Review Article

Is Tonsillectomy really required in the present era: A review?

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Introduction: Tonsillectomy is the most common surgery in practice of an Oto-rhinolaryngologist practice. Gradually many antibiotics came and because of irrational use, drug resistance to these antibiotics was a big concern. The tonsils are well known as immunologically reactive lymphoid organs and are one of the manufacturing unit in body for B and T cell thereby contributing in B and T cell mediated immunity. **Materials and Methods:** A detailed literature search was made in Google search engine using tonsillectomy as the main keyword and was tried with various combinations of anticipated effects such as immune system, autoimmune diseases tonsillectomy in present era and salivary immunity. An effort was tried to find answer to some questions and myths associated with tonsillitis and tonsillectomy. **Conclusion:** The review concludes the tonsillectomy does not adversely affect immune system. It also improves quality of life as after tonsillectomy there is a decline in physician visit as well as there is a decrease in number of missed school and office due to recurrent upper respiratory tract infection.

KEY WORDS: Autoimmune disease, B and T cells, immunity, tonsillectomy

INTRODUCTION

Since many decades, tonsillectomy is the most common surgery in practice of an Oto-rhinolaryngologist practice. None of other ENT surgeries has dared to challenge the surgery. Time has passed by and has seen lots of revolution in medical science and the advancement in the pharmacological medicine is robust. It was in 1928, Sir Alexander Fleming discovered first antibiotic for the mankind named Penicillin and soon followed by Sulfonamides and Streptomycin in consecutive decades. Gradually many antibiotics came and because of irrational use, drug resistance to these antibiotics was a big concern. Same thing happened with tonsillitis, due to drug allergy, irrational use leading to resistance lead to increase in the rate of chronic tonsillitis and the era has noted sudden spurt in the rate of tonsillectomies.

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The present era has witnessed evolution of a variety of antibiotics and even extended spectrum of it. These antibiotics if given in an appropriate dose and duration are capable of curing the acute phase thereby regressing the tonsils size. Still unwise use of antibiotics has failed to prevent avoidable tonsillectomies in past decades. This has caused unnecessary burden on health care system as well as on patients.

A valid point of concern during episodes of acute tonsillitis for the patients particularly parents of pediatric age group is their worry of turning it into life-threatening condition, a proper guidance and counseling about this reversible physiologic condition is worth full.

The strategic location of the Waldeyer ring around naso and oro-pharyngeal inlet makes it the first line of defense against invading microorganisms and its continuous and recurrent exposure leads to recurrent enlargement and regression which is consider as physiological phenomenon, but when recurrent

infection and inflammation cause irreversible changes then it becomes hypertrophied and sometimes even become a source of persistent infection. In the Waldeyer ring, adenoid tissue and palatine tonsils are the most commonly affected.[1]

The tonsils are well known as an immunologically reactive lymphoid organs and are one of the manufacturing unit in body for B and T cell thereby contributing in B and T cell mediated immunity.[2]

Tonsils contain B cells and they have a potential to develop into plasma cells in response to antigens. These further generate polymeric IgA, thereby helping in the development of systemic and mucosal immunity. Some studies have reported spontaneous synthesis of Ig from adenoid tissue and it directly contribute in the regional surface protection by providing local SIgA, this, in turn, participate in local immunity of upper respiratory tract by various proposed mechanisms. First, it may protect adhesion of pathogen to mucosal epithelia thereby blocking its further dissemination and spread of infection. Second, it can bind within the epithelial cells to newly synthesized viral protein thereby preventing assembly of virus. Third, it can also block some of the antigens thereby preventing an increase in the uptake of these antigens in the nasal epithelium and subsequently blocking further allergic reaction. This demonstrates the importance of IgA as an immune factor and reason why there is a transient decrease in the level of it after adenotonsillectomy and return of its level to normal can be explained by body's compensatory function.[3]

The present review will try to focus on certain conflicting issues with the previous studies done on the concerned point.

MATERIALS AND METHODS

A detailed literature search was made in Google search engine using tonsillectomy as the main keyword and was tried with various combinations of anticipated effects such as immune system, autoimmune diseases, and salivary immunity. An effort was tried to find answer to some questions and myths which often occurs in the mind of otolaryngologist and parents of children regarding the possible long-term effect of tonsillectomy on child growth, immunity, future episodes of the upper respiratory tract infection (URI), and lower respiratory tract infection. The answer to possible questions was made by first collecting the related articles of the past 20 years and then segregating in terms of various topics in chronological order of development.

RESULTS AND DISCUSSION

Following is the detailed relevant discussion along with reference on various aspects related to tonsils and adenoid and their surgical removal.

Effect on Immune System

It is a matter of debate whether tonsillectomy has an influence over immune system thereby affecting T and B cell immunity.

Böck *et al*.[1] conducted a study on 160 children who underwent tonsillectomy and were compared with age matched control of 302 non-tonsillectomized children. The study analyzed the effect on the parameters of cellular and humoral immunity in tonsillectomy and non-tonsillectomized children and its effect among the two sexes. The study found a statistically significant increase in lymphocyte subpopulations among male tonsillectomized populations which showed higher percentage of CD 21+, CD 4+, and CD4+DR+ cell count whereas no statistically significant result found among females in the two groups. Both the sexes showed statistically lower level of serum Immunoglobulins in post-tonsillectomy children.

Kaygusuz *et al*.[2] performed a study to find a possible impact on the cellular and systemic immunity of children presenting with chronic tonsillitis and who underwent tonsillectomy for it. The study was performed on 37 children between the age of 5–9 years who underwent tonsillectomy for hypertrophied tonsils with obstructive symptoms and recurrent tonsillitis. The study included 35 healthy children of same age group as control group. Serum levels of immunoglobulin A, G, and M along with complement C3 and C4, percentage of CD 4+ (T Helper), CD 8+ (T cytotoxic), CD 3+, CD 19+, CD 16+, CD 56+, and CD 25+ were estimated in control and pre-operative phase and also 1 month post-operative and control. The study found a statistically significant difference between pre-operative and control and also pre-operative and post-operative value of IgG, IgA, IgM, C3, and C4 value, the value of all these variables decreased after tonsillectomy whereas no statistically difference was found between control and post-operative value. The decrease value of Immunoglobulin post-surgery can be explained by the fact that tonsillectomy removes the source of constant antigenic stimulus as focus of infection causes continued stimulation of lymphocytes resulting in higher levels of Immunoglobulin's.

Yan *et al*.[4] investigated short and long-term impact on immune system of adenotonsillectomy among 30 children younger than 3 years. They observed a decline in the level of IgA but that was within normal range and there were no significant changes in other immunological blood parameters. This concluded that there though there is reduction in level of individual antibodies but there is no adverse impact on immune function and removal of these infected adenoids and tonsils does not lead to increase in the risk of URIs.

Önerci *et al*.[5] performed a study to evaluate the role of function of neutrophils among adult patients suffering from chronic tonsillitis by assessing its function before and after tonsillectomy. The study assessed random motility in the absence of any stimulus and found a statistically significant higher value of neutrophil motility in healthy control in comparison to pre-operative value of patient group whereas an insignificant result was obtained when post-operative motility value was compared with healthy control group. The study concludes that tonsillectomy helps in recovery of neutrophil chemotactic function. The probable reason for the impairment of neutrophil chemotaxis in infected tonsils may be due to release of chemotactic inhibitors from the infected focus of tonsils.

Pediatric clinical trial done by Martí *et al*.[6] on 45 children between age of 3 and 17 years found no evidence on short- and long-term compromise in systemic humoral immunity and stated acquiring the function of palatine tonsils by other group of Waldeyer's ring as the most probable reason for it.

Byars *et al*.[7] conducted a population based cohort study in Denmark where they enrolled all the children born in between 1979 and 1999 who have undergone tonsillectomy and/or adenoidectomy within the first 9 years of life. These enrolled participants were followed up to the age of 30 years for assessing the long-term risk of respiratory, allergic, and infectious diseases. The study concluded that adenotonsillectomy is associated with 2–3 fold increase risk of the upper respiratory tract diseases and smaller increase in risk for getting infectious and allergic diseases. The disease lays stress on the long-term risks associated with adenotonsillectomy while considering the same in younger age group.

Radman *et al*.[8] studied 34 children of age group 9–15 years and who completed 6 years of follow-up following tonsillectomy and age-matched control of 30 children. The study conducted with the objective to see long-term impact on immune function following tonsillectomy. The study found a significant lower level of IgM, IgA, and IgG as well as lower level of expression of CD10 among post-tonsillectomy group whereas no significant difference was found between both groups in terms of expression of CD4, CD8, and CD56. This whole indicated that a decrease in B cells further reduced antibody production as CD10 is a marker of B lymphocytes.

Effect on Quality of Life Index

Bhattacharyya *et al*.[9] conducted a cross sectional survey on 65 patients who have underground tonsillectomy for chronic infectious tonsillitis and have completed at least 1 year of follow up. The variables included for assessment were mean number of oral antibiotic prescription and number of clinic visits for throat infection and also total number of workdays missed as a result of recurrent tonsillitis and this last variable acts as an indicator of index of quality of life. The study found a significant decrease of clinic visit as well as mean number of oral antibiotic prescription and number of workdays missed due to recurrent tonsillitis.

Senska *et al*.[10] performed a study with the aim to evaluate perceived changes in the quality of life after tonsillectomy as well as assess objective parameter which also included number of physician visits and the long-term use of resources such as antibiotic and analgesic use. The study found a significant drop of yearly episodes of sore throat thereby significantly reducing the yearly requirement of analgesics and antibiotics. The study found a drastic decrease in the number of sore throat from mean value of 10 in pre-operative time to 2 in long-term period of 7 years thereby reducing the number of physician visit from mean value of 4 in pre-operative time to 0.7 at 7 year. This was further reflected in the decline in the lost work days due to sore throat from a mean value of 10 days to 1.4 days at 7 year.

A study done by National cohort study from the Korea Health Insurance Review and assessment service using age-matched control and tonsillectomy participants for a period of 9 years. The study did not found any difference between the two groups in terms of number of visits for URI and the reason stated is that with advancing age, immune system gets strengthened and frequency of URI spontaneously decreases. This finding also concludes that tonsillectomy does not adversely affect immune system.[11]

Østvoll *et al*.[12] did a retrospective cohort study with 1044 children of less than 15 years and 2244 adults and compared surgical and non-surgical treatment and an assessment of the outcome on the basis of number of clinic visit for pharyngitis or tonsillitis. The study found largest reduction in post-operative clinic visit in the 1st year following surgery.

Safety Profile in Terms of Age

Bofares[13] conducted a study with long-term follow-up of 648 tonsillectomized children in 7 years with age range from 8 months to 8 years. The study found no significant difference in the rate of post-operative complication in younger age group of less than 3 years and other greater than 3 years. The study aimed at addressing the myth associated with performing tonsillectomy in age younger than 3 years. The result concluded regardless of age group that there are no technical difficulties in operation as dissection is easier in younger age group because of lesser episode of recurrent infection leading to less fibrous tissue, less operative time, and bleeding and relatively marked less post-operative pain. Lesser post-operative pain helps in early and easy return of oral feeds and thereby decreases the chances of dehydration and electrolyte imbalance. On the contrary older age group children have more of fibrous tissue due to multiple episodes of tonsillitis causing relatively more bleeding and post-operative pain

Effect on Salivary Immune Defense

Bitar[14] performed a systematic and meta-analysis to study the effect of tonsillectomy on salivary immune factors and included nine articles related to the topic and found no negative affect of tonsillectomy on host salivary immune defenses.

Effect on Autoimmunity

Ji *et al*.[15] performed a retrospective analysis to establish any association of tonsillectomy in long-term development of autoimmune diseases. The detailed medical records were evaluated from the data obtained from Swedish Hospital Discharge and Outpatient Register of all the patients who underwent tonsillectomy from 1997 to 2012 and had developed any autoimmune disease on long follow-up. A standardized incidence ratio was used to calculate the risk of autoimmune diseases as compared to the general population. The conclusion was that incidence of autoimmune diseases was higher in individuals who had a history of tonsillectomy. The probable reason for this may be accounted because some recent studies have suggested that a stepwise program of T cell development

occurs within the tonsil and the phenotype of subset of T cell has resemblance with its thymic counterpart, tonsillectomy will cause the loss of ability to produce functional T cells. This affects the immune system and finally leads to development of some form of autoimmune diseases.

CONCLUSION

The review concludes that the tonsillectomy does not adversely affect immune system. Various studies have concluded that tonsillectomy improves quality of life by decreasing the number of visits to physician for recurrent URI and this helps in decreasing the number of missed work days from school and office. However, few studies have found higher incidence of auto immune disease in post-tonsillectomy patients on long-term follow-up. Hence, a detailed evaluation of every case of tonsillitis must be performed and a trial of antibiotics as per the recommended dosage should be given before a final decision of tonsillectomy.

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