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A Systematic Review of the Literature on Evaluative Studies of Tonsillectomy and Adenoidectomy

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Although tonsillectomy and adenoidectomy (T and A) is frequently performed (indeed, it is the commonest surgical procedure done in North America^{1,2}) considerable controversy persists regarding its effectiveness.

In 1971, 161,301 T and A's were performed in Canada at an estimated cost of close to 25.6 million dollars.³ In the United States in 1968 more than 1 million T and A's were performed.⁴ Assuming the cost per T and A to be similar to the costs in Canada, around \$150 million were spent

on this procedure in the United States in that year.

The purpose of this study is to review the English language literature pertaining to evalua-

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tion of T and A with particular emphasis on an assessment of the scientific merit of studies which have attempted to determine the efficacy of this procedure.

TABLE I
MAXIMUM ALLOTMENT OF POINTS

Factor	Maximum
Study design	7
Sample	3
Description of illness	6
Treatment	8
Follow-up	10
Total	34

TABLE II
STUDY DESIGN

Score	Design
Points	
4	Randomized (experimental): 3 points if patients were excluded from study for any reason
3	Quasi-experimental: before-and-after study—2 points if seasonal variation was not considered
2	Analytic: case comparison, cohort
1	Descriptive
Bonus points	
1	Study and control group of comparable age (within one year)
1	Comparison by social class
1	Comparable normal group—without symptoms

TABLE III
SAMPLE

Points	Sample Derived From
3	3 or more hospitals/clinics in a geographical area or referred by several physicians or community survey
1	Single clinic

METHOD

Studies evaluating the results of T and A in the English language literature for the past 50 years⁵⁻³³ were evaluated according to the following parameters: study design, sampling, completeness of description of illness and therapy, and precision of follow-up. Those studies which were most objective were awarded the highest points in each parameter. Conversely, studies which were purely descriptive or poorly documented received the fewest points.

The maximum number of points which a randomized, prospective, well-documented study could obtain was 34 points.

Table I shows the distribution of maximum scores in the various categories.

For the parameter of study design, points were awarded as shown in Table II. The highest score was given to a randomized study and the lowest to a descriptive one. Bonus points were given if closer age comparison, social class consideration, and a normal control group were included.

Points were awarded for the parameter of sample selection with reference to the representativeness of the patients studied as shown in Table III.

For the description of illness prior to treatment, points were given in relation to how well the symptoms were quantitated and whether replicable criteria for selection of T and A candidates on the basis of these symptoms were established, as shown in Table IV.

Points were given on the basis of how often a

TABLE IV
DESCRIPTION OF ILLNESS

Points	Information Given
1	No. of sore throats or earaches per year
1	Detailed description of sore throat or ear drum
1	No. of school days lost or days spent in bed per year
1	No. of visits to physician per year for earaches or sore throats
1	Diagnosis confirmed by more than one specialty (otolaryngology, pediatrics, family medicine)
1	Audiograms
1	Throat swab or antistreptolysin titer

TABLE V
TREATMENT

Points	Treatment
<i>Surgical Group</i>	
2	Specification of T and A, or only A
1	Surgical complication, incidence, description
1	Replicable description of operation
<i>Nonsurgical Group</i>	
2	Replicable description of treatment, dosage, duration
1	Side effects of medication
Bonus: 1	Assessment of compliance

symptom recurred, how many days a child missed school or had to stay in bed because of it, and if a diagnosis leading to T and A was agreed upon by physicians from more than one specialty. Objective preoperative tests such as audiograms and throat swabs were credited.

The description of the treatment as shown in Table V was divided into surgical and nonsurgical. In the surgical group points were given if the technique of operation was described and complications of surgery and anesthesia were noted.

In the groups given nonsurgical treatment, points were given if the dose and duration of antibiotics or other drugs were mentioned. Points were given if side effects of medicines were noted and attempts at assessing compliance were made.

The description of follow-up was scored in terms of objectivity of the observations. We gave a low score to follow-up by means of questionnaire to parents, especially those which requested parents to recall symptoms over periods of several months.

Points were given for frequency of observation, objective documentation of physical findings, and relevant laboratory findings, as shown in Table VI.

Interobserver reliability in analyzing the reported studies was assessed by having a second reviewer assess five publications at random with no knowledge of the score given by the first reviewer. The correlation is shown in Table VII.

RESULTS

The total and subtotal scores of the 29* studies

*There were 28 papers; one paper²² described two studies.

TABLE VI
FOLLOW-UP

Points	Procedures
<i>Method of Follow-up</i>	
2	Visit by physician
1	Report from PHN*
0.5	Questionnaire filled out by parents
<i>Quantitation of Symptoms</i>	
1	No. of late postoperative complications (behavior disorders, etc.)
0.5	No. of sore throats per year
0.5	No. of school days lost per year
<i>Frequency of Follow-up</i>	
2	At least one visit per month (PHN, clinic, or physician)
1	At least one visit every three months (PHN, clinic, or physician)
<i>Physical Examination</i>	
1	Specification of lymph node size
0.5	Mention of enlargement
1	Statement of tonsillar remnants or description of tympanic membrane
<i>Laboratory Investigations</i>	
1	Throat swab and/or antistreptolysin titer
1	Audiogram

*PHN = public health nurse.

TABLE VII
OBSERVER VARIATION

Author	Year	Score	
		Observer A	Observer B
McKee ²²	1963	10.0	13.5
Epstein ¹¹	1937	9.0	8.0
Johnston & Watkins ¹⁵	1954	4.0	3.5
Glover & Wilson ¹³	1932	8.0	8.0
Mertz ¹⁹	1954	10.0	8.5
Average		8.2	8.3

are shown in Table VIII. Only one study scored 18 points (52.4%); all the remaining scored less than 14 points (41.1%) of the possible total score.

Individual Categories

Study Design—One study²⁷ scored 5 points out of a possible total of 7. This study was randomized but a few in the control group had to be operated upon for "ethical" reasons. Additional points in

TABLE VIII
TOTAL AND SUBTOTAL SCORES FOR THE VARIOUS STUDIES

<i>Author</i>	<i>Year</i>	<i>Study Design</i> (max. = 7)	<i>Sample</i> (max. = 3)	<i>Description of Illness</i> (max. = 6)	<i>Treatment</i> (max. = 8)	<i>Follow-up</i> (max. = 10)	<i>Total</i> (max. = 34)
Kaiser ¹⁶	1922	2	1	1	0	0	4
Coakley & Pratt ⁶	1922	1	1	0	2	0	4
Pratt ²⁸	1926	1	3	0	0	0	4
Forsythe ¹²	1928	2	1	0	0	0	3
Collins & Sydenstricker ⁷	1928	3	3	0	0	3	9
Wagers ³²	1928	2	3	0	2	0.5	7.5
Paton ²⁶	1929	1	1	0	2	0	4
Kaiser ¹⁷	1930	2	0	0	0	3.5	5.5
Monroe & Volk ²⁵	1930	3	3	0	0	0	6
Selkirk & Mitchell ³⁰	1931	1	0	0	0	2.5	3.5
Cunningham ⁹	1931	1	1	0	0	3	5
Glover & Wilson ¹³	1932	2	3	0	2	1	8
Bass ⁵	1934	1	0	0	0	0.5	1.5
Smith ³¹	1936	2	1	0	0	0.5	3.5
Epstein ¹¹	1937	2	1	1	1	3	8
Paton ²⁷	1942	1	0	1	2	1	5
Godwin ¹⁴	1953	2	0	2	0	1	5
Walker ³³	1953	1	0	0	0	1.5	2.5
Mertz ¹⁹	1953	2	3	0	0	3.5	8.5
Johnston & Watkins ¹⁵	1954	1	1	1	0	0.5	3.5
McCorkle <i>et al.</i> ²⁴ Study 1	1955	3	0	0	0	7	10
Study 2	1955	4	0	2	0	7	13
leReiche & Stiver ¹⁸	1957	4	3	1	2	2	12
Crooks ⁸	1957	2	0	0	1	0.5	3.5
McKee ²²	1963	4	3	1	4	6	18
McKee ²³	1963	4	3	1	3	2.5	13.5
Mawson <i>et al.</i> ²⁰	1967	3	0	1	1	3.5	8.5
Mawson <i>et al.</i> ²¹	1967	2	0	1	1	3.5	7.5
Roydhouse ²⁹	1970	5	3	1	1	4	14

this study were given for social class group and normal group comparison (Table IX).

Sample Selection—Table X shows that only ten studies drew their patients from three or more clinics or hospitals. Eleven did not specifically mention the source of their patients.

Description of Illness—Table XI shows that few studies made an effort to adequately describe the illness prior to treatment.

Treatment—Table XII shows that 27 studies scored 2 points or less in their description of treatment. Only one study scored 50% of the total possible score.

Follow-up—Table XIII shows that only three studies scored more than 50% of the possible total score. The remaining scored below this and six received no points according to the analysis.

Average Scores of Studies for and Those of Studies Against T and A

Table XIV shows the studies for and against and the average scores in each group. Although some authors did not state categorically that they were in favor of T and A or opposed to this procedure, in general the orientation of the authors was readily apparent. The majority were for T and A and the average scores were close.

Comparison of Studies by Specialty of Authors

The studies were conducted by ear, nose, and throat surgeons (12 studies) and public health physicians and pediatricians (17 studies). Table XV shows the comparison of studies for and against T and A and their average scores arranged by specialty.

DISCUSSION

In the past, there have been a number of reviews of the literature on T and A.³⁴⁻³⁸ The present report attempts to quantitatively analyze the methodology of the studies. The method employed in this report was adopted from techniques developed by Haynes and Sackett for the review of articles dealing with patient compliance with therapeutic regimens.³⁹ The interobserver reliability was very high both in the compliance study and in the present analysis.

In setting criteria by which to evaluate T and A studies, an attempt was made to develop realistic rather than ideal goals. The criteria used for study design, sample selection, description of illness, treatment, and follow-up are not impossible to achieve. That this rigor in methodology has not been achieved to date is exemplified by the study

TABLE IX
STUDY DESIGN

No. of Studies (Total = 29)	Score (max. = 7)
1	5
4	4
24	≤ 3

TABLE X
SAMPLE

No. of Studies (Total = 29)	Score (max. = 3)
10	3
8	1
11	0

TABLE XI
DESCRIPTION OF ILLNESS

No. of Studies (Total = 29)	Score (max. = 6)
2	2
10	1
17	0

TABLE XII
DESCRIPTION OF TREATMENT

No. of Studies (Total = 29)	Score (max. = 8)
1	4
1	3
27	≤ 2

TABLE XIII
FOLLOW-UP

No. of Studies (Total = 29)	Score (max. = 10)
2	7
1	6
1	4
7	3 to 3.5
3	2 to 2.5
4	1 to 1.5
5	0.5
6	0.0

TABLE XIV
STUDIES FOR AND AGAINST T AND A

Studies	No. of Studies (Total = 29)	Average Score (max. = 34)
For	21	6.8
Against	8	7.1

TABLE XV
COMPARISON OF STUDIES BY SPECIALTY

Type of Physician	No. of Studies		Average Score	
	For T & A	Against T & A	For T & A	Against T & A
ENT	12	0	5.5	—
Public health & pediatricians	9	8	8.6	7.1

TABLE XVI
COMPARISON BY COUNTRY OF TONSILLECTOMY WITH OR WITHOUT ADENOIDECTOMY*

Country	Year	Men†	Women†
Canada ²	1968	94	100
United States ⁴	1968	53	52
England and Wales ²	1967	34	35

*Per 10,000 population.

†Rounded to exclude decimals.

which achieved the highest points (McKee²²). The bias of the investigators is manifest in the sampling procedure; true randomization was not achieved because the authors believed that a group of patients originally scheduled for the nonsurgical control group had to have urgent T and A on "ethical" grounds.

All studies scored 18 points or less out of a possible 34 points. The average score of studies for T and A was similar to that of studies against, thereby demonstrating that current data do not tell us whether the procedure is beneficial or not.

That all studies by otolaryngologists were in favor of T and A would suggest that most ENT surgeons see a definite advantage in this procedure. Differences in the T and A rate according to

the method of payment^{1,2,40-42} have been described. In instances where doctors are remunerated on a capitation or salary basis rather than by fee-for-service, the rate of T and A's is considerably lower. A comparison of T and A rates per 10,000 population in England and Wales, the United States, and Canada (Table XVI) may be relevant to this fact.^{2,4}

IMPLICATIONS

Aside from the high cost and lack of clearcut evidence of therapeutic efficacy, there is morbidity and mortality associated with T and A. Post-operative hemorrhage necessitating readmission and transfusion is not uncommon, although exact figures were not available in most of the studies reviewed. Long-term behavioral sequelae in the form of sleep, eating, and speech disturbances and regressive behavior have also been reported.⁴³⁻⁴⁵

In view of the cost, financial and human, as well as the lack of evidence clearly supporting the continued performance of this procedure, it is suggested that a prospective, properly randomized controlled study be undertaken, and that the methodologic pitfalls annotated in our review be guarded against.

Such a study could best be undertaken by salaried physicians and surgeons who, as far as possible, would not have a vested interest in the outcome. They, together with colleagues in epidemiology, could be funded by appropriate government or private agencies anxious to evaluate the cost-benefit ratio of this procedure. It would be important for the investigators not to transfer control children into the surgical group on "ethical" grounds, since our review has not uncovered a single study which shows convincingly that withholding surgery is deleterious. Symptomatic nonsurgical patients would not be denied treatment, since antimicrobials, antihistamines, or other therapies would be given.

In this era of escalating health care costs, society can only afford therapies which have been demonstrated to be of benefit. Third-party cost-conscious agencies, private or governmental, would be well advised to undertake such a study.

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