A REVIEW OF FIFTY TRACHEOSTOMIES*

Herbert B. Eckstein, M. A., M. D., F. R. C. S.**
and
Lütfi Tombuloğlu, M. D.***

Whereas diphtheria was the most frequent indication for tracheostomy at the beginning of this century, the disappearance of this disease in Western Europe and North America has greatly reduced the number of emergency tracheostomies performed. On the other hand a better understanding of respiratory physiology and the development of the various forms of artificial ventilation has led to an increased use of tracheostomy in cases of coma or of bulbar poliomyelitis. It was felt therefore that an analysis of 50 consecutive tracheostomies carried out in a center where diphtheria and malnutrition with its sequelae are still important medical problems would prove useful and interesting.

The purpose of this report is to analyze the various aspects of our cases. From September 1958 until August 1960, 55 tracheostomies were performed at this hospital; the case notes of 50 of these patients have been traced and form the material on which this review is based.

All tracheostomies were performed under local analgesic and many of them were performed by the resident staff.

TABLE 1

0-1 years	12
1-2 „	12
2-3 „	4
3-4 „	8
4-5 „	6
5-6 „	5
over 6 years	3

The age incidence of our cases is shown in table 1. About half the children were under the age of two years, and of those aged less than one year, six were under the age of three months. The youngest patient was seven days old, (tetanus neonatorum).

* From Ankara University Faculty of Medicine, Research Institute of Child Health, Hacettepe Children's Hospital.
** Consultant Surgeon.
*** Senior Resident in Surgery.

Forty-one of the tracheostomies were performed for respiratory obstruction, most of these being carried out within a few hours of admission. The causes of laryngeal obstruction are shown in table 2, and it will be seen that non-diphtheritic "laryngo-tracheo-bronchitis" was the commonest disease encountered. However, diphtheria accounted for no less than 12 of the cases for which tracheostomy was performed. In 7 cases of bronchopneumonia, tracheostomy was required to aspirate tenacious muco-pus.

TABLE 2
CAUSES OF RESPIRATORY OBSTRUCTION

LARYNGO-TRACHEO-BRONCHITIS	16 (8)
DIPHTHERIA	12 (4)
BRONCHOPNEUMONIA	7 (3)
PERITONSILLAR ABSCESS	2 (1)
RETROPHARYNGEAL ABSCESS	1
LARYNGOSPASM	1
CYSTIC HYGROMA	1 (1)
CARCINOMA OF THYROID	1 (1)

(Figures in parentheses denote fatal outcome)

In 9 cases the tracheostomy was carried out prophylactically (table 3), or as an aid in the treatment of a non-respiratory disease. The purpose of the tracheostomy in these cases was to allow prolonged artificial respiration in cases of tetanus (two cases of tetanus neonatorum) treated with relaxant drugs, or to facilitate bronchial aspiration in cases of coma. It should be noted that during the two year period under review no case of bulbar poliomyelitis was admitted to the hospital.

TABLE 3
PROPHYLACTIC TRACHEOSTOMIES

COMA (HEAD INJURY)	2 (1)
CEREBRAL TUMOR	1 (1)
MENINGITIS	1
TETANUS	3 (3)
FOREIGN BODY IN BRONCHUS (BRONCHOSCOPY)	1 (1)
ESOPHAGEAL ATRESIA (PREMATURITY)	1 (1)

(Figures in parentheses denote fatal outcome)

Table 4 shows the number of tracheostomies carried out in the different months of the two year period. Although there would

appear to be no definite seasonal variation when all cases are considered, there is a definite decrease in the number of tracheostomies performed for laryngo-tracheo-bronchitis during the summer months. There appears to be no such seasonal variation in tracheostomy required for cases of diphtheria.

TABLE 4
Seasonal Variation

	JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
ALL CASES	5	3	7	5	3	4	1	6	4	2	5	5
LARYNGITIS AND BRONCHOPNEUMONIA	2	2	4	3	2	2	0	1	1	0	2	4
DIPHTHERIA	2	1	3	0	0	1	0	1	1	1	2	0

The length of time during which the tube was left in the trachea is shown in table 5. Unless there were marked bronchial secretions requiring repeated aspiration, the tube was usually removed on the fourth day in cases of laryngo-tracheo-bronchitis. If dyspnea recurred the tube was reinserted at once for a few more days. In over half the surviving cases the tube could be removed within a week and the tracheostomy was allowed to close.

TABLE 5
Duration of Tube in Trachea (Survivors)

LESS THAN 1 WEEK	13
1 - 2 WEEKS	6
3 MONTHS	1
OVER 1 YEAR	1
NOT RECORDED	1
TOTAL	22

In two cases we experienced great difficulty in weaning the child from the tracheostomy tube, these are reported below.

Case Reports

Case 1: M. B., a girl aged 14 months, was admitted with severe bronchopneumonia and laryngitis. There was marked chest retraction and cyanosis on admission and a tracheostomy was performed within a few hours. Because of profuse bronchial secretions and pulmonary infiltration no attempt was made to remove the tube (except to change it) for about one month. When the chest radiograph finally showed clearing of the lung fields after a month, removal of the tube was

attempted but respiratory distress recurred at once. "Trial removals" were attempted at weekly intervals unsuccessfuly until three months and twenty days after the original tracheostomy, when no distress followed removal of the tube. The tracheostomy opening closed spontaneously after a few days and the child was discharged symptom free.

Case 2: D. O., a baby girl, was admitted at the age of two months in August 1959. Her history showed that the baby had had occasional attacks of stridor commencing within a few weeks of her birth, but that for the week preceding admission respiration had become progressively more labored and cyanosis developed. On admission the baby had marked chest retraction and moderate cyanosis but no pyrexia. She was treated with steam and antibiotics but the cyanosis increased and a tracheostomy was performed, 24 hours after admission, below the isthmus of the thyroid gland. The cyanosis and dyspnea disappeared at once. However, when the tube was removed four days later cyanosis recurred at once and the tube had to be reinserted. Repeated attempts to remove the tube during the following month were likewise unsucccessful. Laryngoscopy and bronchoscopy revealed no abnormality, but a tracheogram, produced by instilling a few drops of lipiodol through the tracheostomy incision, suggested a stenosis of the trachea at that level. The tracheostomy was therefore revised and the new tube was inserted into an opening produced by resecting parts of the first and second tracheal rings. However, repeated attempts to remove this tube proved similarly unsuccessful, although the baby would appear to be quite comfortable for varying periods of time (up to 18 hours) only to become distressed and cyanosed again later. The blood calcium was 10.1 mgm. per 100 ml. and the baby's development was normal in all other respects.

In June 1960, she was referred for a specialist opinion in London, where bronchoscopy and laryngoscopy again showed no abnormality. The tracheostomy tube was then inserted through the fourth and fifth tracheal rings after dividing the thyroid isthmus. Following this procedure the opening in the tracheostomy tube was gradually decreased by inserting plastic plugs with holes of decreasing size in them, while the tracheostomy tube itself had a large hole in its upper surface to allow the passage of air through the larynx. However, complete removal of the tube still produced distress and cyanosis.

Results

The results of tracheostomy are difficult to assess. There were no deaths which could be attributed directly to the operation or to the management of a child with a tracheostomy tube. Although 27 of the 50 children died, it is certain that even more would have done so without a tracheostomy. The children with laryngo-tracheo-bronchitis all died with severe bronchopneumonia and it must be recalled that many of them were malnourished. The four patients who died of diphtheria all had severe diptheritic myocarditis.

Discussion

It would appear that emergency tracheostomy in children is still frequently required in Turkey. The fact that half the cases were

under two years of age is probably explained by the relatively small size of the larynx at this age rather than by a higher incidence of inflammatory processes in this age-group.

The proportion of cases of laryngo-tracheo-bronchitis and of diphtheria requiring tracheostomy does not represent the true proportion of the two diseases encountered. In cases of non-diphtheritic inflammation of the larynx it has been our policy to try conservative therapy in the first instance, using steam, vaporisers and antibiotics unless the respiratory distress was very severe. Only if these measures failed did we resort to tracheostomy, and it should be noted that the majority of these patients responded satisfactorily to such non-operative treatment. On the other hand, with cases of diphtheria (either proven by a stained direct smear of the exudate or suspected strongly on clinical grounds), our policy has been more radical and tracheostomy was carried out even for moderate stridor.

The full cooperation of the pediatric colleagues is essential in the management of these cases and we have found it a useful policy to see all cases of stridor soon after admission so that the surgeon himself (as well as the physician) could judge the progress of the child and decide on the optimum time for surgical intervention. As most of our patients were admitted to the isolation ward of the hospital the pediatric residents have, in fact, been responsible for most of the postoperative care. Frequent and regular aspiration of the cannula and frequent cleaning of the inner tube are essential and for the first 48 hours, at least, these patients require considerable medical and nursing care.

Because of the very dry air in Ankara we have found it essential to continue humidification of the patient's room by steam or vaporisers for at least a week following tracheostomy; without such measures the bronchial secretions tend to become very viscid and repeated blocking of the tube will result.

Summary

Fifty consecutive cases of tracheostomy, performed over a period of two years in the Hacettepe Children's Hospital, are analyzed, and it appears that in Turkey laryngo-tracheo-bronchitis is still the most frequent indication for this procedure. No less than twelve cases were suffering from diphtheria. In only nine cases was the tracheostomy performed for non-obstructive lesions. The difficulty which may be experienced in weaning a child from a tracheostomy tube is illustrated by two case reports.