents), and 106 (53 children and 53 adolescents) respondents at baseline and at 6 and 12 months, respectively. The response rate, assessed for 1 year (2009), was 58% (during that year 55 of the 95 tonsillectomy patients who were given the baseline questionnaire returned it). Of those who answered the baseline questionnaire, 80% returned at least one follow-up questionnaire. The respondents and the non-respondents did not differ from each other in a statistically significant manner regarding age or gender.

The study children had significantly lower HRQoL scores on the dimensions of "eating", "excretion", and "school" compared with the age- and gender-standardized general population, but the total HRQoL score was similar between these two groups (data not shown). Altogether 49 children (mean age 9.3 years, 53% female)