

REPRINTS AND REFLECTIONS

The Incidence of Tonsillectomy in School children*

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The rise in the incidence of tonsillectomy is one of the major phenomena of modern surgery, for it has been estimated that 200,000 of these operations are performed annually in this country and that tonsillectomies form one-third of the number of operations performed under general anaesthesia in the United States. There are, moreover, features in the age, geographical and social distribution of the incidence, so unusual as to justify the decision of the Section of Epidemiology to devote an evening to its discussion.

HISTORY

It seems unnecessary to review the history of operative treatment of the tonsil, and I will confine myself to pointing out that while it was natural that, in pre-anaesthetic and pre-Listerian days, the incidence of operation should be very small, it is astonishing to find how recent is the great vogue of the operation. For many years after the introduction of anaesthesia and aseptic surgery the incidence remained low. In 1885 that great physician Goodhart¹ said, "It is comparatively seldom that an operation is necessary, and fortunately so, for parents manifest great repugnance to it. Children grow out of it, and at 14 or 15 years of age the condition ceases to be a disease of any importance". These words were repeated in several subsequent editions.

In 1888 I went to a preparatory boarding school of 50 boys, and then, in 1890, to a public school of 650 boys. Though, as the son of a doctor and destined for the profession myself, I took some interest in medical matters even then, I cannot recall a single boy in either school who had undergone the operation. Both schools still flourish, but the percentage of tonsillectomized boys is now in both alike about 50%, and, as we shall see later, even this is nowadays a low figure for schools of these types.

Old photographs reveal little difference in appearance between the untonsillectomized fathers and the tonsillectomized sons, and although the latter seem to

grow taller and heavier than we did, memory suggests that we were at least as resistant to infection.

EARLY ESTIMATES OF THE NEED FOR OPERATION

It is difficult to estimate the number of operations previous to the introduction of the School Medical Service. Any such estimate is derived either from estimates of the number of children whose tonsils are said to "require immediate operation" or from hospital records.

In 1903 the Report of the Royal Commission on Physical Training (Scotland) gave the age-and-sex grouped results of the examination of 600 Edinburgh and 600 Aberdeen school children, in tables, which showed well the two periods of physiological enlargement. The total percentages of children with enlarged tonsils are in Edinburgh, 30.3, and in Glasgow, 21.2. All enlargements, however slight, are included. "About one-fifth to one-fourth, that is about one in twenty, of all the children examined would probably have benefited by surgical treatment".

Thus some 6% in Edinburgh and 4% of the Aberdeen children were thought probably to require operation. The high figures for the girls at puberty suggest that many cases of physiological enlargement have been included. By way of contrast, twenty-eight years later, ie in 1931, The School Medical Officer for London², stated that more than 33% of London elementary school children had been operated upon by the time they left school at 14 years.

This London figure of over 33% is much the same as the mean (32%) of the Edinburgh and Aberdeen children at age 12–15, but whereas in 1903 it was thought that only one-fifth of this 32% would probably have benefited by operation, in 1931 more than 33% of London elementary school children had actually been operated upon.

HOSPITAL RECORDS

Before dealing further with records from the School Medical Service, I turn to those from hospitals.

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TABLE I – Rise and fall in the number of operations at certain hospitals

	Royal Infirmary, Edinburgh	Radcliffe Infirmary, Oxford	Hospital for Sick Children, Great Ormond St	Middlesex Hospital
1895	21			
1897		14		
1907	792	235		
1911			1819	
1917	1381	352		
1927	2923 (including 728 out-patients)	610		586 (all out-patients)
1931			4019	
1932			3619	
1933			3666	
1934			3378	
1935			3058	
1936			2963	
1937	2046 (including 475 out-patients)	990		352 (all in-patients)

T. Jefferson Faulder³ in 1910 estimated that in twenty-five London “institutions” 23,979 Operations were done in a year. He points out the difficulty of estimation arising from the fact that, at that time, and, indeed, up to comparatively recent years, many tonsil operations were performed in out-patient departments, for which incomplete or no records have been kept. Latterly a fuller appreciation of the risks of the operation, risks repeatedly emphasized by the Board of Education, has caused most authorities to arrange for admission of all patients. Thus Mr PB Ashcroft tells me that, at the Middlesex Hospital in 1927, there were 586 tonsil operations on children, all in the out-patients department. In 1937 there were 352, all on children admitted as in-patients.

The following very incomplete table suggests the rapid rise in vogue of the operation at the beginning of the twentieth century, the comparative slackening during the War years, the high tide of 1931, and the subsequent ebb.

For the information therein I am greatly indebted to Dr G Ewart Martin and Miss R McGlashan as regards the Royal Infirmary, Edinburgh; to Dr P Mallam and Mr AGE Sanctuary as regards the Radcliffe Infirmary, Oxford; To Dr J Paterson and Mr D Owen Davies as regards the hospital for Sick Children, Great Ormond Street; to Mr PB Ashcroft for the numbers at the Middlesex Hospital.

RECORDS FROM THE SCHOOL MEDICAL SERVICE

The School Medical Service first became general in 1907, and was naturally confined in its early years mainly to inspection. The provision of treatment gradually followed and grants in aid of treatment having been first paid by the Board of Education in

1914, it was made compulsory in 1918. Full statistical returns of treatment are available from 1923.

In pre-War years emphasis seems to have been laid rather upon the incidence of adenoids than of tonsil conditions.

The rising tide of incidence. – After the War, during which there was a lull, a rapid rise to a peak in 1931 took place. This is shown in Table II.

In some of the early years of the School Medical Service it had seemed necessary to recommend further provision for the operative treatment of tonsils, but the tide rose so fast that in his Annual Report for 1923, Sir George Newman⁴ issued the first of his many warnings against premature resort to operation. During that year nearly 48,000 tonsillec-tomies were performed upon elementary school children, the children operated upon forming 0.9% of all children in average attendance. Notwithstanding this warning, repeated almost every year, and reinforced by a memorandum from the Section of Laryngology of the Royal Society of Medicine, the number of operations mounted steadily until, in 1931, more than 110,000 operations were performed, ie on 2.2% of the children in average attendance. In his Annual Report for this year (1931, p.50) Newman strongly urged a more conservative attitude towards operation, pointing out that as the normal school life of an elementary school child is nine years – from 5 to 14 – the percentage subjected to the operation at some stage of their school life is much greater than the percentage in any one year. Indeed if the annual percentage were to remain constant, the percentage of children who undergo the operation at some time during their school life would be about nine times the annual percentage.

This strong admonition, combined with the work of Tilley⁵, Paton⁶, Layton⁷, Warwick James⁸, Bradley⁹, Wilson¹⁰, and others in this country, and of

TABLE II – Number of tonsillectomies officially recorded annually in public elementary school children for London and England and Wales respectively

	London	England and Wales
1919	11,817	42,004
1920		55,293
1923	7,656	47,685
1974	8,051	49,436
1925	12,179	60,871
1926	13,165	68,250
1927	14,843	80,548
1928	17,372	92,171
1929	17,186	97,518
1930	18,119	109,738
1931	18,178	110,239
1932	15,558	95,875
1933	11,436	77,564
1934	9,715	73,259
1935	9,959	73,763
1936	9,937	80,676
1937	10,198	84,414

Cunningham¹¹ in America, together with the courageous example of Ash¹² in Derbyshire, exerted a definite influence upon medical opinion.

A considerable fall in the operation rate ensued in 1932 and continued until 1935 in England and 1936 in London. The rate is, however, now rising once more.

Sex incidence. – More boys are operated upon than girls. This fact appears in all series to which I have had access* and in which the sexes are given separately. Thus at the Cyril Henry Treatment Centre of the London County Council, Dr. C.J. Thomas tells me that 647 boys and 554 girls were operated upon in 1937.

In Minnesota, of 1,328 high-school students (11-20 years) 41.3% of boys and 33.3% of girls were tonsillectomized¹³. In English public boarding schools

the present proportion is 58.2% of tonsillectomized boys and 50.1% of girls.

When it is remembered that (1) the incidence of acute tonsillitis in female children under 10 seems equal to or greater than that in male children in hospital patients¹⁴, (2) the incidence of sore throat in girls in boarding schools is somewhat higher, and (3) the incidence of acute rheumatism in elementary schoolgirls is much higher than in elementary schoolboys, the lower incidence of tonsillectomy upon girls appears somewhat strange. The sex incidence of the operation seems worthy of more attention than it has received.

Age incidence. – This subject was admirably presented by T. Jefferson Faulder³ in 1910. Paterson and Bray¹⁵ in 1928, and E.M. Dearn¹⁶ in 1930 also dealt with it, the first in children operated upon in the Hospital for Sick Children, Great Ormond Street, and Dearn in 1,002 children at the School Clinic, Newcastle-upon-Tyne. On the whole, however, the subject has received less attention than it merits, for although the function of the tonsil is unknown, its two periods of physiological enlargement, and its atrophy after puberty suggest that the age at which operation takes place may be of great importance in the result.

Many attempts to assess the after-effects of tonsillectomy lose much of their value, because they give no precise information as to the age of the children at operation. No "control" is of value unless the ages are the same as those of the operated children.

Table III gives the percentage age distribution in four series hitherto unpublished, for which I am indebted severally to Dr. JN Deacon, Dr CJ Thomas (for two), and Dr J Ferguson. Surrey seems to have a later age distribution than London, and the Woolwich girls, as they have a lower incidence, so have they a later age distribution, than Woolwich boys.

In these new series, as in the old to which I have referred, there is a period of the highest incidence between 5 and 7 years. This period in the life-history of a child is a time of great change alike in his oral cavity and in his general development. His environment also changes, and instead of the familiar "herd" infections of the home, he encounters for the first time the many varied infections of the much larger "herd" of school. That so great a proportion of tonsillectomies should be performed during such a period seems to raise questions of importance.

FUNCTION AND PHYSIOLOGICAL ENLARGEMENT OF THE TONSIL

If, as some believe, the tonsils have a protective function, "absorbing small numbers of organisms and so establishing immunity by gradual dosage"¹⁷, the child's entry to the new environment of school might seem the time when they are most likely to be useful.

*Dr. W. Norman Pickles, M.O.H., of Aysgarth R.D.C., whose masterly paper on "Epidemiology in Country Practice" before this Section in 1935, *Proceedings*, 28, 1337 (Sect. Epid., 37), will be remembered, has, however, been good enough to examine the children in four Council Schools in isolated villages in Wensleydale, and found in the total school population 3% of the boys and 7% of the girls tonsillectomized – a total rate and not an annual rate, be it noted. These figures are remarkable not only because they are low, but in that the girls have more than twice the proportion tonsillectomized than the boys. In a secondary school he found 16% of the boys and 18% of the girls tonsillectomized.

TABLE III – PERCENTAGE AGE DISTRIBUTION

Author Date	Incidence of Tonsil Operations			
	JN Deacon 1932 Redhill County Hospital, Edgware, Middlesex	CJ Thomas 1937 London CC SC Woolwich Boys	CJ Thomas 1937 London CC SC Woolwich Girls	J Ferguson 1937 Surrey C. SC
Hospital or School Clinic				
Number of children = 100	200	647	554	1,883
1 year	–	–	–	0.1
2 years	–	–	–	0.2
3..	2	2.8	3.2	1.9
4..	9	11.1	8.7	3.7
5..	10	19.9	17.7	12.8
6..	25.0	17.0	15.9	24.7
7..	16.5	16.8	16.8	17.4
8..	15	9.9	9.4	14.5
9..	8.5	7.0	4.9	7.8
10..	2	4.9	5.1	4.5
11..	5	4.6	8.3	4.1
12..	2.5	1.5	3.4	5.0
13..	6.5	3.1	5.1	2.1
14..	2.5	1.1	1.6	1.1
15..	1.5	–	–	0.2
Over 15	–	0.2	–	–

“To me”, says LW Dean¹⁸ “it is certain that the tonsils in infancy and early childhood are part of the defence mechanism of the body. They protect the organism against those factors which cause them to become acutely swollen.”

If so, it may be that the fate of some tonsils is as unjust as that of Llewellyn’s hound Gelert. If, again, there is a period of physiological enlargement of the tonsil between 4 and 6 years, such an age distribution of operations seems, *prima facie*, open to question.

Is it not possible that many of the operations performed at this age of rapid development remove tonsils which are enlarged physiologically or in response to their protective function? May not some of the improvement ascribed in such cases to tonsillectomy be really due to physiological changes which normally take place at this stage in the child’s life – the critical age of 7 according to Hippocrates. Later authorities, eg HA Harris¹⁹ regard it as one of transition from the second “springing-up” period, which ends at 7, to the beginning of the second “filling-out” period from 8 to 10 years.

The fact that in the inquiry²⁰ into the “catarrhal child”, the “unselected” control children showed a higher percentage of enlarged tonsils and adenoids than did the “catarrhal” children seems to support the theory that some physiological enlargement of the tonsil occurs between 4 and 6 years.

But to the many – parents or practitioners – to whom enlargement at any age seems always pathological, a study of the work of KH Digby²¹, or that of Cunningham¹¹ on female students in California University, may be commended, or of that of E Neuber²² in Hungary, who 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 Russell²³ recently have given us a new and much-needed view of the value of the tonsil.

Speaking of the 4,000 Basque children who had come out of siege conditions and terrible overcrowding to Southampton they say:-

“Another revealing feature of the group was the appearance of the children’s throats. Less than 2% 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%, and that of obvious respiratory infection almost incredibly low. The same is true of nasal discharges and respiratory obstruction. The important question arises as to what will happen to these children now they have reached England. Owing to the difficulty of obtaining parents’ consent to operation, it is devoutly to be hoped that they will retain their tonsils, since it might well prove disastrous if these were to be

removed before the children had had opportunity of acquiring general immunity to catarrhal infections. (It is also perhaps of interest that of the 200 adults examined none showed appreciably enlarged or unhealthy tonsils.)"

The present early age distribution of operation has been criticized by Layton⁷, and more recently IM Epstein²⁴ has convincingly shown that, even in the most carefully selected series of cases, much better results were obtained in children between 6 and 10 years, than in children under 6.

GEOGRAPHICAL DISTRIBUTION

Abroad

The incidence of operation seems to be quite as high in the United States generally as in this county.

In Minnesota¹³, of 1,328 high-school students (11-20 years), 41.3% of the boys had had their tonsils removed, the corresponding figure for the girls being 33.3%. Collins²⁵ found that 61% of the children, from 10-14 years, of medical officers of the Army, Navy, and public health services, had been tonsillectomized, while Cunningham¹¹ found that one-third of 12,530 young white women students who entered the University of California between 1920 and 1929 had had an operation for the removal of tonsils; one-third were thought to have normal tonsils, and the remaining one-third had "pathologic" tonsils, including remnants of tonsils or buried or projecting tonsils.

But even in the States there are contrasts, and in the country districts of south-eastern Missouri only 2% of school children were tonsillectomized in 1931. In 1932 Dr Gustav Seiffert, the then medical officer of health for Munich, told me that in that city not more than 0.5% of secondary school children had been tonsillectomized whilst in the country districts around hardly any children had had the operation.

England and Wales

The Reports of the Chief Medical Officer as early as 1912 (p.44) showed the great local variations in the proportion of children recommended for operation. As the provision of treatment has been increased, these variations have not diminished but increased. As it is not possible to obtain the proportion of tonsillectomized children in an area by other means, the number of children operated upon in each area in a year, expressed as a percentage of the children in average attendance in that area, forms a convenient index wherewith to compare the geographical variations in incidence. Both figures are approximately accurate. To estimate roughly the total proportion of children tonsillectomized during their elementary school life (ie from 5-14 year) this annual incidence rate x may be multiplied by nine. Assuming that the

annual rate remains fairly constant (as we shall see it does) this product ($x \times 9$) will be roughly comparable to the proportion of tonsillectomized children found on entry at 14 to public boarding schools, of which more hereafter.

The annual incidence rate for elementary school children in England and Wales in 1923 was 0.9%; in seven years it more than doubled, and in 1930 and 1931 was 2.2%. Comparisons of some of the rates in different areas in 1931, the peak year of incidence, revealed striking contrasts in areas apparently somewhat similarly circumstanced. Thus in that year the operation rate in Margate was eight times that in Ramsgate; that of Enfield was six times that of Wood Green and four times that of Finchley; that of Bath five times that of Bristol; that of Guildford four times that of Reigate; that of Salisbury three times that of Winchester.

For the year 1936 the operation rates for all local education authorities in England and Wales were tabulated for comparison.

For comparative purposes it would no doubt be better to use an average rate for several years, rather than the rate for a single year. This would, however, have much increased the work, and as the rates generally remain relatively constant in most areas, the disadvantage of a single year rate is less than might be anticipated. A large or sudden change usually denotes a change of medical officer – occasionally, increased facilities for operation.

Table IV shows this relative constancy by comparing the single year rate for 1936 with the average of the rates for the five years 1932-36 in ten areas of different type, six with rather high rates, and four with rather low rates. In only two is the difference significant, or sufficient to change the colouring of the area one degree on the maps which I show [but which were not reproduced in the original article. Ed].

Table IV – comparison of 1936 rate with average of rates for the five years 1932-36

Area	1936 rate	Average of rates 1932-36
Sussex W.C.	2.4	2.5
Hampshire C.	1.0	1.0
Rutland C.	5.1	5.0
Cambridge C.	0.3	0.3
Oxford C.B.	3.1	2.2
Cambridge B.	1.0	1.7
Royal Tunbridge Wells B.	4.0	3.4
Margate B.	2.5	2.2
Ramsgate B.	0.5	0.5
Enfield U.D.	4.0	3.8

An Examination of the Rates in 1936

For all England and Wales, the average was 1.7%. In the English Counties (excluding London) the average was 1.5%; for the English County Boroughs it was 1.7%; for English Boroughs 1.8%; for Urban Districts 2.0%; for London 2.2%. In Wales the averages for the Counties and for the County Boroughs were the same as for the English Counties and County Boroughs. The Welsh Boroughs gave a percentage of 2.2, but the Urban Districts only a percentage of 1.5.

In each of these categories there are extreme variations in the operation rate, the extremes often being in adjacent areas. As regards England, these rates have been examined to see whether correlation could be obtained with any factor which might have some aetiological bearing on chronic tonsillitis and adenoidal growths – such factors for example as overcrowding and unemployment. Other possible factors, such as the efficiency of the school dental service, rainfall, climate, and nutrition returns have been considered, but with one extremely doubtful exception – urbanization – not the slightest suggestion of correlation has been obtained. Urbanization, which for many years has been suspected as a factor, seems at first sight suggested by the County Boroughs having higher rates than the Counties, and London a higher rate than the aggregate County Boroughs. But if urbanization be a factor there are inexplicable anomalies, for the Boroughs and Urban Districts have higher average rates than the County Boroughs, the highest rates of all are in certain agricultural counties, and the Boroughs which have the higher rates of all include residential towns and health resorts famed for their beauty, climate, and spaciousness.

The following shows areas with exceptionally high rates in descending order:-

More than Three Times the Average Rate

Soke of Peterborough, 5.8; Rutland C., 5.8; Blyth B., 5.7; Wrexham B., 5.7; Abertillery U.D., 5.5; Bexhill B., 5.5

Areas with More than Twice the Average Rate

Colne B., 4.2; Huntingdon C., 4.1; Leicester C.B., 4.1; Carlisle C.B. 4.0; Beverley B., 4.0; Tunbridge Wells B., 4.0; Enfield U.D., 4.0; Hebburn U.D. 4.0; Folkestone B., 3.9; Poole B., 3.8; Royal Leamington Spa B., 3.8; Pembroke B., 3.8; Guildford B., 3.7; Pudsey B., 3.7; Rawtenstall B., 3.7; Exeter C.B., 3.6; Loughborough B., 3.4; Hastings C.B., 3.4; Leigh B., 3.4.

On the other hand 4 Counties, 4 County Boroughs, 11 Boroughs and 1 Urban District (this latter having a school population of 23,000) have rates *less than one-third of the average*, while in addition to these 3 Counties, 5 County Boroughs, 17 Boroughs and 2 large Urban Districts have rates *less than half the average*.

The school population in London and Greater London is so vast that I give their rates in full:-

Hornsey, 0.2; Wood Green, 0.4; Finchley, Edmonton and Gravesend, 0.6; Acton and Walthamstow, 0.8; Leyton, 1.2; Hendon, 1.3; Beckenham, Richmond and Erith, 1.4; Kingston, Brentford and Chiswick, 1.5; Heston and Isleworth, 1.6; West Ham and Twickenham, 1.8; Penge, 1.9; London C., 2.2; Barking, Croydon, East Ham, and Wimbledon, 2.3; Willesden, 2.7; Tottenham and Bromley 3.3; Enfield 4.0.

Neighbouring County rates are Middlesex, 1.0; Essex, 1.6; Herts and Surrey, 2.2.

Here are two large coloured maps [not reproduced], one showing rates in County areas, the other rates in the areas of all other Local Education Authorities. Epidiascope maps are also shown: (1) Greater London, (2) areas round Birmingham, (3) parts of Lancashire, (4) Tyneside, (5) some rural counties of the Eastern Midlands.

The second of the large maps suggests a belt of high rates on the south coast, but apart from this, all show extreme variations apparently entirely unrelated to environment, circumstances, efficiency of school medical or dental services, or to any recognizable factor. Areas with the highest and the lowest rates are sometimes next-door neighbours. These rates are approximately accurate; they rest on the real fact of operation, not on diagnosis or assessment. Where they err, they err on the small side, as some operations performed outside the School Medical Service may not be recorded.

These rates cannot therefore be open to the criticisms justly directed to certain statistics of the School Medical Service. Judged by a comparison of these rates for 1936, a child living in Rutlandshire or the Soke of Peterborough is nineteen times more likely to undergo tonsillectomy than one living in Cambridgeshire. An Enfield child is twenty times more likely to have the operation than one in Hornsey. A child living in Bexhill would seem to enjoy climatic and cultural advantages at least equal to those of a Birkenhead child, yet he is twenty-seven times more likely to be submitted to operation.

Let us leave annual rates for a moment and find by actual numbers of operations performed during a nine-year period (the period of a child's elementary school life) what these local variations really mean.

Let us take the nine years 1928-1936. For our first illustration we will take two rural counties A and B, not far apart and not unlike save in size.

During these nine years A, with an average attendance each year of about 2,207 elementary school children, during the nine years had 1,010 children operated upon. If B, with an average attendance of 8,621 children, had had operations in the same proportion as A, we should "expect" that 3,945 children in B would have been tonsillectomized during this period. But the actual number was 335.

Environment and circumstance were not very different, so that it seems 3,610 children, who would have been operated upon had they lived in A, were not operated upon because they lived in B. There is no evidence that more children under school age were operated on in B than in A, or that the children in B are different from those in A in race, or in nutrition, hearing, physical, or mental development. Nor is there any evidence that they have suffered more from running ears, enlarged glands, or rheumatism. The School Medical Service of B is efficient and centred in its county town, a great seat of medical science.

For a second illustration, C and D are "dormitory suburbs" on the north of London and immediate neighbours. During the nine years in question C had an average attendance of 8,450 and D 6,584. D is perhaps, on the whole, slightly more prosperous and better housed. During the nine years 4,055 of C's elementary school children were tonsillectomized. If D had had operations at the same rate as C, 3,160 D children would have been tonsillectomized. But the actual number was 290. D has an experienced aural specialist and again there is no evidence that the education or development of the D population has suffered and some 2,870 children living in D have escaped operation, who, it seems fair to assume, would have undergone it had they lived in C.

REDUCTION OF INCIDENCE SUBSEQUENT TO 1931

Since 1931 most areas have shown a reduction, in some cases – for example, London and Wiltshire – substantial but gradual, but in others great and sudden. Of the latter type of reduction the first example was Hornsey Borough²⁶, where the reduction preceded the general movement by two years. Here Dr. Garrow in 1929, his first year as school medical officer, reduced the number of operations from 186 (2.9% of all children in average attendance) in 1928 (the average number for the seven years 1922-1928 being 169 (2.6%)) to 12 in 1929 and to an average for the eight years 1929-1933 of 13 (0.2%).

Judging by the returns for otitis media (which are now very low) and other conditions, nothing harmful, but rather the reverse, has happened from the substitution, in all but a most carefully selected fraction of cases, of conservative methods for operation, a substitution which has now been carried on for eight years. Diagram I illustrates the yearly numbers of tonsil operations and cases of otitis media discovered at routine and special examinations. On a larger scale was the courageous reduction in Derbyshire initiated in 1932 by Dr. Ash. In this county area the operations in 1931 were 2,626, or 3.9% of all the 68,079 children in average attendance. In 1929 the number had been 2,240, and in 1930, 2,316.

Dr. Ash reduced the numbers to 1,187 in 1932; 523 in 1933; 156 in 1934; 178 in 1935; 193 in 1936; 164 in 1937. If the 1931 rate had been maintained, some 15,700 further children would have been tonsillectomized since the reduction began. The actual number operated upon is 2,401; 1,710 in the first two years. Thus it seems that since 1931 some 13,000 children in Derbyshire have been spared the operation. Here again there seems no evidence that any harm has been done, or any advantage lost.

This is of course no easy matter to decide, as it is impossible to assess such things as the frequency of sore throats and colds in a County area, but attendance has not suffered and compares well with the average. Some light, however, may be thrown on the prevalence of some of the other conditions for which tonsillectomy is performed – such as otitis media and enlarged cervical glands – by the numbers of cases found at routine and special inspections in the schools. Table V and Diagram II show this great diminution in tonsillectomy has, so far at any rate, not been accompanied by any increase in the numbers of the cases of deafness, otitis media, or enlarged non-tuberculous cervical glands. In considering the figures for enlarged cervical glands the great prevalence of scarlet fever in the years 1933 and 1934 will be remembered. Parenthetically, I should like here to say that the increased attention now being given to hearing defect consequent upon the introduction of audiometer testing (attention which will soon be further stimulated by the publication of a Report now in the press) is almost certain to render future returns as to defects of hearing much higher

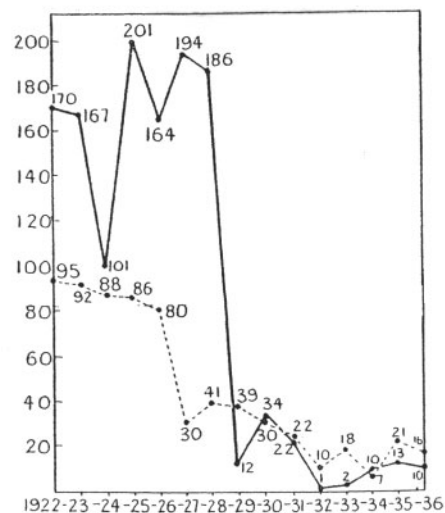


Diagram I Hornsey Borough, 1922-1936. To show the great reduction in the number of tonsil operations. The cases of otitis media show no tendency to increase. Continuous line = Numbers of tonsil operations each year. Interrupted line = Numbers of cases of otitis media found at routine and special inspections

Table V – Derbyshire (Dr W.M. Ash)

Year	Tonsils and Adenoids						Children operated upon Number	Per cent. of average attendance	Other Conditions			Attendance [‡] Per cent No. on roll
	Children referred for treatment	Children referred for observation		Children referred for observation	Children referred for observation	Children referred for observation			Defective hearing Total cases*	Otitis media Total cases*	Enlarged cervical glands Total cases*	
1929	3,333	975	4,308	1,503	81	1,584	2,240	3.3	192	258	843	89.7
1930	3,597	739	4,336	1,784	78	1,862	2,316	3.4	246	228	959	90.7
1931	2,030	846	2,876	2,334	471	2,805	2,626	3.9	219	243	815	90.3
1932	398	180	578	2,629	843	3,472	1,187	1.7	230	266	851	91.1
1933	283	473	756	2,886	813	3,699	523	0.8	222	258	976	90.3
1934	189	119	308	1,425	202	1,627	156	0.2	203	277	617	92.0
1935	234	78	312	1,178	194	1,372	178	0.3	164	225	622	91.1
1936	238	66	304	1,285	177	1,462	193	0.3	137	150	632	90.5
1937	218	68	286	1,211	156	1,367	164	0.27	171	201	643	89.5

* i.e. including all cases seen at either routine or special examinations and whether referred for treatment or for observation.

‡ The average percentage attendance in English County Areas was 1935-6, 89.7; 1936-7, 88.7

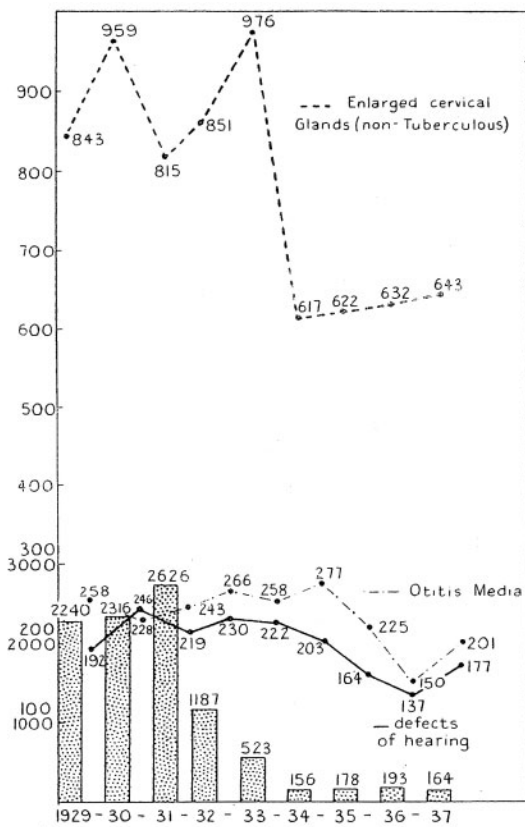


Diagram II Derbyshire. – To show that the great reduction in tonsillectomy in Derbyshire has not resulted in any increase in the numbers of cases (found at routine and special medical inspections) of defective hearing, otitis media, and enlarged (non-tuberculous) cervical glands. The columns representing numbers of tonsillectomies each year are on a scale of height one-tenth that of the curves of the other conditions. Percentage attendance is not shown, but is unaffected and is well above the average of English counties

than of old. This in future may appear to show an increase in defects of hearing, the exact opposite of the truth; what will have increased is the accuracy of ascertainment, due partly to the audiometer testing each ear entirely separately.

Another example of great reduction is Norfolk. Operations in 1931 numbered 1,729 or 4.4%; they were halved in 1932, and appear to be stabilized at less than one-third, being 1.1% in 1936 and 1.5% in 1937.

No unsatisfactory reports have been received of the results of conservative treatment in any area. Dr. Bullough²⁷ (Essex) for example says: "No unsatisfactory result has been seen from conservative treatment in a large number of cases, where the tonsils showed definite enlargement."

THE SOCIAL INCIDENCE OF TONSILLECTOMY

The social incidence of tonsillectomy is the most puzzling feature of its aetiology. Although tonsillitis seems common to all classes of society, the incidence of tonsillectomy is at least threefold heavier in the children of the well-to-do. The annual operation rate on elementary school children in England and Wales in 1936 was 1.7%. The average for the last nine years would be somewhat higher, and multiplying this by nine for the nine years of elementary school life and making some allowance for operations performed in the pre-school years, we may estimate that at the present time some 20% of elementary school children have been tonsillectomized before the age of 14. For the last seven years, of new boys just about the same age of 14 years, at one of our most famous public schools, the

senior medical officer of the school tells me, 75% have been tonsillectomized before entry, and that his latest figures are 83%. This school is not one of those 17 public schools mentioned later.

In 1928 Paton⁶ found a large public boarding school for girls at St. Andrews, 42% of 424 girls were tonsillectomized before the age of 14 years.

The recently published Report²⁸ of the Schools Epidemics Committee of the Medical Research Council gives the following information relating to seventeen large public boarding schools for boys, and nine large public boarding schools for girls.

When the inquiry began in 1930, 52.5% of boys and 43.3% of girls had had their tonsils removed. In every subsequent census these proportions of tonsillectomized pupils increased, until in 1934 we find that the figure for the boys was 58.2%, and that for the girls was 50.1%, a rise of nearly 6.0 and nearly 7.0% respectively.

For the last two years of the inquiry a record was kept each term of the number of new entrants who had previously undergone tonsillectomy, and during this period an average of 59.2% of boys (boarding) and 45.3% of girls (boarding) were tonsillectomized before entry.

Between January 1930 and July 1934 16 of the 17 boys' boarding schools showed increases in the proportion of tonsillectomized pupils varying from 1.3% to 15.2%. Only one boys' school showed a reduction of 1.7%. Seven out of the nine girls' boarding schools showed increases varying from 2% to 12.2%. Two girls schools showed decreases, one of 0.3%, the other of 2.8%.

At the end of the inquiry, the boys' school showing the highest proportion of tonsillectomized had 70.5% of all boys in the school tonsillectomized; the school* with the lowest proportion had 50.7%. Of the girls' schools the highest proportion was 63.6%, and the lowest 42.4%.

Incidence by physical type. – As regards boys' schools, Dr. Wilson and I found, in 1932, that, of the first fifteens and first elevens of eighteen public schools, 141 or 54.4% of these had picked athletes were tonsillectomized. All boys of these schools at this time had a proportion of 54.7%

INCIDENCE OF MORTALITY FROM TONSILLECTOMY IN CHILDREN UNDER 15 YEARS

Diseases of the tonsil. – Before coming to deaths directly assigned to tonsillectomy it may be well to remind you that deaths assigned to diseases of the tonsils have notably increased both in children under 15 and

Table VI* - Deaths from tonsillectomy in children under 15. 5-year period 1931-5

	Boys	Girls	Both Sexes
Tonsillectomy (unqualified)	210	159	369
Adenoids	12	8	20
Enlarged tonsils	20	15	35
5 year period	242	182	424
Annual Average	48.4	36.4	84.8

[Included in the above groups (or in other diseases of tonsils) are the deaths of 85 boys and 56 girls under 15 in which death occurred under or associated with anaesthesia.]

*From the Registrar-General's Statistical Review for 1935, p.115, and information kindly supplied by Dr. P. Stocks.

in adults. The Registrar-General's Statistical Review for 1935 states (p.115) that:

“At ages under 5 the increase in mortality between 1921-5 and 1931-5 amounted to 72% for boys and 76% for girls; at age 5-10 the rates of increase were 74 and 73% respectively, and 10-15 80 and 82%. At ages 15 and upwards the male death-rate increased in the same period from 8 to 21 per million or by 162%, and the female rate increased from 7 to 26 per million, or by 271%.”

The review proceeds to point out the parallelism between recent movements of the rate and those of death-rates from septic diseases.

Tonsillectomy. – In 1932 Layton pointed out that the mortality directly due to tonsillectomy was greater than is usually appreciated. The Registrar-General's Statistical Review for 1935 includes a review of this mortality for the years 1931-1935. Enlarged tonsils or adenoids were given as the cause of 60 deaths, and tonsillectomy – without specification of the disease for which the operation was performed – was given as the cause of 513 deaths, 369 being deaths of children under 15. These numbers do not represent all the deaths following tonsillectomy in the five years, since deaths with mention of tonsillectomy in conjunction with the disease of the tonsils necessitating the operation are classified in tabulation to the particular disease mentioned and a considerable number of deaths following operations are therefore included under other headings in the table, such as enlarged tonsils. The number of deaths classed to diseases of the tonsils which occurred under or associated with anaesthesia are separately shown in Table C IV, p.157, and corresponding tables for previous years, and the total of such deaths during 1931-1935 was 231, 140 of males and 91 of females. Dr. Stocks tells me that 85 of these 140 deaths of males and 56 of the 91 deaths of females (141 in all) were of children under 15.

From the following table it appears that at least 85 deaths of children under 15 occur on an average each year from tonsillectomy, and that, in all probability, this is a very conservative estimate.

*Two schools (U/B and V/B) shown in the Report with lower percentages are not public boarding schools.

In conclusion: I have endeavoured simply to present the incidence of tonsillectomy, and to avoid entering those other tempting paths of investigation, which others besides myself have pursued on previous occasions and in other places, such as the accepted indications for which tonsillectomy is performed, its risks, and the end-results achieved. I have also avoided any reference to the highly important question of sinusitis. A few comments have crept in, but in the main I have left the strange facts of incidence to speak for themselves.

SUMMARY

1. The incidence of operations upon the tonsil remained low until after the beginning of the twentieth century. About 1902-1903 a rapid rise began, there was a partial lull during the War years, after which the rise accelerated sharply, reaching a peak in 1931. There was then a sharp fall. In 1936 a second rising curve began.
2. The incidence is higher in boys than in girls.
3. The highest age incidence is in the period 5-7 years, the peak being usually in the 6th year. The age distribution is somewhat older in girls than in boys.
4. More attention should be given to sex – and, especially, to age-grouping in considering the necessity for operation, and in assessing its results. The recent work of Epstein²⁴ and others suggests that the present age distribution is too young for the best results to be obtained.
5. The high incidence between 5-7 years is due to many operations being performed on tonsils for enlargements which are either (a) physiological – associated with the great changes in development and in the oral cavity which takes place at this critical period; or (b) immunological – in response to the unaccustomed herd infections of the new environment of school, or to the sepsis sometimes resulting from the decay of the primary dentition.
6. A study of the geographical distribution in elementary school children discloses no correlation between the rate of incidence and any impersonal factor, such as over-crowding, poverty, bad housing, or climate. Incidence is not correlated with the general efficiency of the school medical and dental services of the area. In fact it defies any explanation, save that of variations of medical opinion on the indications for operation.
7. Large and, in some cases, drastic reductions in the numbers of operations performed in elementary school children in certain areas have had no unsatisfactory results.
8. Puzzling as is the geographical distribution, the social distribution is yet more of an enigma.

Tonsillectomy is at least three times as common in the well-to-do classes. The more fortunate the child in all other circumstances, and the better the opportunities for careful nurture, so much the more is he liable to tonsillectomy.

9. In the public schools the picked athletes among the boys are tonsillectomized in exactly the same proportion as the other boys in the schools they represent.
10. The mortality from the operation is larger than is generally appreciated.
11. Though, as Dean¹⁸ has recently said, “Practically the removal of tonsils is always a gamble” yet no impartial observer will deny that, in certain cases, tonsillectomy has brilliant results. “In a properly selected case there is no single operation in children’s medicine more successful or that shows such dramatic results as that of tonsillectomy”¹⁵. The facts enumerated above with regard to its incidence suggest that the conspicuous success of the operation in such cases has led to its adoption in many doubtful cases, and that it is too often performed without adequate cause, or sufficient regard to the possibility of enlargement being temporary, physiological, or immunological. With Paton⁶ they seem to question “the justification for so widespread an attack upon a normal structure of the body”, and to suggest that the probability that the tonsil serves some useful purpose, its tendency to spontaneous involution, and the success of non-operative methods of treatment are often alike overlooked in a too-hasty resort to “symptomatic treatment in its most elementary form”⁹.
12. The strange bare facts of incidence seem to support the opinion expressed on other grounds by the Schools Epidemic Committee²⁸ of the Medical Research Council that “it is a little difficult to believe that among the mass of tonsillectomies performed to-day all subjects for operation are selected with true discrimination, and one cannot avoid the conclusion that there is a tendency for the operation to be performed as a routine prophylactic ritual for no particular reason and with no particular result”.

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Commentary: James Alison Glover (1874–1963), OBE (1919) CBE (1941) MD (1905) DPH (1905) FRCP (1933): health care variations research then and now

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'James Allison Glover served in the Boer War and World War I. In 1917 he was appointed to the Cerebro-spinal Laboratory in London. There, his work on cerebrospinal fever resulted in the "spacing out" of beds in huts and earned him the name of "good friend of the private soldier". In 1919 he proceeded (sic) OBE for his work during the war. In 1920 he was appointed medical officer to the new Ministry of Health. He made significant contributions to rheumatology and the understanding and treatment of tonsillitis, and to public health more widely'. So says¹ one of the eulogies to a master in public health, writing well before his time.

Published in 1938 his 'The incidence of tonsillectomy among children' in the *Proceedings of the Royal Society of Medicine* covered pretty much all there was to

know in principle about variations in surgical rates, amply analysed by Glover. The paper provided a blue print for a core component of health services research using epidemiology for understanding rates of intervention as opposed to disease. What was obviously not known then was that surgical rates still vary and tonsillectomy is by no means exceptional. This is now well studied and common knowledge among health service researchers. The essence is, and was, that there are many reasons for doing surgery (and other interventions such as prescribing drugs) and these may sometimes only have an oblique bearing on the therapeutic needs of the patient, tightly defined. This is clearly a difficult message since in the United States for many years reimbursement is a function of an intervention happening² and today in the UK 'payment by results' rewards clinical activity as if the results need no demonstration.³ Medical and surgical intervention is still widely regarded as necessarily beneficial for the health of the patient—as indeed it may (or may not) be, but not necessarily for the reasons assumed.

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