BIBLIOGRAPHY

- Austen, E. E.: *Ann. and Mag. Nat. Hist.*, 1910, Ser. VIII, v, 114.
 Castellani, A.: *Journ. of Hyg.*, 1907, vii, 558.
 Darling, S. T.: *Trans. Fifteenth Internat. Congr. Hyg. and Demog.*, Washington, 1913.
 Duke, H. L.: *Parasitology*, 1919, xi, 415.
 Idem: *Ibid.*, 1921, xiii, 352.
 Idem: *Proc. Roy. Soc. B*, 1923, xciv, 250.
 Idem: *Parasitology*, 1923, xv, 258.
 Hornby, H. E.: *Journ. Comp. Path. and Ther.*, 1921, xxxiv, 211.
 Lamborn, W. A.: *Med. Entom. Rep., Ann. Med. Rep. Nyasaland Protectorate*, 1932, p. 59.
 Napier, L. E., Smith, R. O. A., and Krishnan, K. V.: *Indian Journ. Med. Research*, 1933, xxi, 305.
 Wenyon, C. M.: *Protozoology*, Baillière, Tindall and Cox, 1926.

THE POST-OPERATIVE COMPLICATIONS AND RESULTS OF TONSIL AND ADENOID OPERATIONS IN CHILDREN*

BY

B. ELIZABETH NESBITT, B.Sc., M.B., F.R.C.S. Ed.

SURGEON, EAR, NOSE, AND THROAT DEPARTMENT, EDINBURGH HOSPITAL FOR WOMEN AND CHILDREN; FORMERLY CLINICAL ASSISTANT, EAR, NOSE, AND THROAT DEPARTMENT, ROYAL INFIRMARY, EDINBURGH

This clinical investigation into the post-operative complications and results of tonsil and adenoid operations on children under 14 years of age was suggested by Dr. J. S. Fraser, surgeon, ear, nose, and throat department of the Royal Infirmary, Edinburgh.

Source of Material

1. *Hospital Patients* (1,457 cases).—These cases were operated on as out-patients in the three years 1927–9 inclusive in Dr. J. S. Fraser's department. Out of the 1,457 hospital out-patients 1,138 reported at the Royal Infirmary, and 315 were visited at their homes by the hospital social service. The post-operative complications were considered in all the cases, but only in 1,138 of them were the operation results noted.

2. *Private Practice* (900 cases).—These patients were operated on in private by Dr. J. S. Fraser and Dr. W. T. Gardiner during the ten-year period 1919–28.

The following points were ascertained from the parents of each out-patient who reported, and by means of a questionnaire sent to each private patient's doctor: (a) occurrence of any post-operative complications; (b) disappearance of the preoperative symptoms; and (c) condition of the general health since operation.

The following routine is adopted in Dr. J. S. Fraser's department as regards the out-patient operations on children under 14 years of age. Only those who live within a radius of three miles from the Infirmary are operated on as out-patients. Exceptions are admitted as in-patients—namely, (a) very delicate children, or children with some complication requiring observation (for example, acute suppurative otitis media), and (b) patients living in overcrowded or unsuitable houses. The parent is given full written instructions as to the pre-operative preparation and post-operative care of the patient. The clinical assistants give the anaesthetics and do the operations (tonsil guillotine enucleation and removal of adenoids by curettes) under the supervision of the clinical tutor. When the haemorrhage has ceased the patients are put to bed in a ward for three or four hours after the operation. A clinical assistant examines each patient's throat before the parents take the child home in a taxi.

* Read in opening a discussion in the Section of Oto-rhinolaryngology at the Annual Meeting of the British Medical Association, Bournemouth, 1934.

Statistics

Preoperative examination of 1,138 hospital cases gave the following results:

Enlarged tonsils and adenoids	...	...	1,109 cases
Enlarged tonsils, no adenoids	...	...	10 "
Adenoids only (tonsils previously removed)	...	...	19 "
			1,138

There was a previous history of a peritonsillar abscess in three cases, and a fourth patient presented himself for operation, but owing to the existence of a peritonsillar abscess his tonsil was not removed.

Operations in the 1,138 hospital and in the 900 private cases were as follows:

	Hospital	Private
Tonsils and adenoids removed...	1,089	825
Tonsils only	10	0
Adenoids only	39	75
	1,138	900

Results of tonsil and adenoid operations in the private and hospital cases:

Tonsils	Hospital per cent.	Private per cent.
Complete enucleation	80.3	97.0
Incomplete enucleation	19.0	3.0
Results unascertained (refused examination)	0.7	—

Complete enucleation of one tonsil with the guillotine and dissection of the other was done in eleven of the private cases.

Adenoids	Hospital per cent.	Private per cent.
Complete removal	81.8	99.5
Adenoids remains	17.5	0.5
Results unascertained (refused examination)	0.7	—

The above percentages of incomplete tonsil and adenoid operations are somewhat high in the hospital cases, but these operations were done and the anaesthetics given by thirty-three successive clinical assistants.

Post-operative Complications

The material reviewed below comprises 1,457 hospital and 900 private patients.

HAEMORRHAGE

In all cases, to safeguard against avoidable haemorrhage, a careful inquiry was made as to any tendency to haemorrhage—for example, from an ordinary wound or tooth extraction. If the patient was known to be a haemophilic the coagulation index of the blood was ascertained and appropriate preoperative treatment adopted. In the groups of hospital and private patients under consideration there was no case of congenital haemophilia.

Attention to some points in the preoperative preparation and immediate post-operative treatment of the patients is productive of quick haemostasis. They are: (1) preliminary injection of atropine sulphate, (2) short ethyl chloride anaesthesia, (3) the use of a blunt tonsil guillotine and sharp adenoid curette, and (4) immediate post-operative treatment: this consists of sponging the face and neck with ice-cold water, and the adoption of the sitting position when the patient has recovered from the anaesthetic.

It should be noted that the age of the children is important, as under 14 years severe haemorrhage occurs less frequently than in older children.

Reactionary Haemorrhage.—Out of 1,457 hospital cases sixteen (slightly over 1 per cent.) had some reactionary

haemorrhage; this was slight in fifteen patients, but severe in one. In all cases the haemorrhage stopped spontaneously. Out of 900 private patients reactionary haemorrhage occurred in ten cases (1.1 per cent.). This was slight in eight (one from adenoids only) and severe in two, requiring special treatment to arrest it.

Secondary Haemorrhage.—In the hospital series fourteen cases (1 per cent.) of secondary haemorrhage were reported. This was slight in eleven cases and severe in three. Two of the latter were admitted to the Royal Infirmary, and one of them required special treatment to arrest the haemorrhage. The onset of the haemorrhage occurred on or between the second and seventh days after the operation. This is important, as hospital in-patient tonsil and adenoid cases are usually detained in hospital for only forty-eight hours. In the private series secondary haemorrhage was slight in one case (0.1 per cent.).

Thus we see that while in the private patients two cases of severe reactionary haemorrhage occurred, in the hospital there were three cases of severe secondary haemorrhage. No case of collapse or shock occurred from haemorrhage. The tendency to bleed shown in the above thirty hospital cases could not be credited entirely to partial removal of tonsils and adenoids, for later examination showed that in eighteen cases the operation was complete, while in only five cases were the tonsils incompletely enucleated and in seven there was still some adenoid tissue present.

AURAL SYMPTOMS AND COMPLICATIONS

Earache.—Fifty hospital patients (3.4 per cent.) and twenty-five private patients (2.8 per cent.) complained of post-operative bilateral earache. The earache was probably a reflex otalgia from the operation area, via the glosso-pharyngeal nerve. Analysis of the preoperative histories of these cases showed that six of the private patients had preoperative pathological aural conditions predisposing them to attacks of earache—for example, one had scars in the tympanic membranes, four had previously had acute suppurative otitis media, and one had had a left Schwartz operation. In addition, two had previously suffered from earache.

Acute suppurative otitis media occurred shortly after operation in one private patient (0.1 per cent.), as compared with twenty-two hospital patients (1.5 per cent.); in half of them it was unilateral, in half bilateral. In the preoperative histories of these twenty-two patients the following factors had predisposed to an acute otitis media. Ten cases had complained of frequent colds, two of earache, and twelve of deafness. Of the latter, four had catarrhal otitis media and one had scars in the tympanic membranes. In the post-operative examinations another factor was revealed as influencing the incidence of otitis media after operation—namely, the incomplete character of the operation. In six cases the tonsils were enucleated incompletely, and in nine cases remains of adenoids were still present. The end-result in fifteen of the nineteen cases examined was cessation of the otorrhoea within fourteen to twenty-two days. Three cases went on to chronic suppurative otitis media, and one case had recurring attacks of acute suppurative otitis media. On examination, it was found that the perforations in the tympanic membranes had healed in fifteen cases, and persisted in four cases in the following positions: two central, one anterior, and one posterior.

SEPTIC THROAT

In the hospital patients there were four cases (0.22 per cent.) of septic inflammation of the throat with pyrexia and local inflammatory changes on the tonsillar fossae. No similar condition occurred in the private patients.

NASAL CATARRH

There were twenty-six hospital cases (1.8 per cent.) in which nasal catarrh supervened on the operation. In twenty-five of these it lasted only four days, but in the remaining case it developed into a chronic nasal catarrh lasting for a few months; five months after operation there was no macroscopic pathology in the nose, and an x-ray film of the nasal accessory sinuses showed no comparative obscurity; the patient had recovered. There was post-operative nasal catarrh in only two (0.2 per cent.) of the private patients. These children had previously complained of frequent colds, mouth-breathing, and deafness. In both cases the ultimate result of the operation was satisfactory, and all the preoperative symptoms were cured.

PARESIS OF SOFT PALATE

In the hospital series there were eight cases (0.5 per cent.) of paresis of the soft palate. All complained of difficulty in swallowing and of fluids regurgitating through the nose; six of them were very ill and feverish. All cleared up spontaneously within seven or eight days. The soft palate was injured in one private case (0.1 per cent.) at operation. Recovery was slow, but the symptoms gradually disappeared.

TORTICOLLIS

There were five hospital cases (0.35 per cent.) of torticollis. All recovered; four were well in three days, but one patient had a stiff neck for three weeks, which eventually cleared up with special treatment. No private patient suffered from this symptom.

CHEST SYMPTOMS AND COMPLICATIONS

Cough, lasting for a few days after operation, without pain, sputum, physical signs, or constitutional disturbance, occurred in twenty-six hospital patients (1.8 per cent.). No pulmonary complications occurred in the private cases. There were five cases of pulmonary disease among the hospital patients (0.35 per cent.). All recovered, the bronchopneumonia within six weeks, and the other cases within three weeks. The operation had been done completely in all. These cases are briefly summarized below.

Pneumonia: Case 1.—Female, aged 5 years, following operation on 12/1/28 developed a right upper lobar pneumonia: recovery complete. Case 2.—Female, aged 9 years, after operation on 9/11/29 developed pneumonia: recovery.

Bronchopneumonia: Case 3.—Bronchopneumonia occurred in a male aged 8 years; operation on 4/7/29: recovery.

Pleurisy: Cases 4 and 5.—Two cases of pleurisy (one aged 8 and the other 10 years) occurred following operation on 25/6/27 and 29/8/29 respectively: recovery.

SEPTIC RASH

Septic rash occurred in one case (0.07 per cent.). Previous to operation this patient had a follicular tonsillitis, so that a good deal of infection was present. The septic rash appeared four days after the operation, and disappeared after a purgative was administered. No case of septic rash occurred in the private patients.

SEPTICAEMIA, TOXAEMIA, AND PYREXIA

There was one hospital case of septicaemia after operation. He made a good recovery within three weeks. No case of septicaemia occurred in the private patients.

Toxaemia, due to toxic absorption from the operation areas, occurred in two private cases (0.2 per cent.). Both patients were in a nursing home for four days, and had a rise in temperature for some days after returning home.

Pyrexia, due to persisting preoperative cervical adenitis, occurred in two private cases (0.2 per cent.). Operation

was done while the glands in the neck were inflamed, and fever persisted for two to five days after operation. No similar case was noted in the hospital patients.

ACUTE APPENDICITIS

There was one hospital case (0.07 per cent.) of acute appendicitis with general peritonitis. The patient was feverish for two days and remained in bed for four days after the tonsil operation. Exactly three weeks after the operation she was admitted to the Royal Infirmary and operated on for acute appendicitis with general peritonitis: no concretions were present. She made a good recovery. Acute appendicitis developed in one private case (0.1 per cent.): the patient recovered.

MENINGITIS

One case of meningitis was reported (0.07 per cent.). This patient died in the Sick Children's Hospital fourteen days after the tonsils and adenoids had been removed. The patient had been born prematurely, and was a delicate child. Pathological report on the tonsils: "No tuberculous infection." No similar case occurred in the private patients.

ACUTE OSTEOMYELITIS

Acute osteomyelitis of the femur occurred in one private patient (0.1 per cent.). After operation by a general surgeon the trouble eventually cleared up. No similar case occurred in the hospital patients.

EXANTHEMATA

Scarlet Fever.—Seven hospital patients (0.47 per cent.) developed scarlet fever within five days after operation, so that the infection may have occurred just prior to the operation. It is more probable, however, that they were cases of surgical scarlet fever. Two of these patients had complications: one had acute nephritis and the other purulent rhinitis: both recovered satisfactorily. One private patient (0.1 per cent.) developed scarlet fever after removal of adenoids: the patient recovered.

Pertussis.—One hospital patient, immediately after her operation, developed whooping-cough; this she must have been incubating.

Diphtheria.—In hospital patients two cases of diphtheria after operation were reported to the social service worker. The patients recovered.

There were thus ten cases of infectious fever in the hospital cases (0.68 per cent.), as compared with one (0.1 per cent.) in the private patients.

GENERAL DEBILITY

There were four hospital cases of general debility after operation. They all made good recoveries within seven to fourteen days. No similar case occurred in the private patients.

STATUS LYMPHATICUS AND DEATH UNDER ANAESTHETIC

There was one case of this. A male patient, aged 7 years, was anaesthetized with ethyl chloride, administered by the closed method with a Guy's ethyl chloride inhaler. As the left tonsil was being guillotined the patient stopped breathing; the tonsil was removed, the mouth gag was closed, and the child breathed again. The right tonsil was now removed, and again the patient stopped breathing. Respiration, however, did not return. The adenoids were not touched. All the ordinary methods of resuscitation were resorted to, but without success. At the post-mortem the appearances were those of a case of status lymphaticus. Beyond the great hyperplasia of lymphoid tissue found throughout the body there was nothing which would indicate any cause of sudden death. The thymus gland was enlarged, and weighed 43 grams. (The approximate weight of the normal thymus between the

ages of 5 and 10 years is 23 grams.) In the preoperative history of this patient there was nothing to suggest a lymphatic diathesis, and consequently his enlarged thymus was not investigated clinically before operation.

The following table shows the incidence of the post-operative complications in the two groups of cases—hospital and private patients. For comparison, J. A. Keen's figures for 9,344 cases (1921–30) are given in the last column.

	Hospital (1,457)	Private (900)	Keen's (9,344) Cases
Haemorrhage:			
Reactionary	16 (1.0) per cent.	10 (1.1) per cent.	110 (1.2) per cent.
Secondary	14 (1.0) ..	1 (0.1) ..	58 (0.6) ..
Aural complications:			
Earache	50 (3.4) ..	25 (2.8) ..	— —
Acute suppurative otitis media	22 (1.5) ..	1 (0.1) ..	60 (0.6) ..
Mastoid abscess and intracranial infection	— —	— —	6 (0.05) ..
Septic throat	4 (0.22) ..	— —	— —
Nasal catarrh	26 (1.8) ..	2 (0.2) ..	— —
Paresis of the soft palate	8 (0.5) ..	1 (0.1) ..	— —
Torticollis or stiff neck	5 (0.35) ..	— —	— —
Cough	26 (1.8) ..	— —	*
Pneumonia	2 (0.13) ..	— —	13 (0.14) ..
Bronchopneumonia	1 (0.07) ..	— —	5 (0.05) ..
Pleurisy	2 (0.13) ..	— —	— —
Septic rash	1 (0.07) ..	— —	— —
Septicaemia	1 (0.07) ..	— —	5 (0.05) ..
Toxaemia	— —	2 (0.2) ..	1 in 20 or 30
Cervical adenitis ...	— —	2 (0.2) ..	5 (0.05) ..
Acute appendicitis ...	1 (0.07) ..	1 (0.1) ..	— —
Meningitis	1 (0.07) ..	— —	— —
Acute osteomyelitis...	— —	1 (0.1) ..	— —
Scarlet fever	7 (0.47) ..	1 (0.1) ..	18 (0.18) ..
Whooping-cough ...	1 (0.07) ..	— —	1 (0.01) ..
Diphtheria	2 (0.13) ..	— —	3 (0.03) ..
General debility ...	4 (0.27) ..	— —	— —
Status lymphaticus...	1 (0.07) ..	— —	— —
	13.02 per cent.	5.3 per cent.	

* Keen gives the figure 5 (0.05 per cent.) under the heading "bronchitis."

Physical Examination following Operation

The material reviewed below comprises 1,138 hospital out-patient cases. Where information is available the results in the 900 private patients are also given.

FAUCIAL PILLARS AND SOFT PALATE

The pillars of the fauces showed scarring in 753 cases, and one or both pillars had been removed altogether in a few instances. The palate was scarred and drawn tightly across the fauces in three cases. The uvula had been removed in seven cases.

LYMPHOID TISSUE IN OROPHARYNX

Granular pharyngitis with distinct lymphoid nodules on the posterior pharyngeal wall was present in 463 cases; these patients had no subjective symptoms. Before operation the condition was noted as being present in only forty-seven cases. The lymphatic tissue in the lateral pharyngeal bands was hypertrophied in 473 cases: in one case there was a follicular lateral pharyngitis. Previous to operation the lateral pharyngeal bands were noted as

enlarged in only two cases. The lingual tonsil was enlarged in six cases; in one of these the lingual tonsil was enormously hypertrophied. Post-operative examination was carried out in each case at periods varying from some months up to three years after the tonsil and adenoid operation. The whole picture showed the tendency to compensatory hypertrophy of lymphoid tissue in the oropharynx, and suggested that the presence of lymphoid tissue is necessary for the well-being of these young patients. (Digby considers that lymphoid tissue plays a large part in the production of acquired immunity.)

CERVICAL ADENITIS

In the hospital patients the tonsillar lymph glands were found to be enlarged before operation in 526 cases (on both sides in 507 and in the remaining nineteen cases on one side only). At the post-operative examination, carried out in each case at periods varying from some months up to three years after the tonsil and adenoid operation, the glands were still enlarged in 53 cases, markedly so on both sides of the neck in two cases, and on one side of the neck in four cases. Excision of the enlarged cervical glands was carried out in two cases. The tonsils were examined histologically in thirty-one of the 526 cases, but tuberculous follicles were found in only five cases. In the private patients prior to operation eleven had cervical adenitis, one of whom had discharging sinuses in the neck following incision. After operation the infected sinuses in this case continued to suppurate. The enlarged glands in the neck subsided in three cases and persisted in seven cases after operation.

STATE OF TYMPANIC MEMBRANES

In the hospital patients the tympanic membranes presented the following characteristics on examination made, in some cases, a few months, in others one, two, or three years after the operation.

	Right	Left
Normal tympanic membranes ...	46	44
Retracted tympanic membranes ...	1,032	1,036
Perforated drumheads ...	44	42
Ears not examined ...	16	16
	1,138	1,138

In the cases with normal tympanic membranes the adenoid operation was complete in thirty-four cases (74 per cent.), and in those with retracted tympanic membranes the adenoid operation was complete in 912 (88 per cent.). It is of considerable interest that patients, examined at varying lengths of time after operation, should present such an enormous number of retracted tympanic membranes. Some were slightly retracted, some markedly retracted, and some so much indrawn that they were in contact with the inner tympanic wall, outlining the promontory and showing the incudo-stapedial joint as an outstanding prominence. As these cases do not show the expected result—namely, the re-establishment of the air equilibrium in the middle ear and external meatus—it is apparent that a course of politizerization or Eustachian catheterization is frequently necessary after adenoid operations to re-establish the normal air pressure within the tympanum.

ACUTE AND CHRONIC OTITIS MEDIA

Below is discussed the effect of the operation on pre-operative acute and chronic suppurative otitis media.

Acute Otitis Media.—At time of operation twenty-six cases (thirty-one ears) were suffering from acute otitis media; of these, twenty-one were unilateral and five bilateral. The tympanic membranes in eight ears were red and bulging, but not perforated. In the remaining

twenty-three ears there was a perforation in the tympanic membrane in the following positions: anterior perforation, twelve; central perforation, seven; posterior perforation, one; site unknown, three. Of the thirty-one ears so affected before operation, twenty-nine cleared up within a few days or weeks after operation. These included the eight cases without perforation of the tympanic membrane and one which required paracentesis six days after operation. In the two remaining cases the otorrhoea persisted; in one the perforation was central and in the other anterior.

Chronic Suppurative Otitis Media.—At the time of operation seventy patients (in all 89 ears) suffered from chronic suppurative otitis media—fifty-one unilateral and nineteen bilateral. After operation otorrhoea ceased in fifty-five ears (62 per cent.) within a period of two weeks up to five months; the perforations in the tympanic membranes healed in thirty-eight (43 per cent.) of these, but persisted (dry perforation) in seventeen (19 per cent.). Otorrhoea continued in thirty-three ears (37 per cent.); in two a Schwartz operation had been performed previous to the tonsil and adenoid operation. The remaining patient had a radical mastoid operation two and a half years after the tonsil and adenoid operation.

On examination of the ears in this group the position of the perforation and the pathological condition of the tympanic membranes were as follows:

	Dry Ears	Running Ears
Anterior ...	18 (12 perforations healed)	11 (6 with granulations)
Central ...	18 (11 " ")	9 (6 " ")
Posterior ...	10 (7 " ")	4 (2 " ")
Posterior marginal ...	5 (4 " ")	7 (6 " ")
Site unknown	4 (4 " ")	2
	55	33

At the time of the tonsil and adenoid operation there were seven cases of healed chronic suppurative otitis media. In one of these recurrence took place after operation. The effect of the adenoid operation on acute and chronic suppurative otitis media, considered in relation to the position of the perforation in the tympanic membrane, was that in cases with anterior perforations otorrhoea ceased in 71 per cent., with posterior perforations in 73 per cent., with posterior marginal perforations in 41.6 per cent., and with central perforations in only 29.4 per cent. On the whole, the results obtained by operation in cases of otorrhoea may be regarded as satisfactory.

PERSISTENCE OF SYMPTOMS AFTER OPERATION

The beneficial effect of the operation on the local symptoms is illustrated in this series of hospital cases by their disappearance in the great majority of the patients.

Throat Symptoms.—Attacks of sore throat occurred in 635 cases before operation, but only in thirty after operation. Choking sensation and difficulty in swallowing occurred in twenty-two cases: all were cured by operation. Cough persisted in eighteen out of forty patients after operation. Thick speech noted in thirty-eight cases remained the same in eighteen after operation. Patients complaining of lisps, stuttering, and hoarseness were not improved by operation. Three hoarse patients had singers' nodes on the vocal cords.

Nasal Symptoms.—Snoring, present in 798 patients before operation, persisted in only fifty-eight: of 408 mouth-breathers all but seventy-five were cured. Nasal catarrh and frequent colds in 629 patients continued to recur in 313. Epistaxis in fifteen cases was cured.

Aural Symptoms.—A marked improvement occurred in these. Deafness in 161 cases was cured in all but twenty-three, despite the indrawing of the drumhead. (Eleven deaf-

mates were operated on for enlarged tonsils and adenoids, but were, of course, not benefited as regards their hearing.) Attacks of earache recurred in forty-five out of 152 cases after operation. Tinnitus in two patients (aged 8 and 12 respectively) disappeared. Acute suppurative otitis media healed in twenty-nine out of thirty-one cases, and chronic suppurative otitis media healed in fifty-six out of eighty-nine cases.

Patients complaining of headache (fifteen) and nocturnal enuresis (two) were not improved.

General Summary of Results in 1,138 Hospital Patients

The local symptoms for which the operation was recommended were completely cured in 851 (75 per cent.), partly cured in 204 (18 per cent.), but persisted in eighty-two (7 per cent.).

There was a marked improvement in general health in 982 (86.4 per cent.), but no improvement in 139 (12.2 per cent.). There were seventeen cases (1.4 per cent.) examined three weeks after operation—that is, too soon to estimate improvement in general health.

Discussion and Summary

On reviewing the post-operative symptoms and complications one sees that their total percentage is higher in the hospital patients (13.02 per cent.) than in the private patients (5.3 per cent.). If we exclude symptoms—for example, earache and cough—and complications—such as, exanthemata—we find that the percentage of 7.54 for complications in the hospital patients still remains higher than in the private patients (2.2).

The difference between the two figures can be accounted for as follows: (a) Some inherent factor is probably present in the preoperative condition of the hospital patients. Their general nourishment and constitution are, as a rule, inferior to those of the private patients, while in this hospital series several patients had predisposing factors in the causation of aural complications, and a number of them were possibly operated on in the prodromal stages of the exanthemata. (b) The results of hospital operations carried out by junior operators are not so good as those done by experienced surgeons in private practice. (c) Complications may be due to chill on the journey home in a taxi after operation; this was a possibility in the five cases of pulmonary complications, though the aspiration of septic blood clot during the operation—for example, in the case of bronchopneumonia, or of septic embolism from the operation area, as in the atypical case of pneumonia (right upper lobe) and in the two cases of pleurisy—cannot be excluded. No lung complication occurred in the private cases. (d) The only case of death after discharge from the Royal Infirmary was the case of meningitis. (e) No complication was found due to neglect of the parents to carry out written instructions given them for the pre-operative and post-operative care of the children.

In this series of hospital out-patients, for whom every precaution was taken as to the general state of their health, their preoperative preparation, conveyance from the Infirmary to their homes, and the suitability of their homes for convalescence, the total percentage of complications was rather more than twice as high as that in the private cases. Considering the nature of some of the complications recorded in hospitals—for example, temporary torticollis, paresis of the soft palate, and nasal catarrh—the difference in the percentages is hardly of sufficient importance to make us condemn the present out-patient operation system and recommend hospital authorities to provide beds for all tonsil and adenoid cases. One acknowledges that the ideal post-operative treatment for these cases would be to detain the patient

in hospital for at least forty-eight hours after the operation, but even with this precaution complications may occur. In support of this there are the statistics published by J. A. Keen in the *Journal of Laryngology* (January, 1932) in an article entitled "Medical and Surgical Complications of Tonsillectomy in Childhood." In his series of 9,344 cases each patient was kept in hospital for at least twenty-four hours after operation; sixty-six cases (0.66 per cent.) of aural complications occurred, consisting of sixty cases of acute suppurative otitis media and six cases of mastoiditis (including three deaths from this cause), as compared with our twenty-two cases (1.5 per cent.) of acute suppurative otitis media (no mastoiditis, and no deaths) in the Edinburgh hospital cases. Further, there were five cases of septicaemia (0.05 per cent.), including one death, in Mr. Keen's group, as compared with one case (recovery) (0.07 per cent.) in the Edinburgh group.

I wish to thank Dr. J. S. Fraser and Dr. W. T. Gardiner for allowing me to use the records of their private patients; also to acknowledge my indebtedness to Dr. J. S. Fraser and Dr. Logan Turner for their interest in, and helpful criticism of, this paper. Finally, I should like to thank Miss Watt and other members of the Royal Infirmary of Edinburgh Social Service Department for the records they obtained for me of cases which did not report for examination.

PULMONARY TUBERCULOSIS IN ASTHMA CASES

BY

ERNEST M. FRAENKEL,

WESTMINSTER HOSPITAL TUBERCULOSIS RESEARCH FUND

Among 522 cases of asthma seen in recent years there were 369 which I have investigated with a uniform method between 1930 and 1932—200 men and 169 women of the working class in active employment. In all of these cases a detailed examination was made both by clinical and x-ray methods for any signs of active or healed tuberculous lesions in the lungs (E. Fraenkel').

Evidence from the Literature

The view that asthma and pulmonary tuberculosis are mutually exclusive is widespread in this country as well as abroad. Regarded from the statistical point of view there is undoubted justification for this attitude. The work of Schroeder,² for example, shows that out of 4,716 cases of pulmonary tuberculosis only thirty cases showed typical symptoms of asthma. Kaemmerer,³ an experienced German clinician, considers that tuberculosis plays no part in the genesis of asthma. Bandelier and Roepke⁴ believe that asthma may produce some immunization against the disease. In support of this we have the observation that tuberculous guinea-pigs appear to be protected against horse-serum shock; this is explained by Pagel⁵ as due to diminution of antibody formation, which is dependent on the number of tuberculous foci. In conjunction with Pulvertaft⁶ I have recently been able to show that a similar protection may be obtained by massive and repeated injections of Calmette's B.C.G. On the other hand, a single dose or the injection of dead or damaged B.C.G. was ineffective, and did not produce a local lesion. These results would seem to support in some degree the hypothesis of Pagel.⁵

Such authors of standing as Liebermeister,⁷ Krez,⁸ Zdansky,⁹ and Wernscheid,¹⁰ however, insist that the majority of asthma cases are of tuberculous origin. Harkavy and Hebal,¹¹ working at the Mount Sinai Hospital, report in a series of 400 asthma cases over 10 per