Effect of tonsillectomy on the immune system: where do we stand now?

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Abstract

Objectives: The immunological sequelae of tonsillectomy in children has long been a source of debate among physicians and a continuous concern for the parents. Trying to answer this question, we conducted a thorough review of the literature, including an unpublished study we previously conducted. Methods: A Medline search was conducted. A total of 27 articles were included.

Results: The changes in immune system parameters were variable, with a decrease in serum IgG, IgA, and IgM, and an increase in saliva immunoglobulin levels. Of the studies that showed a negative effect on the immune system, 6 studies included 722 patients showed that TAA has no negative effect on the immune system.

Conclusion: While the results of this study are promising, more comprehensive studies are needed to further investigate the effects of tonsillectomy on the immune system.

Introduction

Tonsils produce antibodies via their B cells. Massive tonsillar growth occurs between 4 and 8 years of age, when immunity begins to exert its role in the body in response to pathogens.

The immunological sequelae of tonsillectomy in children has long been a source of debate among physicians and a continuous concern for the parents. In some children, tonsillar growth causes upper airway obstruction. In others the tonsils become a source of recurrent febrile illness. Obstructive tonsils become the most common indication for tonsillectomy in children. To decrease post-operative discomfort, partial tonsillectomy was revived in 2002 by Kollat and this has been the choice of practice for the last 12 years. The literature has focused on this type of partial tonsillectomy. As far as we know, the literature has not included any other type of tonsillectomy.

We conducted a thorough literature review, to assess the effect of partial tonsillectomy on the immune system. We included in our review unpublished data of a pilot study, conducted by the authors, that looked at the effect of partial tonsillectomy on serum IgG and IgA levels, and saliva secretory IgA levels. We also included all children that were under any other type of tonsillectomy.

Methods

Literature review

Medline search was conducted using the search phrase: (tonsillectomy AND humoral immunity) OR (tonsillectomy AND cellular immunity) OR (tonsillectomy AND immune disorders) OR (tonsillectomy AND immune system). All articles up to February 2012 were included. We excluded descriptive articles and narrative reviews. In addition we excluded patients duplicated in studies.

Patients

The study was approved by the Institutional Review Board of the American University of Beirut. Children with obstructive signs were randomized to undergo either partial (using the microdebrider) or total (using the electrosurgical tonsillectomy) tonsillectomy after was obtained from the parents or legal guardians. The patients had a history of symptoms of tonsillar hypertrophy for at least 3 months. Symptoms included at least two episodes of tonsillar hypertrophy a month, frequent episodes of neck pain, and frequent episodes at night or obstructive breathing during sleep. Children with a history of recurrent tonsillitis, immunodeficiency syndromes, or infections or immune stimulants or suppressors were excluded. Blood and saliva samples were obtained immediately post-operatively and at 1 month post-operatively.

The saliva samples were obtained using an indirect enzyme immunoassay kit (Salimetrics Inc, State College, PA). The Serum IgG, M and A concentrations were measured by radial immunodiffusion according to the manufacturer's protocol (Dade Behring, Marburg GmbH, Newark, USA).

A questionnaire exploring the susceptibility to infections or chronic diseases in these children was completed at one year follow-up. The frequency of leucocyte illness, the mean duration of missed school days, the frequency of visits to the doctor for colds, the frequency of antibiotic uptake, any change in the frequency of existing allergic symptoms, or the emergence of new ones, and the emergence of any chronic diseases were all checked.

Statistical Analysis

The reviewed studies addressed different parameters, so a meta-analysis could not be conducted. Only the parameters that were measured in at least five studies, were analyzed. These were serum IgG, IgA, cellular immunity to pathogens, comparison to a control group, pre operative and post operative values, and the duration of follow up.

The population parameter, parent trait, was used to determine the significance of differences between pre and post tonsillectomy serum mean IgG, and IgG concentrations. This was done for both partial and total tonsillectomy groups. P values less than 0.05 were regarded as significant.

The all studies that showed a negative effect on the immune system were conducted prior to 1971. One could argue that the methodology applied by those authors was insufficient to properly analyze the results of these studies. Therefore, one cannot deny that laboratory techniques are improving significantly. The changes in immune system parameters were variable, with a decrease in serum IgG, IgA, and IgM, and an increase in saliva immunoglobulin levels. Of the studies that showed a negative effect on the immune system, 6 studies included 722 patients showed that TAA has no negative effect on the immune system.

Results

Discussion

The changes in SSIgA level after partial tonsillectomy.

The presence of controls enhances the quality of the studies and makes their conclusions more relevant. Seventeen studies used a control group (1134 patients). Only 3 of them (364 patients or 32%) showed a negative effect on immunity, while 14 studies (770 patients or 68%) showed no effect.

The presence of long-term follow up is important in children because the immune system continuously evolves. The studies showing a negative effect on the immune system after tonsillectomy had a mean follow up of 0.85 ± 0.7 years, with a maximum follow up period of 2 years. While the studies that showed that tonsillectomy had no harmful effect on the immune system included a mean follow up of 2.6 ± 2.5 years reaching a maximum of 20 years.

While the presence of tAA levels were within normal limits both pre and post operatively. The changes, except for IgM, were non-significant. Even the significant changes in IgA levels post partial tonsillectomy were within normal limits. The prominence of these significant changes among males, and patients 5 years and older, were observed. These results support the indication of a larger scale study (in disclosure to be published). This is not only a type of prophylaxis against impo