A DESCRIPTIVE STUDY ON COMPLICATIONS OF TRACHEOSTOMY

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ABSTRACT

BACKGROUND
Tracheostomy is a lifesaving procedure that has stood the test of time. Reports of surgically securing the airway dates back to ancient times. However, Chevalier Jackson is credited with the first clear open surgical description in 1909. Only during the last three decades has this operation assumed its rightful place as a simple and safe procedure. During recent years, the complications and deaths due to tracheostomy have markedly decreased. But, complications do occur and there is not much published data, especially in the recent years on complications of tracheostomy. Hence, this study was conducted at Government Medical College, Thiruvananthapuram, to assess the incidence of immediate, intermediate and late complications of tracheostomy and to study the steps taken to manage these complications.

MATERIALS AND METHODS
The study was conducted on 205 patients who underwent tracheostomy, both emergency and elective between June 2013 and December 2014 at Medical College Hospital, Thiruvananthapuram.

RESULTS
The incidence of complications was found to be 28.3%. The most common immediate complications were bleeding and cardiopulmonary arrest. The most common intermediate complication was infection and difficult decannulation was the most common late complication.

CONCLUSION
Knowledge of probable complications and their causative factors is necessary to tackle and prevent them. Majority of the complications can be avoided by using non-metallic tracheostomy tubes, patients seeking early treatment, the expertise of the surgeon, adequate tracheostomy care and regular follow up.

KEYWORDS
Tracheostomy, Complications.

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BACKGROUND
Tracheostomy is a common surgical procedure being increasingly performed nowadays. Prior to the introduction of antisepsis and improved anaesthesia, it was an extremely hazardous procedure and was undertaken with a good deal of anxiety on the part of both the surgeon and the patient. In recent years, there has been a considerable shift in emphasis regarding the indications for tracheostomy. Tracheostomy is also being performed with ease with better knowledge of anatomy and by adopting the classical technique advocated by Jackson during the early years after 1900.¹

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Study Population
205 consecutive cases of tracheostomy, both emergency and elective between June 2013 and December 2014 were included in the study.

Inclusion Criteria
All patients who underwent tracheostomy during the study period, willing to be included in the study.

Exclusion Criteria
Patients not willing for the study and not available for follow up.

MATERIALS AND METHODS
After obtaining consent for the study, detailed history of the patient including sociodemographic variables, history of disease and indication for tracheostomy were taken and detailed ENT examination was done. The complications of tracheostomy if any during the procedure were noted down in detail. Complications occurring during or within 24 hours of the procedure were considered to be immediate complications. Complications occurring after 24 hours and within 4 weeks were included under intermediate complications. Complications occurring after 4 weeks till six months were termed as late complications. The types of tracheostomy tubes used were Jackson’s metallic tracheostomy tubes, Portex cuffed/Shiley non-metallic tracheostomy tubes. Each patient was followed up for a period of six months. After discharge, patients were followed up at weekly intervals for the first one month and monthly for next five months. Each time, the patient came for follow up, detailed ENT evaluation was done and complications if any were noted.

Statistical Analysis
The statistical analysis of the data collected was done. Descriptive and inferential statistical analysis was carried out.

RESULTS AND OBSERVATIONS
In the present study, the most common age group in which patients underwent tracheostomy was 60-70 years of age (39.5%). Details are given in Table 1.
Of the 205 cases studied, complications were observed in 58 (28.3%) cases. Intermediate complications were the most common. Details are given in Figure 2.

Complications were more common in those who underwent emergency tracheostomy. Details are given in Figure 3.

Intermediate complications were commonest in the emergency group and late complications in the elective group. Details of the overview of the complications in emergency and elective complications are given in Figure 4 and Table 3.
Immediate complications occurred in 8 emergency cases and 1 elective case. The most common immediate complications were haemorrhage (6.9%) and cardiopulmonary arrest (6.9%). Two patients developed cardiopulmonary arrest following apnoea. The only immediate complication that occurred in elective cases was haemorrhage in one case (Figure 5).

Figure 5. Incidence of Immediate Complications in Elective Vs. Emergency Cases

Intermediate complications occurred in 35 emergency cases. No intermediate complication occurred in elective cases. The most common intermediate complication was infection, which was seen in 26 cases (44.8%) followed by displacement of the tracheostomy tube in 4 cases (6.9%), obstruction of the tracheostomy tube in 2 cases (3.5%), pneumothorax in 2 cases (3.5%) and tracheoesophageal fistula in one case (1.7%). Although, surgical emphysema was observed in 111 cases, it was minimal, did not require any intervention and hence was not considered to be a complication. No intermediate complications were observed in elective cases (Figure 6).

Figure 6. Incidence of Intermediate Complications in Elective Vs. Emergency Cases

Late complications were observed in 12 emergency and 2 elective cases. The most common late complication was difficult decannulation in 7 cases (12.1%). Haemorrhage in 5 (8.6%), tracheocutaneous fistula in 1 (1.7%) and tracheal scar hypertrophy in 1 (1.7%) (Figure 7).
Immediate complications most commonly occurred in patients between 60 to 80 years of age (Table 4).

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Cardiopulmonary Arrest</th>
<th>Haemorrhage</th>
<th>Apnoea</th>
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<tr>
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Table 4. Immediate Complications Observed in Different Age Groups

Intermediate complications were most common in patients in their 7th decade (Table 5).

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Tube Displacement</th>
<th>Infection</th>
<th>Tube Obstruction</th>
<th>Pneumothorax</th>
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</table>

Table 5. Intermediate Complications Observed in Different Age Groups

Late complications occurred commonly in patients in their 6th decade (Table 6).

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Difficult Decannulation</th>
<th>Haemorrhage</th>
<th>TCF</th>
<th>Trach. Scar Hypertrophy</th>
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Table 6. Late Complications Observed in Different Age Groups

In this study, complications were observed with patients on metallic tubes than on non-metallic tubes. Of 205 cases, metallic tubes available in the hospital were used for 172 patients and non-metallic tubes like Portex and Shiley were used for 33 cases, who could afford to purchase them.
DISCUSSION
This study included 205 consecutive cases of tracheostomy of varying indications at Medical College Hospital, Thiruvananthapuram, during the study period of 18 months from June 2013 to December 2014. A humble attempt has been made to identify the indications, the immediate, intermediate and late complications of tracheostomy and how it was managed.

In the present study, the age group that underwent tracheostomy was ranging from 10-83 years with 60-70 years as the most common age group. In the study of incidence of complications of tracheostomy and their management done by Ahmed Rohail et al,2 also the commonest age group that underwent tracheostomy was 61-70 years of age.

In the present study, males underwent tracheostomy more than females with a ratio of 3.4:1. In the retrospective study done by Crysdale3 in 1976-1985 on 319 cases, more males underwent tracheostomy than females.

In the present study, the most common indication for tracheostomy was upper airway obstruction (84%). In a study carried out by Mahadevan M et al with 122 cases from the Starship Hospital in New Zealand between 1987 and 2003, also airway obstruction (70%) was the main reason for doing a tracheostomy.

In this study, 180 cases (88%) were done as emergency and 25 (12%) were done as elective. In a study done by Fazal-I-Wahid et al6 on 160 patients, 148 cases (92.5%) done as emergency and 12 cases (7.5%) as elective procedure and more males underwent tracheostomy compared to females. These findings are similar to our study.

In the present study of 205 cases, the general incidence of complication was 28.3%. Out of 180 emergency cases, 55 (30.8%) developed complications and 3 (12%) out of 25 elective cases developed complications. These findings are in accordance with the study on complications of tracheostomy by Abdul Aziz Hamid et al7 who also had more complications in the emergency group.

Immediate complications occurred in 8 emergency and 1 elective case. The most common immediate complication was haemorrhage that occurred in 4 cases (6.9%), cardiopulmonary arrest in 4 (6.9%) cases and apnoea in 3 cases (3.4%). In a cross-sectional descriptive study of complications of tracheostomy and their management on 50 patients done by Ahmad Rohail et al,7 the early complications were haemorrhage (16%), cardiac arrest (4%), apnoea (8%) and damage to local structures (8%). These findings are similar to our study.

Intermediate complications occurred in 35 emergency cases. None of the elective cases had intermediate complications. The most common intermediate complication was infection in 26 cases (44.8%) followed by displacement of the tracheostomy tube in 4 cases (6.9%), obstruction of the tracheostomy tube in 2 cases (4.9%), pneumothorax in 2 cases (3.4%) and tracheoesophageal fistula in one case (1.7%). A retrospective study of hospital records of 43 tracheostomized patients by Aass AS19 in Scandinavia (1975) revealed early complications of one each of tube occlusion (2.3%), dislocated tube (2.3%) and bilateral pneumothorax (2.3%). These findings are similar to our study.

Late complications were observed in 12 emergency and 2 elective cases. The most common late complication was difficult decannulation in 7 cases (12.1%), haemorrhage in 5 cases (8.6%), tracheo-cutaneous fistula in 1 case (1.7%) and tracheal scar hypertrophy in 1 case (1.7%). In a prospective study on the complications of tracheostomy done by Stauffer et al in 1981, problems with tracheostomy included stromal infection (36%), stromal haemorrhage (36%) and subcutaneous emphysema or pneumomediastinum (13%). Follow-up studies revealed a high prevalence of tracheal stenosis (65%). Tracheal stenosis was not found in any of the patients in our study probably because of the short follow-up.

The most common complication encountered in this study was infection (26 cases). Diabetic patients were more prone to infection. Patients presented with pain and erythema or crusts and granulations around the stoma. Most of them were treated as outpatient cases with broad spectrum antibiotics and regular dressing with antibiotic creams. In those cases with exuberant granulations, cauterisation with copper sulphate was done. 4 patients had maggot infestation and were hospitalised for intravenous antibiotics and regular suctioning and dressing of the stoma site. All 4 cases had uncontrolled diabetes mellitus and were treated with injection regular insulin with monitoring. Surgical emphysema was present in 111 cases. It occurred due to repeated bouts of coughing and too tight closure around the tracheostomy wound. In this study, it was limited to neck and was detected by touching the overlying skin. All patients were asymptomatic. After regular suctioning and crust removal after anaesthetising, cough suppressant and adequate hydration, it resolved within a few days. Thus, it was not considered as a complication.

Difficult decannulation occurred in 7 cases of which one was a paediatric case. The most common cause was psychological dependence on the tube in 5 cases, severe asiration in one case and granulations in and around the stoma in one case. Decannulation was done gradually by downsizing the tube followed by corking of the tube. These patients were kept under observation for respiratory distress. When the patient tolerated corking for more than 24 hours, tracheostomy tube was removed and strapping was done. Patients were then asked to review after 3 weeks to look for closure of the wound site.

Late haemorrhage occurred in 5 cases and immediate haemorrhage occurred in 4 cases. Immediate haemorrhage was due to injury to anterior jugular vein. Bleeding from wound edges was dealt by pressure/ligation. Late haemorrhage was due to inflammation and bleeding from granulation around the stoma site. These patients were admitted and managed with intravenous antibiotics, regular cleaning and suctioning of the tracheostomy site and removal or cauterisation of granulations.

Cardiopulmonary arrest occurred in 4 cases out of which 2 cases first developed apnoea followed by cardiac arrest.
Immediate resuscitation was done by shifting the patient to intensive care unit, cardiac massage and external defibrillation. However, death occurred in all 4 cases.

Displacement of tracheostomy tube occurred in 4 cases. Causes included severe coughing, improperly tied tube tapes and removal by the patient themselves. The displaced tube was then properly introduced and secured in place.

Obstruction of the tube was seen in 2 cases. In both cases, patients were on Portex single lumen tracheostomy tube. The obstruction was promptly recognised and managed with proper suctioning of the tube and removal of clots and mucus plug.

Pneumothorax occurred in 2 cases. It was due to injury to pleura and in both cases, it was right-sided. Patient presented with increasing dyspnœa. Diagnosis was confirmed by chest X-ray. Treatment was by intercostal drainage.

Tracheoesophageal fistula occurred in one case. Patient had violent coughing during eating. It was due to pressure and necrosis of the tracheostomy tube on the posterior wall of trachea and anterior wall of oesophagus resulting in a fistula. The patient was kept nil orally and nasogastric tube feeding was started. Spontaneous closure occurred without any need for surgical intervention.

Tracheocutaneous fistula occurred in one case. Patient was kept on regular follow up. Spontaneous healing of the fistula occurred in 3 months.

One case developed hypertrophied tracheostomy scar treated by excising the hypertrophied scar.

Most of the patients who underwent tracheostomy belonged to lower socioeconomic status. Only Jackson’s metallic tube was available free of cost in our department, which are not used regularly elsewhere. In the study, more complications were observed with metallic tube than non-metallic tubes like Shiley and Portex. But, since they were expensive, patients could not afford it. Hence, complications that were largely preventable could not be prevented.

CONCLUSION
In our study, 60-70 years was the most common age group for which tracheostomy was done. Tracheostomy was done more in males than females and more under local than general anaesthesia. The most common indication for tracheostomy was upper airway obstruction followed by prolonged ventilation and laryngotracheal trauma, respectively. Out of 205 cases, emergency tracheostomy was more than elective. Complication rate was higher in emergency procedures compared to elective ones. The incidence of complications was 28.3%. The bulk of the complications were intermediate. The most common immediate complications observed were haemorrhage and cardiopulmonary arrest. The most common intermediate complication observed was infection. No intermediate complications were observed in the elective tracheostomy group. The most common late complication was difficult decannulation. Complication rates were more with metallic tubes compared to Portex/Shiley tubes. Death occurred in 4 cases out of 205 cases.

Tracheostomy likely will remain one of the most useful and reliable techniques employed in the care of patients with real or potential respiratory insufficiency. Even now, patients present late to the surgeon in severe stridor necessitating emergency tracheostomy, which increases the risk of complications. When indicated, tracheostomy should be performed confidently without hesitation. Awareness of the complications should discourage the indiscriminate use of the operation and its performance by unskilled surgeons. Majority of the complications can be avoided by using non-metallic tracheostomy tubes, patients seeking early treatment, the expertise of the surgeon, adequate tracheostomy care and regular follow up.

REFERENCES