THE PAEDIATRIC APPROACH TO TONSILLECTOMY*

BY

J. ALISON GLOVER, C.B.E., M.D., F.R.C.P., D.P.H.

Tonsillectomy is by far the most frequent operation done under a general anaesthetic, and in the last twenty years far more than one and a half million tonsillectomies have been done on public elementary school children in England and Wales. It is an operation not devoid of risks or even of mortality and, as the Journal of the American Medical Association (Editorial, 1947) (a journal by no means prejudiced against it) has recently stated, it 'should command all the respect of a major operation.' Its incidence, despite much criticism of mass tonsillectomy, is still excessive.

Incidence

The eccentricities of the incidence of tonsillectomy distinguish it from that of any other surgical procedure or morbid condition. In this country its frequency has mounted in some forty-five or fifty years from almost none to some two hundred thousand a year, and in the children of the well-to-do it is more than three times as high as in children who attend public elementary schools.

Local Incidence

If this latter, the incidence upon public elementary school children, be studied from the official returns made by local authorities of tonsillectomies done under their schemes of treatment, comparisons between neighbouring or similar areas often show startling differences in the tonsillectomy rates, that is, in the number done each year shown as a percentage of the children in average attendance at the public elementary schools in that area. These great variations in local incidence are unrelated to any climatic, environmental, or nutritional factor, but appear to depend almost entirely upon medical opinion in the individual area. The table shows the incidence in Kent in the last three pre-war years. The rate in these three years was relatively constant in each area. The unimpressive looking percentages for England and Wales given for comparison represented the enormous numbers of about 81,000, 84,000 and 89,000 tonsillectomies done in the respective years.

Kent County Council, comprising largely rural areas, had for the three years exactly the same average percentage rate as England and Wales, and the actual number of operations done in 1938 was 1,362.

Of the urban areas in Kent, seven—Beckenham, Chatham, Dover, Maidstone, Rochester, Erith, and Penge—had practically the same rate as the county and England and Wales (1.8 per cent.). Faversham (1.3) and Gravesend (1.2) had somewhat lower rates, and Ramsgate (0.9) had just half the national

TABLE
KENT EDUCATION AREAS: ANNUAL PERCENTAGE RATE OF ALL CHILDREN IN 'AVERAGE ATTENDANCE' AT PUBLIC ELEMENTARY SCHOOLS TONSILLECTOMIZED IN THE LAST THREE PRE-WAR YEARS

Education Authority	Annual tonsillectomy rate			3-years average	Percentage of children who would be tonsillectomized during the nine years of school life (i.e. (2) × 9)
	1936	1937	1938		
E. and Wales	1.7	1.8	2.0	1.8	16
Kent C.C.	1.9	0.9	2.6	1.8	16
Canterbury C.B.	2.7	3.6	4.1	3.5	32
Beckenham	1.4	1.8	2.3	1.8	16
Bexhill	5.5	4.3	5.5	5.0	45
Bromley	3.3	3.5	3.8	3.5	32
Chatham	1.4	1.8	2.0	1.7	15
Deal	0.2	0	0	0.1	1
Dover	1.4	1.7	2.1	1.7	15
Faversham	1.4	1.4	1.2	1.3	12
Folkestone	3.9	4.4	3.5	3.9	35
Gillingham	2.4	2.5	2.8	2.6	23
Gravesend	0.6	0.9	2.2	1.2	11
Maidstone	1.0	2.0	1.6	1.9	17
Margate	2.5	2.7	3.7	3.0	27
Ramsgate	0.5	0.9	1.4	0.9	8
Rochester	1.7	2.3	1.5	1.8	16
R. Tunbridge W.	4.0	6.2	3.9	4.7	42
Erith	1.4	2.8	2.4	2.2	20
Penge	1.9	1.8	2.3	2.0	18

rate. In Deal hardly any were done under the local authority's scheme. Deal, in this respect, had good companions in other counties. But Canterbury (3.5), Bromley (3.5) and Folkestone (3.9) had twice—and Bexhill (5.0) and Royal Tunbridge Wells (4.7) nearly three—times the county and national rate. Column 3 shows what these rates meant when applied to the nine years of a child's elementary school life. A child in a Bexhill elementary school was five times more likely to have his tonsils out than was a child in Ramsgate, and, by the time elementary school life was over, nearly 50 per cent. of Bexhill children would have been tonsillectomized. Margate had a rate three and a half times that of Ramsgate, and Royal Tunbridge Wells one nearly three times that of Beckenham. Elsewhere (Glover, 1938) I have given still more striking contrasts in other counties.

* Presidential address to the Kent Paediatric Society, 1947.

Social Incidence

But these elementary school percentages in column 3, of children who have been tonsillectomized by the end of their school life at fourteen years, look small beside those of the pupils of wealthy public boarding schools, who have been tonsillectomized before entry at about thirteen and a half years.

The Report of the Schools Epidemic Committee, dealing with seventeen large boarding schools for boys and nine large public boarding schools for girls shows that in 1934 58.2 per cent. of boys and 50.1 per cent. of girls were tonsillectomized, and that these percentages had risen by 6.0 per cent. and 7.0 per cent. in five years, although in the same years the number of tonsillectomies done in the public elementary schools had shown a reduction of one-third, this being in response to the strong criticism of excessive operating which culminated in 1931. Most public school pupils had been operated upon before entry. At Eton in 1938 some 83 per cent. of new boys were found to have been tonsillectomized before entry. In general, the wealthier and the more exclusive the school the higher is the tonsillectomy rate, and for a boy 'to be born with a silver spoon in his mouth' seems to be one of the conditions which lead to tonsillectomy.

Sex Incidence

Boys are more frequently tonsillectomized than girls, and earlier in life, though girls seem to suffer as much from acute tonsillitis as boys. Maternal solicitude may be a factor, for the boy of five to seven years more often looks skinny and miserable than the girl.

The Age Incidence

A consideration of age distribution of incidence is of great importance in our paediatric approach. The highest incidence* occurs between five and seven years with the peak at six, and thus coincides with the end of the second 'springing up' phase of the child's development, and with great changes in his dentition and in his environment, for he then first comes into contact with the fresh infections of school life. If the tonsil has a function 'absorbing small numbers of organisms and so establishing immunity by gradual dosage' (Griffith, 1937) this is the time when it is most likely to be useful, and when enlargement might be expected and might even be beneficial. In fact the fate of many a tonsil seems like that of the poor faithful hound Gelert, whose abnormal appearance caused his death before they found the dead wolf he had slain and the unhurt child he had saved.

Many of the operations performed at this age of rapid development remove tonsils which have become enlarged in response to their protective function. Some of the improvement ascribed in

these cases to tonsillectomy may well be due to developmental changes which take place at this stage in the child's life, the critical age of seven according to Hippocrates, and according to Harris (1931) the year of transition from the second 'springing up' period to the second 'filling out' period of eight to ten years.

Neuber (1932) in Hungary found that in the lower forms of elementary schools children with 'hypertrophic' tonsils had a greater average height and weight than those with 'normal' tonsils.

Ellis and Russell (1937) wrote of the 4,000 Basque children who had come out of siege conditions and terrible overcrowding to Southampton: 'Another revealing feature of the group was the appearance of the children's throats. Less than 2 per cent. had had tonsillectomies performed, and in a very great number of cases the tonsils were as large or larger than walnuts. But the incidence of both cervical adenitis and otorrhoea was only approximately 0.4 per cent., and that of obvious respiratory infection almost incredibly low. The same is true of nasal discharges and respiratory obstruction.'

Epstein (1937) has shown that even in carefully selected cases better results were obtained by tonsillectomy in children between six and ten years, than in children under six.

Indications for Tonsillectomy

Though as Dean (1934) has said, 'it is always a gamble,' few will deny that in a properly selected case tonsillectomy may have brilliant results. Why has this useful operation been debased into 'so widespread an attack upon a normal structure of the body' (Paton, 1928)? Why have its probable function in childhood and its tendency to spontaneous involution alike been so often overlooked in this wholesale and hasty resort to symptomatic treatment in its crudest form? These questions form the crux of my subject.

The indications for operation fall into two main groups: the 'objective' (size and appearance), and the 'indirect,' the hoped-for prophylactic or curative effect of the removal of the tonsils on respiratory infections and other conditions.

Objective Indications

As regards the first group they are almost invariably present, that is, the tonsils either are large, or look 'diseased' or 'infected' or 'pathological.'

Nowadays fortunately it is generally said that the size of the tonsil (which after all may be only the sign of hard immunological duty well done) is of no clinical importance unless there is real obstruction, which is a rare condition. 'If the standard of size be adopted many innocent tonsils will be sacrificed whilst some of the worst offenders will escape' (Allen, 1932). But though this be said I fear many a tonsil is still condemned on size alone, for slight enlargement without any other symptom was the

* Rolleston (1939), in 870 children found the highest incidence between 4 and 6 years with a sharp peak at 5 years.

only indication in 31 per cent. of Griffith's (1937) series of 4,500 children sent to hospital for tonsillectomy. Most books state that obviously 'diseased' or 'pathological' or 'infected' tonsils should be removed. Some think these conditions can be ascertained by inspection, and consider a band of chronic dark red congestion in the mucous membrane covering the anterior fauces diagnostic. Others, like Scott Stevenson (1935) and Ballenger (1943) consider the presence of pus in the crypts, shown by pressing the anterior pillar when muco-pus or cheesy matter exudes from some of the crypts, a most important sign. Even here we have much contradiction. Epstein (1937) found large tonsils almost always infected and that redness of the anterior pillars was not a reliable indication of infection. Others say that abscessed crypts are practically always found after infancy. Epstein found no evident connexion between the amount of caseous matter in the crypts or the size of the crypts and the results of removal. But Dean (1934) writes that 'he could not identify a chronically diseased tonsil except after removal and microscopic study,' which recalls the old Guy's aphorism, 'Call no man healthy until he is dead and Dr. Moxon has performed the post-mortem.' Epstein, by no means a disbeliever in sane tonsillectomy, goes further: 'There are two objections to the dictum that an infected tonsil should come out. The first is that it usually has no bearing on the situation in children, whose tonsils are removed usually because of infections of the upper respiratory tract. The second objection is that even if infected tonsils ought to be removed, the dictum is valueless because the physician admittedly does not know an infected tonsil when he sees one. As pointed out previously there is not even agreement as to the diagnosis of infection on microscopic examination, let alone on clinical examination . . . there is nothing to lead one to feel that the appearance of the tonsils should ever influence one's judgment as to the advisability of removing them for the improvement of the child's health.'

It is obvious that an organ of which the probable purpose is to arrest invading organisms must be 'infected.'

The *Lancet* recently (Editorial, 1943) said, 'It now seems probable that the tonsil by trapping pathogenic bacteria, not only may act as a front line guard against infection, but may also contribute to the production of antibodies specific against the invading micro-organisms. Enlargement of lymph glands in response to infection is commonplace, and is not as a rule accompanied by increase in blood lymphocytes. Rantz studied specific antibodies in sixty-four children who were streptococcal throat carriers, thirty-three of whom were proved by culture of the excised tonsil to have been carriers of Group A haemolytic streptococci. He found a quick and consistent fall of antistreptolysin and correlated the reduction in circulating antibody with

the removal of the antigenic stimulus in the tonsil. The argument seems to be in favour of a conservative attitude towards the enlarged tonsil.'

Indirect Indications

Many textbooks and papers give us lists of indirect indications, sometimes with percentage frequencies. Here is one by Ash (1931) of the indications in nearly 1,700 cases in elementary school children, gathered into twelve groups: 20 per cent. for frequent sore throats and tonsillitis; 12 per cent. for frequent colds; 12 per cent. for chest conditions; 11 per cent. for enlarged turbinates and deviated nasal septum; 11 per cent. for earache and obstructive deafness; 4 per cent. tubal catarrh; 6 per cent. otitis media; 6 per cent. enlarged cervical glands; 4 per cent. rheumatic conditions; 9 per cent. 'systemic and general conditions'; 3 per cent. eye conditions; 4 per cent. 'reflex conditions.' Another authority gave thirty-three indications (in seven groups) and a recent text book forty-seven. The length of and great variation in such lists suggest that many of the indications shown in them may be of little value, and recalls the words of Sanford Blum who, as early as 1915, wrote, 'Tonsillectomy has become a menace. It is performed not only where definite indications are present, but also for the most trifling reasons (witness reports of reputable physicians that they consider anorexia, faucial hyperemia, restless nights, indications for tonsillectomy) and sometimes for no reason.'

Acute tonsillitis. It is generally agreed that frequently repeated attacks of acute tonsillitis form the most reliable indication. It is the one assigned in about one-fifth to one-third of the cases in most series. But how frequent have the repetitions to be to condemn the tonsil? Acute tonsillitis may be a reaction to invasion by *S. pyogenes* and protective rather than dangerous.

Layton (1938) suggested three acute attacks within one year, or two if accompanied by joint pains. Most authorities merely say 'repeated' or 'frequent.' As the frequency of sore throats decreases rapidly as age increases, this indication must be related to the age of the patient. An attack sustained during an epidemic of sore throats, scarlet fever, influenza, or measles, in the community of which the child is a member, should be regarded as a protective reaction.

The possibility of a child having repeated attacks of acute tonsillitis because some intimate contact is a carrier of *S. pyogenes* should be borne in mind.

Recurrent quinsy is a strong indication for tonsillectomy after an appropriate interval, but quinsy rarely occurs in children.

Frequent colds. Frequent colds, nasal catarrhs, and coughs are still often invoked to justify operation. Epstein, who had 'fair results' in older children, found results for head colds and coughs 'especially poor' in those under six years, and

particularly so in those under four. Bradley (1930) in England, like Smiley (1924) and Forsythe (1928) in America, thought little of this indication. More recently Griffiths (1937) has written, 'In no circumstances should tonsils be removed for nasal catarrh.' Layton (1938) 'did not believe recurring colds were ever cured by tonsillectomy,' and Rodgers (1940), 'Tonsillectomy done for colds in the head was needless and sometimes harmful.' Paton (1943), judging by school days lost in a well-to-do boarding school observed over ten years, found that 435 tonsillectomized girls 'suffered much more from respiratory infections' than 393 non-tonsillectomized girls.

Thus, although thousands of tonsillectomies are still done to prevent colds, nasal catarrhs, and coughs, opinion now tends to regard them rather as symptoms of sinusitis, than as indications for tonsillectomy, which is neither preventive nor curative of them.

Sinusitis. Sinusitis, long considered to be an indication for tonsillectomy, is now regarded rather as a cause of tonsillitis. Griffith found that first attacks of sinusitis occurred more commonly in his operated children, and Kaiser (1942) that tonsillectomy rarely benefits this condition. Crookes (1938) concludes first that 'disease of the tonsils and adenoids is not a common cause of sinusitis and that their removal is neither a preventive nor a cure of the condition . . . sinusitis is a common cause of inflammation of the adenoids and to a lesser degree of the tonsils. The first step in the treatment of sinusitis is the treatment of the sinus itself and not the removal of the tonsils and adenoids.'

Birdsall (1939) writes, 'Tonsillectomy is often performed upon children with sinusitis without any beneficial results. Careful examination of the nose would prevent this error in a large proportion of cases.'

Bronchitis. Even recent textbooks, like that of Hall (1941), give 'bronchitis and other chest conditions associated with colds and sore throats' as indications. Twelve per cent. of Ash's children and 14 per cent. in Griffith's series had been operated on for 'chest conditions.' The general trend of opinion now is, however, towards regarding bronchitis and pneumonia rather as contra-indications.

Kaiser found that bronchitis occurred 'somewhat more frequently' and pneumonia 'more frequently' in the tonsillectomized children than in the unoperated controls of his series (who are particularly valuable as controls because they had initially been considered just as suitable for tonsillectomy, but for some reason had not had the operation).

The value of deductions from statistics such as those of Paton or of the School Epidemics Committee from boarding schools with high proportions of their pupils tonsillectomized is somewhat lessened by the argument that although the tonsillectomized may suffer more from colds and chest conditions than the non-tonsillectomized, they might have

suffered still more than they did, and, further, that the operation rendered them nearly as resistant as their non-operated companions. But this latter argument seems to lose much of its force when a very high proportion of the pupils, such as obtains in some wealthy schools, is tonsillectomized.

Asthma and allergic conditions. Denzer and Felshin (1943) found that, in 11 per cent. of 217 children presented for tonsillectomy, asthma or some other allergic condition unlikely to be relieved by operation was the cause of the symptoms. Tonsillectomy has no beneficial effect on asthma, allergic conditions, or toxic acidosis.

Enlarged cervical glands. These accounted for 6 per cent. in Ash's series, and 15 per cent. in Griffith's and are rated high by the textbooks. Hall specifies 'prolonged glandular enlargement which does not subside with the recovery of the tonsillar infection'; Lederer (1943) 'recurrent or persistent'; Denzer 'when it occurs in children with large or diseased tonsils with frequent upper or lower respiratory disease.' In Kaiser's series 15 per cent. alike of operated and control groups had visible enlargement; he found that, for this condition, tonsillectomy was justified and the benefit striking. Paton, on the other hand, found adenitis more common in those girls whose tonsils had been removed. Davis (1938) found cervical adenitis was common and more severe in tonsillectomized patients. Hobson (1938) regards a persistent though varying enlargement associated with tenderness on pressure and recurrent febriculae as important clinical evidence of chronic tonsillar infection and, in the absence of sinusitis and dental sepsis, an indication for tonsillectomy; but he nevertheless finds enlargement as obvious and universal in the tonsillectomized as in those with intact tonsils, and that an acute adenitis in the tonsillectomized individual is a peculiarly noticeable feature of many streptococcal epidemics.

Otitis media. Lederer places this indication high (fourth) on his list, as does Hall. It was the indication in 6 per cent. of Ash's series, in addition to 11 per cent. for 'earache' and 'obstructive deafness,' and 4 per cent. for 'tubal catarrh,' that is, 21 per cent. in all for ear conditions. 'Ear conditions' were the indication in 3.4 per cent. of Paterson's series, and 'deafness' for 4 per cent. in Griffith's.

In Kaiser's series purulent otitis media had occurred before operation in 15 per cent. of the operated children and 12 per cent. of the non-operated controls. After ten years' follow-up he thinks less of this indication than after three years. During the three years following the operation the incidence was considerably lower in the operated than in the controlled, but during the next seven years the controls fared somewhat better than the operated.

Davis writes, 'Symmetrical (i.e. of both ears) catarrhal otitis media, when not due to any other cause, makes tonsillectomy and the removal of

adenoids imperative.' Griffith concludes that tonsillectomy does not necessarily improve cases of middle-ear disease. Tumarkin (1937) pronounces strongly against this indication.

The Epidemics in Schools Committee found some slight indication that the incidence of rheumatism, otitis media, and mastoid disease is higher in the tonsillectomized, but here again pointed out that it might have been higher in them if tonsillectomy had not been performed.

There is evidence that drastic reduction in the number of tonsillectomies by no means increases the incidence of otitis media and cervical adenitis. The Derbyshire school medical service (Glover, 1938) in the three year period 1929-31 did on an average 2,394 tonsillectomies a year, and found at routine and special examinations an average of 243 cases of otitis media and 872 of enlarged cervical glands. Drastic reduction in tonsillectomy begun by Ash in 1932, and three years later, in the three-year period 1935-37, the yearly average of tonsillectomies done was 178, less than one-thirteenth of the average in 1929-31; the average number of cases of otitis media found was reduced to 192 and of enlarged cervical glands to 632.

Similar reductions in the case of otitis media followed even more drastic reductions of tonsillectomies by Garrow in Hornsey, which began in 1929 (Glover, 1938).

Tonsillectomy is in some cases the cause of suppurative otitis media. Keen (1932), in 9,344 tonsillectomies, found that sixty (0.64 per cent.) of children who had not had otitis previously, besides seven others in whom a previous otitis recurred, developed suppurative otitis media directly following the operation. The sixty included six with mastoiditis and intracranial complications of which three children died. Burton and Sandiford report that at the Ilford Aural Clinic (1939) of 212 cases of otorrhoea seen in four years, the original cause of the primary otitis media in seventeen cases (8 per cent.), was tonsillectomy.

O'Donnell had five (0.85 per cent.) cases of acute otitis media following 588 tonsillectomies, and Nesbitt (1934) twenty-two (1.5 per cent.) in 1,459 out-patient children at the Royal Infirmary, Edinburgh.

Nephritis. Nephritis, though not numerically important as an indication, is of interest as an example of how hard it is to get rid of a fallacious indication. It is a well defined condition for which tonsillectomy was confidently recommended, and still is by some. It has been studied by Illingworth (1939) at Great Ormond Street, where no bias against the operation could be suspected, for over eleven years. He shows that (a) tonsillectomy does not prevent nephritis, but may predispose to it, (b) tonsillectomy does not cure nephritis or prevent it from progressing to the chronic stage, (c) tonsillectomy may cause nephritis.

Nevertheless six months after the publication of Illingworth's paper, a distinguished surgeon on the

staff of the same hospital, writing that nephritis is another disease which in many cases is secondary to tonsillitis (which is of course true), goes on to say, 'Although grave damage has already been done further injury can be arrested by timely attention to the source of infection' (that is, tonsillectomy).

How slow medical opinion is to abandon tonsillectomy as a remedy is shown by its being done in the acute stage in 119 cases though no beneficial effect on the urinary condition was observed in any case. In 5 per cent. of the three hundred cases tonsillectomy was the probable cause of the nephritis. There seems little doubt that nephritis should be transferred from 'indication' to 'contra-indication.'

Acute rheumatism and carditis. Gradually medical opinion has turned against this indication in which twenty years ago I believed. Some, while recognizing that the operation is neither a preventive nor a cure of rheumatic disease or of its recurrence, still hesitate to relinquish it. Wallace and Brownlie-Smith (1936) found no evidence that tonsillectomy before the age of five years protects a child against acute rheumatic infection, and that comparison with a controlled series of cases suggests that tonsillectomy during early childhood may even increase a child's susceptibility to acute rheumatism.

Summary

As paediatricians our approach to tonsillectomy should be cautious and should take into account the following considerations,

1. Despite criticism, the incidence of tonsillectomy, the most frequent cause of hospital admission, remains excessive, particularly in children between five and seven years of age.

2. This age distribution suggests that many tonsillectomies are done because of enlargements which are either physiological, associated with the great changes in development during this critical period, or immunological responses to the unaccustomed infections met with on entry to school, or to the sepsis resulting from the decay of the primary teeth.

3. Tonsils cannot be determined as 'diseased' or 'infected' by clinical examination; as their function includes the arrest of pathogenic organisms, the fact that these can be found in them after removal forms no justification for the operation.

4. Tonsillectomy should command all the respect due to a major operation. In a proportion of cases it is followed by unpleasant sequelae, and it has a mortality which, though small, is larger than is generally appreciated. Moreover, tonsillar remnants are often left, which may be more harmful than the original tonsils.

5. The most reliable indication is the occurrence of frequently repeated attacks of acute tonsillitis

which cannot be explained by extraneous infection.

6. Some indications still often held to justify the operation, particularly frequent colds, chronic nasal catarrh, and otitis media are misleading. To remove the tonsils to cure sinusitis is to put the cart before the horse. Certain other conditions, including bronchitis, asthma, and nephritis, are definitely contra-indications. The value of the operation in benefiting acute rheumatism is doubtful.

7. The operation has no value as a prophylactic against common infectious diseases, with the possible exception of diphtheria. In residential schools with high tonsillectomy rates, while the incidence of recurrent sore throats may be somewhat diminished, that of frequent colds is slightly increased. The incidence of otitis and mastoid disease is the same, or perhaps slightly increased, in the tonsillectomized, while their liability to bronchitis and pneumonia is also increased.

8. The operation is never urgent, and should always be preceded by a period of observation of six months after the completion of any necessary treatment of teeth or sinuses. It should not be done in winter or early spring, or during the prevalence of infectious diseases, especially of measles or influenza, and most of all when poliomyelitis is epidemic.

9. Further critical and controlled investigation of the indications for and after-results of tonsillectomy are needed, with further study of the optimum age; probably these could best be carried out at the type of clinic resembling the 'Upper Respiratory Clinic for Children' suggested by Mr. Capps, or the pre-tonsillectomy clinic at Mount Sinai Hospital described by Denzer.

10. It is well to remind ourselves that in 1885 that great paediatrician, Goodhart, said of tonsillar enlargement, 'It is comparatively seldom that an operation is necessary . . . children generally grow out of it and at fourteen or fifteen years of age the condition ceases to be a disease of any importance.'

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