Original Research Paper

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COMPLICATION OF TRACHEOSTOMY - A PROSPECTIVE STUDY

ENT

KEYWORDS: Tracheostomy, Complications of Tracheostomy

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ABSTRACT

This study done in the department of ENT, Medical College Kottayam during the period January 2002 to August 2004 was a prospective analysis of 150 patients of all ages and both sexes presenting to the department for whom Tracheostomy was done for various reasons. The aim was to study the incidence of complications of Tracheostomy and do a statistical analysis and to suggest measures to prevent the same. The incidence of complications was 43.3% with no mortality, the commonest complication being per-operative bleeding. The common indication was malignancy (77.3%) of which laryngeal malignancy accounted for 87.7%. Glottis carcinomas accounted for 79% of laryngeal malignancy. We concluded that all complications are preventable and the best method of prevention is early intervention

INTRODUCTION

Tracheostomy, derived from the greek word meaning 'I Cut The Trachea' has probably been know for about 3000 years[1]. Though a life saving procedure, Tracheostomy is not without complications, possibly stemming from the close relation of trachea to important structures like oesophagus, major blood vessels, nerves and superior mediastnum, the complications range from simple apnoea to fatal tracheoarterial fistula, some treatable, some untreatable but definitely preventable. Hence we felt there is a need to study the incidence of complications, and to suggest measures to prevent complications of Tracheostomy.

MATERIALS AND METHODS

This study was done in the department of ENT, Medical College Kottayam during the period January 2002 to August 2004. This study included prospective analysis of 150 patients of all ages and both sexes presenting to the department for whom Tracheostomy was done for various reasons both elective and emergency

Tracheostomies done from other hospitals were not included in this study. Cricothyrotmy, an emergency procedure done to provide airway through the cricothyroid membrane and End Tracheostomy, a permanent Tracheostomy created after laryngectomy were also not included

Procedure

Informed consent was obtained from the patient for the study and follow up. Majority of the Tracheostomies were done under local anaesthesia.

The patient was placed in supine position with neck extended. The skin and subcutaneous tissue was infilterated taking care that the local anaesthetic did not go into the trachea-oesophageal groove or into the trachea. The skin was incised from the lower border of cricoids cartilage to the suprasternal notch. The muscles were separated with blunt dissection and the thyroid was retracted. After the exposure of the trachea and complete hemostasis, it was incised by a vertical incision and a piece of cartilage removed. Jackson's Tracheostomy tube was introduced except in cases which were done under general anaesthesia when portex tube was introduced. The tube was secured with tapes after the extension of the head. The tube was regularly suctioned under aseptic precaution for removal of secretions.

The presence of complications was noted at the time of surgery and in the post operative period. A detailed analysis of the complications was done which were further divided into immediate, intermediate, and late. The patient was followed up at regular intervals at 1 week, 1 month, 1 months, 6 months and 1 year. The data were entered into a master sheet and results analyzed. Test of significance between various factors producing complication were calculated. Standard error of difference (SED) between two proportions i.e. the probability of chance of a particular difference between two sample population, was calculated using the formula

$$SED=\sqrt{\frac{p_1q_1}{n_1}+\frac{p_2q_2}{n_2}}$$

Where p = probability of occurrence of an attribute

q = 1-p, probability of non occurrence of same attribute
n = total number in sample

If the difference $p_1 - p_2$ is less than 2 times the SED, it is not significant. ($p>0.05$). If the difference $p_1 - p_2$ is more than 2 times the SED, it is significant at 95% confidence level ($p<0.05$). If the difference $p_1 - p_2$ is less than thrice the SED, it is highly significant. ($p<0.01$)

OBSERVATION AND ANALYSIS

The age of patients in this study varied from 1.5 years to 90 years. The maximum number belonged to the age group 51 to 60 years and 61 to 70 years (24% each). There were 136 males (90.7%) and 14 females (9.3%). The most common indication was malignancy, a total of 116 cases (77.3%) as shown in table 1 and figure 1

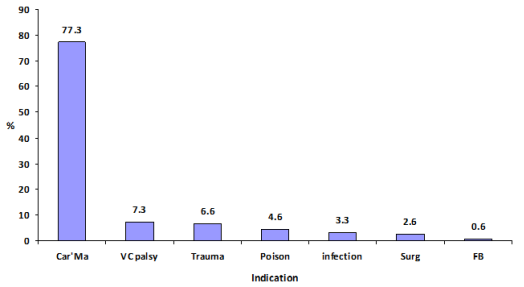

Figure 1

Table 1 Indication for Tracheostomy

Causes	Number	Percentage %
Carcinoma	116	77.3
Larynx	96	82.7
Glottis	76	79
Supraglottis	20	20.8
Hypopharynx	18	15.5
Oesophagus	1	0.8
Thyroid	1	0.8
Vocal cord palsy (idio)	11	7.3
Trauma/ RTA	10	6.6

Ventilatory Support (cva)	7	4.6
Infection	5	3.3
Surgery (Thyroid)	4	2.6
Foreign body	1	0.6

Regarding addictions to tobacco or alcohol, 120 males (80%) had some addictions except children and females. 119 (79.3%) of the cases were done as an emergency procedure and 31(20.6%) cases as elective. Majority of the cases 148 (98.6%) were done under local anaesthesia. General anaesthesia was given by orotracheal intubation in 2 pediatric cases and tracheostomy was done by keeping the endotracheal tube as guide. Jacksons metal tracheostomy tube was used in 123 cases (82%). In 25 cases (16.6%) portex tube was used for ventilator purpose and later changed to metal tube

Complication of Tracheostomy

Out of 150 cases, 65 cases showed different types of complications i.e 43.3%. Of these, 36 cases (55.4%) had immediate complication (table 2), 36 cases (55.4%) of intermediate complication (table 3) and 12 cases (18.4%) had late complication (table 4)

Table 2 – Immediate complication

Complications	Number	Percentage %
Hemorrhage	30	20
Cardiopulmonary	4	2.6
arrest	3	2
Apnoea	0	0
Air embolism	2	1.3
Local damage	0	0
False passage	9	6
Surgical emphysema		
Total	36	

The commonest immediate complication was hemorrhage (20%), which occurred due to injury to underlying veins and was controlled during operation. The incidence of surgical emphysema was 6%. 2.6% of patients had cardiopulmonary arrest but were resuscitated. Local damage to surrounding structures especially to thyroid was seen in 1.3%.

Table 3- Intermediate complication

Complication	Number	Percentage %
Displacement	13	8.6
/Expulsion	13	8.6
Crusting	9	6
Bleeding	20	13.3
Infection	1	0.6
Pnumothorax	0	0
Pneumomediastinum	1	0.6
Necrosis	0	0
Tracheo arterial	1	0.6
fistula	0	0
Tracheo oesophageal		
fistula		
Dysphasia		
Total	36	

Of the intermediate complication the commonest was infection of the tracheostoma (13.3%). One person developed necrosis of the trachea (0.6%). These were seen commonly following radiation in cases of carcinoma. Crusting was seen in 8.6% of cases. This was due to inadequate humidification at home. Expulsion of tube was seen in 8.6% of cases, the common reason being severe cough. Bleeding from the site was seen in 6% which was controlled by local pack. One case of trachea oesophageal fistula was seen (0.6%) which was due to infiltration by malignancy. Tracheoarterial fistula and pneumomediastinum were not seen in our study

Table 4 – Late complication

Complication	Number	Percentage %
Stomal Stenosis	6	4
Sub glottis stenosis	1	0.6
Trachea cutaneous	2	1.3
fistula	4	2.6
Scar / Keloid	1	0.6
Web		
Total	12	

Of the late complication 4% was stomal stenosis when the patient removed the tube for extended period against medical advice. One patient developed subglottic stenosis (0.6%). Tracheocutaneous fistula was seen in 1.3% following decannulation and strapping.

DISCUSSION

Statistical analysis showed no significant difference in the incidence of complication between males and females, adults and pediatric patients, between patients in age group 1-50 and 50-90 and emergency and elective procedures. (p value > 0.05)

In the review of 1928 cases conducted in 1972 by Chew and Cantrell [2] of the Otolaryngology Service of Naval Hospital, San Diego, the overall complication rate was 1.5% with mortality of 1.6%. The most common complication was hemorrhage and the common cause of death was hemorrhage and displacement of tube

In 1981, Arola, Inberg [3] reported a complication rate of 46% in a retrospective study of 794 tracheostomised patients. The commonest complication in their study was infection.

Gaudet, Peerless and Sasaki [4] in 1978 reported a complication rate of 33% in a retrospective analysis of 123 pediatric patients.

Yarrington, Frazer [5] from the division of otolaryngology and department of surgery of university of Rochester, New York studied 240 cases over a period of 2 years and reported a complication rate of 6.7%, the commonest being pneumothorax.

In our study the incidence of complication was 43.3% with no mortality. The commonest complication was per-operative hemorrhage (20%). This was due the fact that 79.3% of procedure was done as a emergency procedure in patients with severe stridor. And this institution being a teaching hospital, surgeries are done mostly by junior residents which also increased the complication. In a study by Skaggs [11] the immediate complication was hemorrhage (17%) followed by surgical emphysema (0.6%). Surgical emphysema was seen in 2.5% case in the study by Yarrington, Frazer [5], 0.9% in study by Chew and Cantrell [2]. We had 6% of surgical emphysema which was due to wide tracheostoma, tube displacement and obstruction which produces air leakage. (Figure 3) We had 2.6% cardiopulmonary arrest on the table which was not reported in any study.

The commonest intermediate complication in Chew and Cantrell [2] study was tube obstruction (2.7%) followed by tube displacement (1.5%), pneumothorax (0.9%) and trachea esophageal fistula (0.2%). Arola, Inberg [3] reported tube obstruction in 5%, trachea esophageal fistula in 0.4%.

In our study the incidence of infection of the stoma was high (13.3%), the cause being improper care by patient after discharge from hospital. The next frequent complication was tube displacement (13%). This is a serious complication that requires immediate reinsertion.

Pneumothorax was seen in 0.6% of cases in our study, which is in par with other studies. This complication is found more in children. In our study this was seen in a patient who as struggling during an emergency procedure. A closed intercostal drainage had to be put in this case. Persistent dyspnoea should arouse suspicion of

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pneumothorax and X-ray of chest should be done to rule out this condition.

We had one case of trachea-esophageal fistula which was due to the progression of the carcinoma. A naso gastric tube was inserted. This occurs when the posterior tracheal wall is damaged or erosion of wall occurs due to malpositioned tube. Periodic deflation of cuffed tube will prevent pressure necrosis. Late bleeding is severe bleeding due to erosion of vessels, the tip of the tube eroding the innominate artery and associated infection. A significant warning sign is the sentinel bleed. Chew and Cantrell[2] reported an incidence of 0.36% of late bleed and 10% mortality. Yarrington and Frazer[5] reported 0.8% of delayed bleeding

Dane and King[6] in 1975 reported 16% tracheal necrosis and later tracheal stenosis as a late complication. In our study we had one case (0.6%) of tracheal necrosis (figure 4) which was due to exposure of cartilage and its erosion by the tube. Excessive long and angulated tube and prolonged cuff pressure can contribute to it.

Chew and Cantrell[2] reported 0.5% tracheal stenosis and 0.2% of persistent stomas a late complication. Dane and King[6] reported 8% of tracheal stenosis. Arola, Inberg[3] reported 0.1% of tracheal stenosis. The incidence of tracheal stenosis is more in pediatric case as reported by Oliver[7]. Presscott[8] reported 17% of peristomal granulation tissue formation that required removal. Waldron [9] in a study of 150 cases reported 3.4% incidence of tracheocutneous fistula. In our study the incidence of trachea cutaneous fistula was 1.3%, tracheal stenosis was 0.6% which correlates with the study of Chew and Cantrell[2]. Waldron [9] reported 1.3% of keloid formation which needed surgical excision. In our study keloid formation was 2.6% which required no treatment. Rare complication like broken tracheostomy tube was reported by Bhatia and Mallik[10].

Difficult decannulation is seen in children the cause being failure to correct the reason for tracheostomy, granulation tissue obstructing the airway, tracheomalacia, physiological dependence on tracheotomy. In our study all temporary tracheostomies were successfully decannulated (9cases) except for one patient who developed tracheal stenosis

Conclusion

The incidence of complication was 43.3% with no mortality and the most common complication was per-operative bleeding. The most common indication for tracheostomy was malignancy (77.3%) of which laryngeal malignancy accounted for 82.7%. Glottis carcinomas accounted for 79% of laryngeal malignancies. All complications are preventable as most occurred while performing a hurried procedure in a struggling patient. Hence the best method of prevention is early intervention in a semi emergency situation. Moser's dictum is valid that-'the best time to do tracheostomy is when you first think about it'. In an emergency time should not be wasted to stop bleeding but airway should be secured first. Constant palpation of trachea avoids deviation from midline and injury to esophagus and recurrent laryngeal nerve. In case of cuffed tube, the cuffs should be deflated frequently to prevent pressure necrosis



Figure 3- Subcutaneous emphysema



Figure 4 – Tracheal necrosis

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