Section of Laryngology

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DISCUSSION ON THE TONSIL AND ADENOID PROBLEM

R. S. Illingworth (Professor of Child Health, The University of Sheffield): The remarkable antipathy possessed by many for the tonsil is exemplified by the work of Denzer and Felshin (1943). They examined 1,000 11-year-old New York school children and found that 610 had had their tonsils removed. The remaining 390 were referred to 20 school medical officers, and all but 65 were advised to have the tonsils taken out. Glover (1938, 1944, 1948) has drawn attention to the great frequency of the operation in this country and to the remarkable variation in its incidence from town to town. Glover (1948), Colins and Sydenstricker (1927), Kaiser (1930), Paton (1928, 1943), pointed out that the operation is performed much more frequently in the rich than in the poor. Whereas in elementary schools in this country about 20% of children have had the operation before the age of 14, 83% of new entrants to Eton in 1938 had had the tonsils out.

DIFFICULTIES IN THE INTERPRETATION OF PUBLISHED WORK

(1) *Failure to correlate bacteriological study of the tonsils with the disease for which they are removed.*—It would seem logical that if tonsils are to be removed as part of the treatment of acute nephritis, rheumatic fever, or other condition related to the hæmolytic streptococcus, only those tonsils should be removed in which there is evidence of that infection. Almost all papers fail to give such information, the writer's included (Illingworth, 1939*b*). Admittedly, the presence of hæmolytic streptococci in a throat swab does not prove that those organisms are the cause of the disease or represent anything more than the carrier state, but their presence would at least be a guide to rational treatment. It is possible, but unproved, that the removal of tonsils, in which there is a persistent hæmolytic streptococcal infection, might benefit the course of nephritis or rheumatic fever. Inclusion in statistical studies of the effect of operation in children with no such infection is very likely to obscure good results, if any, from an operation done for proper indications.

It is a well-recognized fact that a considerable proportion of cases of acute tonsillitis are due neither to the hæmolytic streptococcus nor to other known organisms, and are probably virus in origin. The commission on Acute Respiratory Disease (1946) in a three-year study of exudative tonsillitis and pharyngitis at Fort Bragg, found that only 25% showed satisfactory bacteriological evidence of streptococcal infection. In children suffering from recurrent tonsillitis the effect of the removal of those tonsils which were infected with the hæmolytic streptococcus might well be very different from that of removing tonsils in which there is no such infection. We have no information on that point.

There have been a few bacteriological studies of tonsils removed at operation, but little correlation between these findings and the symptoms of the patient. Caylor and Dick (1922) attempted to correlate a quantitative bacterial count in the tonsils removed at operation and the incidence of rheumatic fever. They found that clinical improvement occurred when heavily infected remnants were removed.

(2) *Unsatisfactory evidence of completeness of the operation.*—Very few papers on tonsillectomy give satisfactory evidence that the operation has been complete. Opinions as to the frequency of remnants differ considerably. Paton (1943) put the figure at "well over a third".

Gordon (1947) found remnants in 42·4% of 1,000 children who had had the operation. McLaggan (1930) found remnants in 49%, Clark (1913) in 42%, Rhoads and Dick (1928) in 73%, Campbell (1939) in 77·3%, Meyer (1946) said "I believe that complete tonsillectomies are performed rarely". It is possible that some of these so-called remnants represent merely compensatory hypertrophy of remaining lymphoid tissue. It is certainly unreasonable, in a condition such as nephritis or rheumatic fever, to compare the effect of tonsillectomy, when a remnant is left which may grow as large as the original tonsils with the effect of leaving the tonsils intact. The possible good results of the operation are obscured by poor results arising from poor operative technique. Rhoads and Dick (1928), Campbell and Warner (1930), and Meyer (1946) have all discussed the good results achieved by removing infected tonsil remnants. Caylor and Dick (1922) found that one tonsillar remnant examined by them contained more organisms than all other tonsils investigated. Campbell (1939) considered that such remnants are often a greater menace to a patient, both locally and generally, than the original tonsils.

The compensatory hypertrophy of remaining lymphoid tissue after the operation for tonsils and adenoids has often been discussed (e.g. Bordley, 1947; Crowe, 1944). Crowe stated that adenoids recur in 75% of children in whom the operation is done before puberty. It is uncertain whether this compensatory hypertrophy of lymphoid tissue is of value to the patient for the development of immunity, or of disadvantage to the patient as a nidus of infection. The literature does not compare the effect of medical treatment, in such conditions as rheumatic fever, with a really complete operation.

(3) *Persistence of infection.*—With very few exceptions the literature does not tell us whether the infection for which the operation has been performed has been removed or not. It is well known that a streptococcal infection commonly persists after the operation. If it does persist one can hardly expect the operation to prove an effective therapeutic measure. Longcope and co-workers (1935) stressed the importance of this persistence of infection after operation for nephritis. Allen and Baylor (1938) found that exacerbations of rheumatic fever were much more frequent in those children in whom infection persisted after tonsillectomy than in those in whom the infection was cured by operation.

(4) *Inadequacy of treatment.*—Bound up with the topics discussed above is the fact that in any clinical study, in which comparison is made between two lines of treatment, it is essential that in each case the treatment should be really adequate and thorough. Most of the literature on tonsillectomy merely compares the effect of the removal of the tonsils with that of leaving them intact. It does not compare the effect of proper medical treatment, including chemotherapy, with the effect of *complete* removal of tonsils and adenoids, in which there are no remnants, and in which any residual infection is properly treated by chemotherapy and other methods. Too often the throat is forgotten when once the tonsils have been removed. Once more, the good results of the operation, when properly performed for adequate reasons, and with proper after-care, are obscured by the bad results of inefficient techniques and inadequate post-operative treatment.

The writer is unaware of any study which compares the effect of tonsillectomy, for such conditions as recurrent tonsillitis, nephritis or rheumatic fever, with prophylactic chemotherapy designed to prevent streptococcal infection.

(5) *The combined or single operation.*—The literature leaves us very much in the dark as to whether the tonsils and adenoids should be removed in various conditions, or whether it is sufficient for only one or the other to be removed. Most of the literature concerns the combined operation.

(6) *The timing of the operation.*—This may be of importance in such diseases as nephritis, but it is hardly mentioned in the papers on the subject. It is possible that the operation would prove valuable if done early—but there is no evidence to that effect. Rudebeck (1946) found that the operation was of no value in nephritis, however early it was performed. There is a natural tendency to perform the operation when the disease has failed to respond to all other measures, or is already hopeless. There is evidence that the operation fails in those circumstances, but for reasons stated the investigations have been inadequate and do not prove that operation is never of value in the condition.

(7) *Methods of controlling.*—The method of controlling used in many papers has been unsatisfactory. Many papers fail to take the factor of age into account. A child is older after the operation than before it and the fact that he improves after the operation is no proof that the improvement is due to the operation. Most children develop a natural immunity to upper respiratory tract infections at the age of 6 or 7—the very age at which the peak incidence of tonsillectomy is reached. All comparisons of morbidity rates must be made in children of the same age group. Social factors, racial and geographical factors have to be taken into account. There is a higher incidence of streptococcal infections in some places than in others. Too often those factors are ignored in papers on tonsillectomy.

Many papers compare the health of those who have had the tonsils removed with that of children with intact tonsils. Many of these studies depend entirely on the history given by the mother. This is very apt to be fallacious. A mother who was anxious to have the operation performed is very likely to express satisfaction at the results of the operation and say that the child is better. Studies based on doctors' reports sent to school to explain a child's absence are somewhat more reliable. This sort of study helps little, however, for it is clear that those who have had the operation are likely to have had it for some reason, however bad that reason, and that there will be a higher incidence of colds, otitis and other infections in those submitted to operation than in controls. It is possible that those submitted to operation might have been worse if not operated on. Kaiser's investigation (1930), though one of the most careful, is not entirely satisfactory. He conducted a ten-year follow-up of 4,400 children who had been advised to have the operation. Half those children submitted to the operation, while the other half for various reasons were not operated upon. Subtle differences in the two groups reduce the value of the investigation. In the group of children who did not have the operation the parents may have been less co-operative and less intelligent, and so given a less accurate follow-up history of infections. There are many other difficulties in published work which make the interpretation of the results particularly difficult.

(8) *The duration of the follow-up.*—This has been inadequate in most papers. Kaiser showed how the incidence of colds and otitis media was less in the operated group for the first three years after the operation, but became greater thereafter than in the control group. It is possible that the operation caused a postponement of the age at which immunity to upper respiratory tract infections is normally developed.

(9) *Errors in diagnosis.*—Inaccuracy of diagnosis has led to many unnecessary operations. Once more the poor results of the operation done for improper indications obscure the good results of the operation done for proper reasons.

(*a*) *Sinus infections*: It seems certain that many of the symptoms for which tonsils and adenoids are removed are, in reality, due to infection of the nasal sinuses. Most papers make no mention of this. Crooks and Signy (1936) found infected sinuses in 24 out of 100 children at the time of tonsillectomy. 15 of the 100 children investigated had a chronic sinus infection. Griffiths (1937), Dean (1934), Selkirk and Mitchell (1931), Walker (1947), and others all emphasized the frequency of sinus infections in children sent up for tonsillectomy. Crooks (1938) found that only 9 out of 24 children with sinus infections were improved by tonsillectomy.

(*b*) *Adenoid facies*: This may be due to any nasal obstruction, and is not due merely to adenoids.

(*c*) *Mouth-breathing*: This may be due to several causes other than adenoids. It may be due to a habit, nasal obstruction, malocclusion or mental defect. Crooks (1938) said that there was mouth-breathing in 62% of his cases of chronic sinus infection. Epstein (1937) emphasized the frequent failure of adenoidectomy for the relief of mouth-breathing in children under the age of 6 years.

(*d*) *Colds*: So-called colds are often an allergic rhinitis or sinus infection.

(*e*) *Postnasal discharge*: This is often due to a sinus infection.

(*f*) *Growing pains*: Pains in the thighs rather than joints, are often wrongly called rheumatic fever. They do not respond to tonsillectomy, and, as far as is known, bear no relationship to the hæmolytic streptococcus.

(*g*) *Cervical adenitis.*—This is often due to dental caries, septic places on the face and scalp, and pediculosis capitis.

Other Difficulties Regarding Indications for Operation

(1) *Doubt about the function of the tonsil.*—It is generally thought that the function of the tonsil is that of immunity production. Most children acquire relative immunity to upper respiratory tract infections at the age of 6 or 7, and thereafter the tonsil decreases in size. It is possible that the regeneration of lymphoid tissue which follows the removal of tonsils and adenoids is designed by nature to help to produce that immunity. For this reason the complete destruction of lymphoid tissue by irradiation may or may not be altogether advisable.

Unfortunately we do not know at what stage the tonsil becomes more of danger than of value to its owner: there is no laboratory test which helps us to decide the question.

(2) *Focal sepsis.*—The problem has been adequately discussed by Reimann and Havens (1940) and others. We can certainly say that the theory of focal sepsis has largely fallen into disrepute, possibly for the same reason as the operation for the removal of tonsils—the great dilution of good results of treatment for proper indications with the bad results of random and unnecessary treatment.

(3) *Cervical adenitis.*—Many papers deal with the incidence of cervical adenitis before and after operation on the tonsils, and compare the incidence in children who have intact tonsils with that of children who have had them out. Most of these papers ignore the other common causes of cervical adenitis, mentioned above, and most make no attempt to define what is meant by cervical adenitis. What many would think normal others would think abnormal. Some define it as an adenitis which is visible. Few distinguish the non-suppurative from the suppurative form. Few papers, in fact, give us much help in assessing the value of the operation for the condition.

There seems little doubt that the fear of cervical adenitis is an exaggerated one. At one time it was thought that infected tonsils were the portal of entry for the tubercle bacillus. There is no evidence to this effect. It seems likely that many examples of tuberculosis of cervical lymph nodes, in adults at least, are due to infection via the blood stream, or infected sputum. Newhart and co-workers (1934) found that the tonsils of 48 out of 100 adults with pulmonary tuberculosis contained tuberculous foci, and Schlittler (1938) thought that most cases of tuberculosis of the tonsils in adults were due to infection from the lungs. The literature was reviewed by Rather (1943). We know that the tubercle bacillus can be recovered from the stomach washings in the great majority of children with primary lung tuberculosis, the organism having reached the stomach after being swallowed. We do not know how many cases of tuberculous cervical adenitis in children are of bovine and how many of human origin: but it is certainly advisable to take an X-ray of chest in all cases of tuberculous adenitis in children and to type tubercle bacilli which are recovered from glands which have broken down. It would not seem reasonable to perform a tonsillectomy for tuberculosis of the tonsils of human and therefore secondary origin.

In non-tuberculous cervical adenitis, as long as suppuration does not occur, there is no need to fear that the adenitis will harm the child. Enlarged nodes of this nature worry the mother, but not the child. Selkirk and Mitchell (1931) in their careful investigation found no evidence that the incidence of suppurative cervical adenitis is in any way reduced by the operation.

The extremely low incidence of cervical adenitis in the Basque school children who came to this country as refugees was noted by Ellis and Russell (1937): less than 2% of these children had had the tonsils removed.

(4) *Sore throat and tonsillitis.*—Some of the difficulties in the evaluation of published work on the subject have already been mentioned. Most papers ignore the difference between a sore throat at the commencement of a cold and a true tonsillitis. Most papers necessarily rely completely on the mother's history as to the frequency of tonsillitis. This history is notoriously inaccurate. The mother and father often disagree as to how often a child has tonsillitis. The finding of a follicular tonsillitis of which the parents are quite unaware and of which the child has not complained is commonplace. On the other hand a child may complain of a sore throat when inspection reveals nothing abnormal. Most papers on the effect of tonsillectomy on recurrent tonsillitis do not take these difficulties into account. It need hardly be added that true tonsillitis certainly should be rarer after the operation than before, just as appendicitis should be rarer after appendicectomy.

Another difficulty is that while many papers discuss the effect of the operation on the frequency of colds and sore throats, they do not discuss the effect on their severity. It might well be that careful investigation would show that while the frequency of colds is not affected by tonsillectomy, their severity is reduced. There is no evidence of this at present.

(5) *Nephritis.*—It is possible that once acute nephritis has developed the disease pursues its course irrespective of the removal of the source of infection. Addis (1931) inclined to this view, and quoted the experiment of E. C. Dickson, who caused acute nephritis in rabbits and guinea-pigs by giving them one injection of a uranium salt. The inflammatory reaction set up persisted long after all possible traces of the uranium had disappeared, chronic nephritis resulting. It would seem reasonable to suppose, however, that the prevention of exacerbations is desirable, and we know that exacerbations often follow a hæmolytic streptococcal infection. Such infections might well be prevented by prophylactic chemotherapy, as they are in rheumatic subjects, and there is no evidence that tonsillectomy will achieve more than prophylactic chemotherapy. If this failed to prevent infections, tonsillectomy would have to be considered, but the danger of tonsillectomy is the frequency with which it causes exacerbations of the nephritis. The writer (Illingworth, 1939*b*) found that the operation caused an exacerbation in 28 out of 119 nephritic children (24%) submitted to the operation, in one case causing death. It seems reasonable to suppose that such exacerbations are harmful to the child, for it is likely that they lead to a further destruction of kidney tissue. It would be interesting to determine whether chemotherapy or antihistamine drugs as a cover to tonsillectomy would prevent these exacerbations. In the present state of our knowledge one has to balance the risk of an exacerbation with the possible advantage of the operation. The trouble is that we do not know whether the complete removal of

tonsils, in which a hæmolytic streptococcal infection has been found, will do anything to cure the disease. We can certainly say that, as yet, there is no evidence that tonsillectomy has proved to be of any value in nephritis.

Much the same argument applies to rheumatic fever.

(6) *Complications of the operation.*—Complications following the operation are relatively infrequent, considering the enormous numbers of tonsillectomies, but far from rare. They tend to be seen much more by the physician than by the Ear, Nose and Throat Specialist. The Registrar-General's Returns (Glover, 1938) show at least 85 deaths each year from the operation under the age of 15. It is thought that this is an underestimate of the true position, because deaths are liable to be entered under such diagnoses as pneumonia, whereas really they are due to the operation. No purpose would be served by enumerating the various complications. The columns of the "Index Medicus" list numerous articles on the subject of complications of tonsillectomy, affecting almost every tissue in the body. Many of these complications are due, no doubt, to the bacteriæmia which so frequently follows the operation. Elliott (1939) found a bacteriæmia in 38 out of 100 children a few minutes after the operation. The organisms found included *Streptococcus pyogenes*, *Streptococcus viridans*, *Streptococcus pneumoniæ*, *Hæmophilus influenzæ*, *staphylococci* and *corynebacterium*.

There have been numerous articles concerning the danger of poliomyelitis after the operation. The evidence of that danger appears to be very strong. Aycock (quoted by Burnet, 1946) went so far as to say that the only known prophylactic measure to adopt in an outbreak of poliomyelitis is to stop all operations on tonsils and adenoids. The American National Foundation for Infantile Paralysis advised that no operation on the nose and throat should be performed during an epidemic of poliomyelitis (Editorial, *J. Pediatrics*, 1949). Magnus and Melnick (1948) showed that certain types of monkey investigated by them were rendered very much more susceptible to experimental poliomyelitis by tonsillectomy. Anderson (1945) compared the incidence of poliomyelitis following tonsillectomy before, during and after an epidemic of that infection. Before the epidemic began the poliomyelitis : tonsillectomy ratio was 0·7 : 1,000; at the height of the epidemic it was 25·5 : 1,000. Fischer and Marks (1941), Aycock (1942), and others noted the same connexion. Anderson (1945) showed that in Utah in 1943, 43% of cases of bulbar poliomyelitis were preceded by a tonsillectomy within thirty days of the onset. The incidence of poliomyelitis in those who had recently had the operation was 2·6 times more than that of the rest of the child population, while the incidence of bulbar poliomyelitis was 16 times greater than that of the rest of the child population. Cunning's evidence (1948) to the contrary, based on a questionnaire, is fallacious, because by that time the operation was not being performed in areas where the infection was prevalent.

Another striking and disturbing fact is the frequency with which the operation causes in some children a disease which, in others, it is intended to cure, or is followed by an increased frequency of that disease. Many have commented upon the frequency with which sinus infection follows the operation (Helmholz, 1930; Selkirk and Mitchell, 1931; Walker, 1947; Griffiths, 1937). The same workers found that infection of the sinuses was commoner in those who had had a tonsillectomy than in those whose tonsils were intact. The occurrence of otitis media after the operation is well known.

Kaiser (1948) found that although colds and otitis media occurred less frequently in the children who had a tonsillectomy, in the first three years after the operation, than in controls whose tonsils were intact, they occurred more frequently than in controls in the remaining part of the ten-year follow-up period. The writer (Illingworth, 1939*a*) in an investigation of 300 children with very frequent colds (averaging one per month) in the Outpatient Department of the Hospital for Sick Children, Great Ormond Street, found that the third commonest factor from which the colds originated was the operation on tonsils and adenoids. Many other workers have found a greater incidence of infections of the upper respiratory tract in those who have had the tonsils removed than in those whose tonsils are intact (Paton, 1928, 1943; Epstein, 1937; Selkirk and Mitchell, 1931; Forsythe, 1928; Glover and Wilson, 1932; Cunningham, 1931). Some of the difficulties, however, of assessing such studies have been discussed above.

In an investigation of nephritis in children (Illingworth, 1939*b*), the writer found that 18 (5%) of 365 cases of nephritis immediately followed, and were therefore presumably initiated by the operation. As already stated, the operation during the course of the nephritis caused an exacerbation in 28 out of 119 children (24%).

The psychological effect of the operation was discussed by Levy (1945). Night terrors were the characteristic response in children under 3, and negativism and fears of the dark, or of strange men, in children over 4. He thought that these responses were due largely to separation from the mother, and to the difficulty of explaining to the child what was going to happen to him.

Much more could be said about the complications of tonsillectomy, which are familiar to all physicians. Some of these are so serious that it behoves everyone to bear them in mind when considering the advisability of performing the operation in the presence of uncertain indications. The worst of these—death under the anæsthetic or from post-operative complication, is a terrible disaster which a man who has caused the operation to be performed without adequate indication, should never forget for the rest of his life. Most of us have seen such a death in children on whom the operation was done without any adequate reason.

False Indications and Contra-indications

(1) *The appearance of the tonsil.*—The most valuable contribution to the tonsil and adenoid problem in recent years is the work of Epstein (1937) at the Children's Memorial Hospital, Chicago. He attempted to correlate the careful observations of the physicians and throat surgeons in 152 children with the histological findings. He was unable to find any connexion between the severity of the symptoms and the degree of infection revealed by histology. "Some well-nourished children with no complaints save mouth-breathing had tonsils riddled with abscesses and sealed off by scar tissue. On the other hand some of the children complaining of almost constant sore throats had almost normal tonsils on histology." There was no relation between the size of the tonsil and the success of the operation in relief of symptoms. It was impossible to relate pathological evidence of infection with a history of preceding sore throats or other infections of the upper respiratory tract, neither could it be related to the prognosis. There was no connexion between redness of the anterior pillars and the degree of infection found. In some badly infected tonsils the anterior pillars were pale: some children had reddening of the anterior pillars, while their tonsils proved to be normal. He admitted that the tonsil with crypts, especially when much epithelial debris can be expressed, is usually infected. He concluded: "The physician does not know an infected tonsil when he sees one. There is nothing to lead one to feel that the appearance of the tonsils should ever influence one's judgment on the advisability of removing them. In children at least it would have a salubrious effect on the physician's attitude if he abandoned the diseased and hypertrophied tonsils and adenoids and substituted frequent sore throats or whatever the complaint or indication is. Whether tonsils were buried, cryptic, smooth, large or small bore no relation to the preoperative symptoms or the degree of success of the operation."

Many others feel that the appearance of the tonsil should not influence one's decision concerning the desirability of its removal (e.g. Denzer and Felshin, 1943; Brennemann, 1925; Dean, 1934). Most will agree that the mere size of the tonsil is no indication for the operation, except in the very rare cases in which the tonsils are so enormous that they may cause obstruction of respiration. It is normal for tonsils to enlarge at the age of 4 to 6, when immunity to infection is developing. There is some evidence of a connexion between the size of the tonsil and body build (Neuber, 1932), the large child tending to have larger tonsils than the smaller child. It is well recognized that large tonsils are not necessarily the most heavily infected ones. Caylor and Dick (1922) showed that the tonsils with the largest bacterial count per unit were the relatively small ones with chronic inflammatory changes.

Others think that the ability to express pus from the tonsil is a valuable indication for operation. More often than not, however, it is not pus which is expressed, but epithelial debris. The expression of either is often prevented by obstructing fibrous tissue.

It may be added that there is little agreement among pathologists as to what are the criteria of infection in the tonsil (Epstein, 1937; Wilkinson, 1929). Jackson and Coates (1929) concluded that: "Abscesses and abscessed crypts are present in varying numbers and sizes in all of the laryngopharyngeal lymphoid structures in the vast majority of human subjects beyond infancy—in other words a practically universal condition."

(2) *The recommendation of all and sundry.*—The decision as to the removal of tonsils should not rest with the school nurse, the mother, the father, aunt, neighbour or other lay person. Neither should the General Practitioner make the decision. He may know a lot about the child, but the decision must rest with the specialist. Neither should the pædiatrician push the throat specialist into removing the tonsils: rather he should state his opinion and ask for the opinion of his surgical colleague. No pædiatrician really respects the throat specialist who never has an opinion, who will not stand by his convictions, and who always does what he is asked to do for fear of causing offence. Some ear, nose and throat specialists have allowed themselves to become mere technicians, and to degenerate to the level of the fourth class general surgeon who first sees the acute abdomen on the operating table, instead of being consultants whose opinion is sought and respected, because it is known that they will give a carefully considered honest opinion after a full and thorough examination of the patient.

Some surgeons forget to put the child first. The child matters a very great deal more than the wishes of the doctor, nurse, mother or father. It is the child who suffers the discomfort of the operation and who may have to suffer complications of the operation. If a proper unhurried consultation is given in the out-patient department, and the problem is fully discussed with the parents, and their questions and fears are properly answered, it will be found that very few parents still want the operation to be performed when the consultant advises against it. No amount of insistence by the doctor or anyone else should ever make a surgeon perform an unnecessary operation on a patient.

(3) *Age.*—Tonsils should practically never be removed before the age of 4, and rarely before the age of 5 or 6. Adenoids should be removed for proper indications at any age.

(4) *General diseases.*—In the present state of our knowledge there is no justification for removing tonsils for any general disease unless they are producing local symptoms. They should not be removed for frequent colds, upper respiratory tract infections, or allergic conditions.

(5) *Absence of symptoms.*—They should never be removed in a child who is free from symptoms.

Suggested Indications

(1) The operation should only be recommended by a physician or surgeon if he would have it done on himself, under the same circumstances, or on his own child, due regard being paid to the possible risks of the operation.

(2) Tonsils should be removed on account of frequent tonsillitis with fever—three or four attacks a year.

(3) Tonsils should probably be removed after a peritonsillar abscess.

(4) Tonsils should be removed in the very rare case in which they are so large that they cause obstruction to respiration.

(5) Tonsils should probably be removed in diphtheria carriers in whom other treatment has failed.

(6) Adenoids should be removed when they are causing obstruction to the Eustachian tube, or are causing mouth-breathing, or are preventing the drainage of secretions, at whatever age the trouble occurs.

The writer cannot express an opinion as to whether the tonsils should be removed at the same time as the adenoids, or whether adenoids should necessarily be removed when tonsillectomy is performed.

Final Suggestions

If the operation is to be performed, it is suggested that :

(1) It should be done at a suitable time of the year.

(2) It should only be done when the child is an in-patient, never as an out-patient.

(3) The child, if old enough, should be told about the sensations he is going to experience.

(4) He should be given full premedication, so that he does not experience the unpleasantness and frightening experience of an anæsthetic.

(5) The operation should be done by dissection.

(6) The child should have proper convalescent treatment.

(7) He should be properly followed up so as to ensure that the infection for which the operation was performed has been eliminated.

REFERENCES

Addis, T. (1931) *Bull. Johns Hopk. Hosp.*, **49**, 271.

Allan W. B., Baylor, J. W. (1938) *Bull. Johns Hopk. Hosp.*, **63**, 111.

Anderson, J. A. (1945) *J. Pediat.*, **27**, 68.

Aycock, W. L., quoted by Burnet, F. M. (1946), The Background of Infectious Diseases in Man. The Melbourne Permanent Postgraduate Committee, p. 49. Melbourne.

—— (1942) *Medicine*, **21**, 65.

Bordley, J. (1947) *Amer. J. Dis. Ch.*, **74**, 635.

Brennemann, J. (1925) *Arch. Ped.*, **42**, 145.

Burnet, F. M. (1946) The Background of Infectious Diseases in Man. The Melbourne Permanent Postgraduate Committee, p. 38. Melbourne.

Campbell, E. H. (1939) *Arch. Otolaryn.*, **30**, 863.

Campbell, M., Warner, E. C. (1930) *Lancet* (i), 61.

Caylor, H. D., Dick, G. F. (1922) *J. Amer. med. Ass.*, **78**, 570.

Clark, J. P. (1913) *Ann. Otol. Rhin. Laryng.*, **22**, 421.

Colins, S. D., Sydenstricker, E. (1927) Pub. Health Bull., 175, Washington D.C., Govt. Printing Office.

Commission on Acute Respiratory Disease (1946) *Ann. int. Med.*, **25**, 473.

Crowe, S. J. (1944) *Ann. Otol. Rhin. Laryng.*, **53**, 227.

CROOKS, J., SIGNY, A. G. (1936) *Arch. Dis. Ch.*, **66**, 281.
—— (1938) *Brit. med. J.* (i), 935.
CUNNING, D. S. (1948) *Laryngoscope*, **58**, 503.
CUNNINGHAM, R. L. (1931) *Arch. int. Med.*, **47**, 513.
DEAN, L. W. (1934) *J. Amer. med. Ass.*, **103**, 1044.
DENZER, B. S., FELSHIN, G. (1943) *J. Ped.*, **22**, 239.
Editorial Comment (1949) *J. Ped.*, **35**, 526.
ELLIOTT, S. D. (1939) *Lancet* (ii), 589.
ELLIS, R. W. B., RUSSELL, A. E. (1937) *Lancet* (i), 1304.
EPSTEIN, I. M. (1937) *Amer. J. Dis. Ch.*, **53**, 1503.
FISCHER, A. E., MARKS, H. H. (1941) *Amer. J. Dis. Ch.*, **61**, 305.
FORSYTHE, W. E. (1928) *Pub. Health Rep.*, **43**, 560.
GLOVER, J. A., WILSON, J. (1932) *Brit. med. J.* (ii), 1.
—— (1938) *Proc. R. Soc. Med.*, **31**, 1219.
—— (1944) *Month. Bull. Min. Health*, **3**, 52.
—— (1948) *Arch. Dis. Ch.*, **23**, 1.
GORDON, I. (1947) *Brit. J. soc. Med.* (i), 238.
GRIFFITHS, I. (1937) *Lancet* (ii), 723.
HELMHOLZ, H. F. (1930) In discussion *J. Amer. med. Ass.*, **95**, 837.
ILLINGWORTH, R. S. (1939*a*), Unpublished results.
—— (1939*b*) *Lancet* (ii), 1013.
JACKSON, C., COATES, G. M. (1929) The Nose, Throat and Ear and Their Diseases, Philadelphia.
KAISER, A. D. (1930) *J. Amer. med. Ass.*, **95**, 837.
—— (1948) in Brennemann's Practice of Pediatrics, Vol. **2**, Ch. 40, p. 1. Hagerstown, Maryland.
LEVY, D. M. (1945) *Amer. J. Dis. Ch.*, **69**, 7.
LONG, E. R., SEIBERT, M. V., GONZALEZ, L. M. (1939) *Arch. int. Med.*, **63**, 609.
LONGCOPE, W. T., BORDLEY, J., LUKENS, F. D. W., in The Kidney in Health and Disease, 1935, by Berglund, H., and Medes, G., p. 338. London.
MCLAGGAN, J. D. (1930) *Lancet* (ii), 1150.
MAGNUS, H. V., MELNICK, J. L. (1948) *Amer. J. Hyg.*, **48**, 113.
MEYER, O. (1946) *Eye, Ear, Nose and Throat Monthly*, **25**, 244.
NEUBER, E. (1932) Quoted by Glover, J. A. (1948) *Arch. Dis. Ch.*, **23**, 1.
NEWHART, H., COHEN, S. S., VAN WINKLE, C. (1934) *Ann. Otol. Rhin. Laryng.*, **43**, 769.
PATON, J. H. P. (1928) *Quart. J. Med.*, **22**, 107.
—— (1943) *Quart. J. Med.*, N.S., **12**, 119.
RATHER, L. L. (1943) *Amer. J. Path.*, **19**, 725.
REIMANN, H. A., HAVENS, W. P. (1940) *J. Amer. med. Ass.*, **114**, 1.
RHOADS, P. S., DICK, G. F. (1928) *J. Amer. med. Ass.*, **91**, 1149.
RODGERS, T. S. (1940) *Proc. R. Soc. Med.*, **33**, 347.
RUDEBECK, J. (1946) *Acta. med. Scand. Suppl.*, **173**, p. 136.
SCHLITTLER, E. (1938) *Schweiz. med. Wochenschrift*, **68**, 37. Abstract in *J. Amer. med. Ass.*, 1938, **110**, 773.
SELKIRK, T. K., MITCHELL, G. (1931) *Amer. J. Dis. Ch.*, **42**, 9.
WALKER, F. M. (1947) *Brit. med. J.*, **2**, 908.
WILKINSON, H. F. (1929) *Arch. Otolaryng.*, **10**, 127.

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THE TONSIL PROBLEM (*Abridged*)

History.—Removal of the tonsils was mentioned first in the literature by Celsus [1] in the year A.D. 10. He speaks with some familiarity of the operation and describes complete removal. In more modern times Physick [2] of Philadelphia was the first to stress the importance of complete removal of the tonsils and he introduced the first tonsillotome or guillotine. As Scott Stevenson [3] has said the rise in incidence of this operation has been one of the major phenomena of twentieth century surgery. The realization of some of the benefits to be obtained from some of the operations in suitable cases led to a wave of over-enthusiasm for operation. This is an easy operation—to do badly ; and therefore all and sundry have been attempting it. There may indeed be difficulties attending the operation and there may be serious complications, and the realization of these points should emphasize the desirability of entrusting the selection and operation of these children to properly trained laryngological teams.

Basic assumptions.—It is suggested that four basic assumptions be accepted :

(1) Where removal of tonsils and adenoids is indicated this should be complete. The technique employed is immaterial provided that results conform with this dictum.

(2) It is extremely doubtful that there is an internal secretion for these particular pieces of lymphoid tissue, any more than for Peyer's patches to be found in the intestine.

(3) It is a reasonable hypothesis that the tonsils and adenoids are part of a defensive mechanism against infection, specially highly developed at the entrance to the food and air passages and specially active when most needed. For example the enlargement of this tissue in response to local sepsis at various ages is well known; the literature is voluminous.

(4) The defence mechanism may itself become heavily infected and therefore cease to function.

Repeated upper respiratory infections are probably a function of overcrowding in home and school life. The fact that so many children are sent up about their tonsils and adenoids is surely the biggest single argument that we must expect to continue to do a large number of these operations. The tonsil problem, then, resolves itself into a double challenge—to the experts of preventive medicine, and to hospital authorities to provide an adequate number of beds.

Diagnosis.—The problem presenting itself to the laryngologist is whether the tonsils of any given child are harmful rather than valuable. Inspection alone is almost valueless because tonsils will show changes in size and appearance according to the season of the year, and according to how recently the child may have had an upper respiratory infection. The history is of paramount importance, and should be obtained from the parent and the family doctor. The school doctor is less likely to give reliable evidence because he sees the child only at routine inspection, and may not have had a chance to obtain the history from the parents, and almost certainly does not treat the child when ill. Furthermore it is important in evaluating the history to distinguish clearly between the symptoms which might be ascribable to the tonsils and those which might be ascribable to the adenoid tissue. The fact that tonsils and adenoids are frequently removed at the same sitting has led to a good deal of loose thinking and writing, and surveys of results of operation have often been clouded by the fact that the benefits or the reverse have not been ascribed to one piece of tissue rather than the other.

Assessment of adenoidal hypertrophy and infection.

Enquiries here should be directed towards the history of nasal trouble, obstruction, mouth-breathing and snoring. As a result of these questions one may discover that the child is suffering to some degree from sinus infection, and one must not be too sanguine in expecting miraculous cures of this condition by removal of the lymphoid tissue alone. Inspection should include examination of the anterior nares, and for this an aural speculum is found to be extremely useful in small children. Posterior rhinoscopy by means of a mirror is sometimes unsatisfactory, and it is suggested that more use should be made of the naso-pharyngoscope. Digital examination of the post-nasal space in children should be reserved for those cases where there has been a previous adenoidectomy and where there is doubt about residual tissue. Even then that examination is best conducted under general anæsthesia. A high-arched palate, a deviated nasal septum and dental overcrowding form a triad of signs which one should regard as important.

Assessment of the tonsils.

It has been laid down by eminent laryngologists many times that the most certain proof of chronic infection is the occurrence of repeated acute attacks. A peritonsillar abscess (even one) is an indication that the tonsil function has broken down. As has been said the appearance of the tonsils constitutes no clear evidence about whether they should be removed. On the other hand chronic enlargement of glands at the angle of the jaw would suggest that the first line of defence has in fact broken down. Unfortunately the matter cannot be settled by biopsy because morbid histologists are unable to assess the grade to which a tonsil is infected.

Five absolute indications for removal are suggested:

(1) Repeated attacks of acute infection, i.e. more than two.

(2) The occurrence of a single quinsy, though this is uncommon in children.

(3) Cervical glands persistently enlarged in the absence of chronic nasal sinus disease.

(4) Gross hypertrophy causing such obstruction to the air and food passages as to produce symptoms.

(5) Tuberculous adenitis.

In amplification of this last, it would seem a reasonable assumption that in the majority of cases of tuberculous glands in the neck the infective organism enters via the tonsil tissue. In a very large number of cases, tuberculous giant-cell systems can be found in the tonsils of such children. Irwin Moore [4], Scarff and Whitby [5] and Pagel [8] have all written about this topic. Where operation on the glands is proposed it is suggested that this should be carried out before the tonsillectomy, because minor post-operative sepsis of the tonsil-bed may lead to a secondary infection of the gland with breaking down and consequent abscess formation.

In addition, there may be relative indications for the removal of tonsils and adenoids, each of which taken singly would have no real significance. Here again the history is of some

importance. Minor sore throats, attacks of unexplained pyrexia, poor appetite, a dry "tickly" cough having no origin in the chest or nasal sinuses, repeated earache and in general such conditions as are supposedly caused by a focus of infection should all be considered on their merits. The laryngologist, however, would be wise to place major diagnostic reliance upon an actual history of repeated sore throats.

Statistical evidence.—Many statistical surveys have been made in an attempt to assess the value of this operation in children. That made by Kaiser [6] and that by Paton [7] may be mentioned. These surveys are open to criticism from one standpoint or another. For instance it would seem to be important to compare the history of children who have their tonsils and adenoids removed before and after the operation, rather than compare those children with another series who were supposedly healthy. Advice from a statistical expert on this matter suggested that children presenting themselves in the clinic should be divided into two main groups, those who needed the operation and those who did not. Half of the number in each group should have their tonsils and adenoids removed and the other half should be spared the operation. The subsequent history of each sub-group should then be compared with its own prior history, and with the subsequent history of each other sub-group.

It is evident that it would be difficult to reconcile such a survey with clinical honesty.

A brief survey of 337 children upon whom the dual operation was performed in the Radcliffe Infirmary in the last two years has been made by Miss Esmé Hadfield, and her results, though probably not satisfactory to the statistician, at least embody the principle that the children are compared with themselves. It is suggested that no other comparisons are so valid when dealing with methods of treatment of disease in the human subject.

Poliomyelitis and tonsillectomy.—It is generally agreed that the virus of poliomyelitis can be transmitted either by droplet spray or by the intestinal route, and that the latter is the more important. It is suggested that the virus settles in the tonsillar fossæ in recently operated patients and travels straight up the nerve sheath so exposed to the brain. Evidence has been collected that where cases of poliomyelitis closely follow upon tonsillectomy, the type of case is likely to be bulbar rather than spinal. The small number of very dramatic family groups where something of this kind has occurred lend colour to the idea. But it must be remembered that there is no proof that these children had acquired the infection *de novo*, that they were about to develop the disease anyway, or that they were in fact carriers.

Very little can be said with certainty about the epidemiology of this disease, and though it is supposed that the invasion and carrier rates in the child population are very high in the season of peak incidence, it may also be concluded that the immunity rate is high, too.

Scott Stevenson [3] has made a survey of the figures reaching this country from the United States of America and these have been extremely contradictory. In general it seems that the incidence-rate of poliomyelitis in recently tonsillectomized children is about the same as it is in the total child population, but that where such cases do occur they tend to be bulbar and therefore severe. It is necessary to preserve a sense of proportion in this matter, and to remember that the risk of a given child contracting poliomyelitis within a given period of time is less than the risk it runs in crossing a city street. It is suggested that from a public health point of view it is important to weigh that chance against the total good done to the child population by well-chosen operations in the optimum season.

Extra beds.—The waiting list for cases of tonsils and adenoids is something quite distinct from the general list of ear, nose and throat cases. This is, it is suggested, the true "Tonsil Problem". The introduction of the Health Service will, it is hoped, be followed by a very proper diminution of the number of unskilled operations and of the use to which Cottage hospitals are put for this purpose.

Conclusions

(1) Removal of the tonsils has been known as a beneficial operation for 2,000 years at least.

(2) The hypertrophy of the lymphoid tissue calling for operation is due to repeated infections; these being determined by the overcrowded conditions of civilized life.

(3) The number of children continuing to be sent up by their family doctors is in itself the best argument that in selected cases the operation is a beneficial procedure.

(4) The diagnostic criteria now adopted by responsible laryngologists are conservative and sound. Adenoids need separate consideration from tonsils.

(5) The selection of the cases and the operation should be in the hands of specialist teams.

(6) There is a nation-wide shortage of beds, but hospitals could devote beds to no better purpose.

(7) There is no satisfactorily established evidence that the removal of tonsils and adenoids increases the likelihood of a patient acquiring an infection with the virus of poliomyelitis in the epidemic season.

REFERENCES

1 CELSUS. A.D. 10. De Medicina. Cap. vii, Sect. 12.
2 PHYSICK, P. S. (1828) *Amer. J. med. Sci.*, **1**, 262.
3 SCOTT STEVENSON, R. (1949) "Recent Advances in Otolaryngology", 246, 265. London.
4 MOORE, J. L. I. (1928) The Tonsils and Adenoids and Their Diseases, 86. London.
5 SCARFF, G. R., and WHITBY, L. E. H. (1928) *J. Laryng. Otol.*, **43**, 328.
6 KAISER, A. D. (1922) *J. Amer. med. Ass.*, **78**, 610.
7 PATON, J. H. (1943) *Quart. J. Med.* N.S., **12**, 119.
8 PAGEL, W. (1942) *Pract. oto-rhinolaryng.*, **4**, 279.

Miss Esmé H. Hadfield: This pilot survey was made at very short notice and I doubt if the figures are statistically significant although I believe them to be mathematically correct. Altogether 337 children were reviewed. Of these 170 had had their tonsils and adenoids removed in 1947 and 167 in 1948. The cases were in no way selected, and although I have not worked out the age and sex distribution accurately I believe that they are roughly equal in each group. The family doctors of these children were circularized and asked for their comments on their health since operation. Some of their answers were very full and helpful, but the proportion who had lost touch with the children was too high to make it worth while to analyse their statements.

One was very impressed in making the survey by the mothers' answers to the question "is this child better or not for the operation?" Such remarks as "100% better", "a different child", and "she lived on M & B before" occurred with gratifying frequency. However, one was prevented from becoming too smug by the rare mother who produced a long tale of illness which began the moment that the child returned home from the hospital and was still going on.

While reviewing these children I picked up 4 who needed investigation of their sinuses, 3 with allergic rhinitis, 4 with tonsil relics who were still getting severe sore throats, 1 with chronic otitis media, and 10 with unrelated pathological conditions.

My first table shows the percentage answers to the question: "Is the child better or not for the operation?"

	Better	Not better	Don't know	Unchanged
1947	89·4	1·2	4·7	4·7
1948	88·6	1·2	6·6	3·6

Incidence of sore throats before and after the operation.

	Sore throat before none since	Never had a sore throat	Still has sore throat
1947	58·0	30·0	12·0
1948	68·0	23·5	8·5

Incidence of colds.

	More colds	Less colds	Unchanged	Don't know
1947	3·5	74·0	22·0	0·5
1948	0·6	90·0	9·4	0

Improvement or not in hearing. (Of course in the large proportion of children the hearing had never been affected.)

	Better	Worse	Not better	Never affected
1947	15·6	4·3	3·0	77·1
1948	17·0	0·6	4·2	78·2

Snoring.

	Before operation but not since	Never snored	Still snoring
1947	73·0	16·8	10·2
1948	75·0	21·5	3·5

Incidence of aural discharge without symptoms of acute otitis media.

	Before but not since	Since but not before	Before and since	Never
1947	10·6	3·0	5·9	80·5
1948	13·2	0·6	3·0	83·2

Incidence of acute otitis media.

	Before not since	Since but not before	Before and since	Never
1947	8·3	5·3	2·3	84·1
1948	7·6	0·6	1·8	90·0

Present general condition and development of the children.

	Average	Above average	Below average
1947	55·0	28·2	16·8
1948	62·7	26·5	10·8

Only one child had had a subsequent operation on the ears, nose or throat and this child had had a re-adenoidectomy.

Mr. R. Scott Stevenson said that he must take exception to Professor Illingworth's use of the word "irrefutable" regarding the alleged evil influence of tonsillectomy on the incidence of poliomyelitis. The evidence from America, on which this opinion was founded (for there was not enough evidence in this country), was certainly not "irrefutable". For his own part he thought it wrong to found an opinion one way or another on the American evidence, for one publication was cancelled out by another ; if Professor Illingworth quoted Utah in 1943 he could quote against him Wichita, Kansas, in 1940, and so on and on ; there were scores of articles to quote from on each side.

Probably the most reliable authority in this field was D. S. Cunning of New York, who, in recent years, had been collecting statistics from different districts and analysing them in the form of a useful annual report. Cunning (*Laryngoscope*, 1949, **59**, 441), who had studied 17,000 cases of poliomyelitis and 35,000 cases of tonsillectomy, said that he was "quite convinced that no definite causal relationship between tonsillectomy and poliomyelitis had been established". In the Manhattan Eye, Ear and Throat Hospital, among 35,039 children in nine recent years who had had their tonsils operated on, only 5 had contracted bulbar poliomyelitis.

Turning to the subject of tonsillectomy, the attack upon that operation in recent years was in the main by public health officials and had been grossly exaggerated. The Medical Research Council in a report on epidemics in schools in 1938 stated that "there was a tendency for the operation to be performed as a routine prophylactic ritual for no particular reason and with no particular result". Such a remark was merely an impertinence and unworthy of an M.R.C. publication. Dr. Alison Glover's repeated attacks on tonsillectomy were more worthy of attention, but his opinions had been founded entirely on statistics, and they all knew what they could do with statistics.

Professor Illingworth was good enough to say that the ear, nose and throat specialist was a better judge than the pædiatrician on whether tonsillectomy should be done or not. He himself felt that the problem was best approached from the point of view of the patient's history, and the child's mother might often make the best judge. Was the child getting sore throats, frequent colds, otitis media ? If the tonsils were giving trouble they should be taken out ; but if they were not giving trouble they should be left alone.

The following speakers also took part in the subsequent discussion : **The President (Mr. R. D. Owen), Mr. H. V. Forster, Mr. Mackenzie Ross, Dr. R. F. Hendtlass, Dr. J. C. McFarland, Mr. W. L. Thomas, Mr. T. A. Clarke, Mr. Munroe Black, Mr. Denis Browne.**

Professor Illingworth, in reply, said how much he had enjoyed Mr. Scott Stevenson's contribution. Mr. Scott Stevenson had stated that Cunning was the most reliable worker in the United States. That was a statement which he could not accept. Mr. Scott Stevenson had further said that he did not believe at all in statistics, and then he had gone on to try to convert them with statistics from Cunning. He himself knew the work of Cunning and had read his articles, but he felt that there were snags in that statistical study. One was that in the questionnaire which was sent out at the instigation of the American Oto-Rhino-Laryngological Society, the results were obtained after the operation had been very largely stopped in the areas where poliomyelitis was most heavily epidemic ; therefore the results were rather obscure. In the areas where there was poliomyelitis a lot of people decided not to do the operation. The American Foundation for Infantile Paralysis recommended that the operation should not be done during the prevalence of a poliomyelitis outbreak.