Tracheotomy in Cancer Patients: Experience from a Cancer Hospital in Pakistan

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Abstract Tracheotomy is commonly performed for the management of upper airway compromise. Trauma and head and neck cancers are the most frequent indications. The objective of this study was to share our experience with tracheotomy performed for a broad range of malignancies including but not limited to head and neck cancer. This study is a retrospective case series of patients who underwent tracheotomy from January 2004 to June 2012 at Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore, Pakistan. A total of 130 patients were included in the study. Patient demographics, indications for tracheotomy, underlying malignancy, and duration of follow-up were assessed. Main indications were elective (prolonged intubation and/or as a prerequisite for head and neck cancer surgery) and emergency (stridor). Outcome was assessed on a basis of successful decannulation and complications related to tracheotomy. Indications for tracheotomy were elective in 55 (44.7 %) and emergent in 75 (55.3 %) patients. Most common underlying malignancy was leukemia/lymphoma in 38 (29.2 %) patients. There were seven (5.3 %) complications in emergency tracheotomies including bleeding in three, emphysema in two, and dislodgement and infection in one patient each. In the elective setting, three (2.3 %) complications were observed with dislodgement in one and stomal stenosis in two patients. Decannulation was successfully carried out in 23 (18 %) patients. Median follow-up of patients was 1 month (range 0–86). No tracheotomy-related mortality was observed. Tracheotomy was performed with relative safety in cancer patients, but low rate of

successful decannulation predominantly due to persistent nature of disease.

Keywords Tracheotomy · Indications · Emergency · Outcome

Introduction

The word tracheotomy is derived from two Greek words trachea arteria (rough artery) and tome (cut) [1]. Earliest reports of this procedure come from a sacred Hindu book and date back to the second millennium before Christ [2]. The operation came to limelight in early twentieth century with the work of Chevalier Jackson who described the modern method and indications of this procedure [3, 4]. Main indications of this procedure include prolonged mechanical ventilation, weaning failure, upper airway obstruction, and copious secretions [1]. Recent changes in the management of patients with respiratory compromise have somewhat changed the frequency and indications for which tracheotomy is performed [5]. Majority of published reports have shared the experience of tracheotomy for a broad variety of indications including maxillofacial trauma, head and neck cancers, and patients on prolonged mechanical ventilation [5–7]. Patients with cancer represent a unique group due to their altered physiology, immune response, and continual nature of disease. Here, we share our experience with tracheotomies performed specifically in cancer patients with a broad range of underlying malignancies.

Materials and Methods

A retrospective review of patients with cancer who underwent tracheotomy at Shaukat Khanum Memorial

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Cancer Hospital and Research Centre from 2004 to 2012 was performed. A total of 130 patients were included in the study.

Patients' demographics, underlying malignancy, and indication for tracheotomy were assessed. Indications were divided into emergency for stridor and elective for prolonged intubation (10 days or more) or as a prerequisite for head and neck cancer operation. Outcome was assessed on a basis of observed complications and successful decannulation. Data regarding outcome was extracted from the follow-up notes. Only patients who had documented evidence of death were considered dead. In addition, reasons for inability to decannulate in alive patients and patients who died 1 month after the procedure were also evaluated. All tracheotomies were performed in the operating room by a consultant surgeon. Preoperative neck CT scan was performed in all patients undergoing emergency tracheotomy. Single-lumen tube was used for most adults, which was replaced with a double-lumen fenestrated tube if long-term airway control was required. All tracheotomies were performed under general anesthesia except in cases of emergency tracheotomy where preoperative imaging deemed endotracheal intubation impossible. Data was reported as frequencies for different variables. All data were collected and analyzed using SPSS version 20.

Surgical Technique

All tracheotomies were performed in the operating theater suite under general or local anesthesia. A transverse skin incision was used. Subcutaneous fat was dissected with electrocautery, and strap muscles were identified. Straps muscles were retracted laterally, widening the median raphe thus exposing the pretracheal fascia. The thyroid isthmus was retracted upwards in majority of cases, but occasionally, it was divided with electrocautery or harmonic sheers. An inverted U-shaped opening was created in the trachea, involving the second and third tracheal rings. The tracheal lid was reflected on to the skin inferiorly using Prolene sutures and was fixed with adhesive tape. Appropriate size tracheotomy tubes were atraumatically inserted after controlled pull back of the endotracheal tube by anesthetist. End tidal carbon dioxide was confirmed on capnograph. The tube was stitched to adjacent skin using Prolene sutures or secured with neck straps. All patients who underwent emergency tracheotomy stayed overnight in the hospital and were discharged after they were briefed regarding tracheotomy care instructions by respiratory therapist. Decannulation was performed only after confirmation of objective evidence of upper airway patency on fiber optic laryngoscopy.

Results

Patient Presentation

A total of 130 tracheotomies were performed from 2004 to 2012. Median age of patients was 50.5 (range 1–91) years. Male to female ratio was 1:1.4 (76 males and 54 females). Indications for tracheotomy were elective in 55 (42 %) and emergency in 75 (58 %) patients. Although most common underlying malignancy was leukemia/lymphoma in 38 (29 %) patients, head and neck cancers together constituted the most common indication for tracheotomy with a total of 62 (47 %) patients. Table 1 represents underlying malignancies in the study group.

Outcome

Overall, ten complications were observed. There were seven complications in emergency tracheotomies including bleeding in three, emphysema in two, dislodgement in one, and infection in one patient. In the elective setting, three complications were observed with dislodgement in one and stomal stenosis in two patients (Table 2). Out of three patients with posttracheotomy bleeding, two patients had to be taken to theater suite for hemorrhage control. Bleeding vessel in thyroid substance was tied off in one patient, while diffuse ooze from peritracheotomy surface was managed with pressure packing in the second. The third patient had on and off ooze from peristomal region and was managed with local

Table 1 Characteristics of patients who underwent tracheotomy

	<i>n</i> (%)
Gender	
Male	76 (58)
Female	54 (42)
Indication of tracheotomy	
Emergency	75 (55)
Elective	55 (45)
Underlying malignancy	
Leukemia/lymphoma	38 (29)
Hypo-pharyngeal cancer	30 (23)
Laryngeal cancer	24 (18)
Thyroid cancer	4 (3)
Tongue cancer	4 (3)
Colorectal cancer	4 (3)
Esophagus cancer	5 (4)
Breast cancer	3 (2)
Pancreatic cancer	2 (2)
Bladder cancer	2 (2)
Lung cancer	2 (2)
Other rare tumors	12 (9)

Table 2 Outcome of tracheotomy in cancer patients

	Elective (<i>n</i>)	Emergency (<i>n</i>)	Total (<i>N</i>)	Percent
Decannulation				
Yes	9	14	23	18
No	46	61	107	82
Complications				
Dislodgement	1	1	2	1.5
Stenosis	2	0	2	1.5
Infection	0	1	1	0.7
Bleeding	0	3	3	2.3
Emphysema	0	2	2	1.5

hemostatic measures. Patients with posttracheotomy subcutaneous emphysema were managed successfully with observation. Inadvertent decannulation occurred in two patients, and both required reinsertion. One patient developed stomal stenosis 3 months after laryngectomy due to a fibrotic band and required excision of this band in OR, while the second patient with acute lymphoblastic leukemia required refashioning of stoma site 1 month posttracheotomy.

Decannulation was successfully carried out in 23 (18 %) patients. Out of these, 19 patients were alive on the last follow-up note. Cause of death in patients who were successfully decannulated included distant metastatic disease (primary nasopharynx and larynx) in two patients, locally advance thyroid malignancy in one patient, and progressive Wilms' tumor in one patient. Reasons for inability to decannulate in alive patients and patients who expired 1 month after tracheotomy are shown in Table 3. Around 50 % of patients in both groups had persistent disease in the head and neck region as the reason for inability to decannulate.

Follow-up and Mortality

Median follow-up of patients was 1 month (range 0–86). A total of 49 (38 %) deaths were observed in the follow-up period: 16 (12 %) in emergency and 33 (25 %) in the elective tracheotomy. No tracheotomy-related mortality was observed.

Discussion

This retrospective review highlights the safety of surgical tracheotomy in cancer patients. Tracheotomy was performed with an acceptable complication rate of 8 % and no associated mortality. All complications were successfully managed without serious sequelae. The high mortality rate of 37 % observed in the present study was related to underlying malignant process and was not attributable to surgical procedure.

The complication rate associated with tracheotomy is variable, but can range from 4 to 48 % [5, 7]. Newer studies have

Table 3 Reasons for inability to decannulate in alive patients and patients who died >1 month after tracheotomy

Underlying cause	Alive		Dead	
	<i>n</i>	%	<i>n</i>	%
Progressive head and neck malignancy	31	49	8	62
Sepsis/ARDS	10	16	3	23
Head and neck surgery requiring permanent tracheotomy	5	8	–	–
Upper airway narrowing, edema, stenosis	4	6	–	–
Impaired swallowing secondary to brain tumor	–	–	2	15
Lost to follow-up	12	21	–	–
Total	62	100	13	100

reported lower complication rates of around 9–15 % [8, 9]. The likelihood of complication increases significantly when it is performed in emergency setting [5]. The low complication rate in the present study can be attributed to multiple factors. These include availability of operating room and an experienced maxillofacial surgeon, meticulous attention to detail with the use of diathermy for dissection, and absence of patients with maxillofacial trauma. These factors probably also contributed to 0 % tracheotomy-related mortality in the present study. Bleeding in perioperative period is the most common complication of tracheotomy. Fattahi et al. in their review of 171 tracheotomies reported this complication in only two patients [7]. Three patients in the present study experienced this complication of which two required exploration in OR, and one was managed conservatively. Accidental dislodgement of the tube has been reported to occur in up to 5 % of patients with tracheotomy [10]. A very low frequency of this complication was observed in the current study. Routine use of Prolene suture to secure tracheotomy tube to the skin has been shown to reduce the risk of accidental decannulation, and this was a regular practice at our institute. Long-term complications are often underreported as patients are lost to follow-up [11, 12]. Since patients with cancer have a regular long-term follow-up, this was not a problem in the present study. Four patients developed complications after 1 month of the procedure including tracheal stenosis, operative site infection, and dislodgement.

Majority of patients who undergo tracheotomy are successfully decannulated. In fact, successful decannulation rates higher than 70 % have been reported [5]. Low rate of successful decannulation in the present study reflects the deleterious impact of malignancy. Only 13 % of patients were successfully decannulated either due to persistent underlying malignant process or death of patients before decannulation could be attempted.

Benefits of tracheotomy include establishment of long-term secured air way, lower risk of infection, and decreased hospital and ICU stay [7]. It is generally recommended that

tracheotomy should be performed early in the course of disease to accentuate its benefits [13, 14]. In the present study, patients on mechanical ventilation were referred for tracheotomy after a threshold of 10 days. Majority of patients with stridor had tracheotomy on the same day.

In recent times, less invasive techniques like percutaneous dilatational tracheotomy (PDT) and submental intubation have added significantly to existing options for securing an airway [15, 16]. A meta-analysis of 17 randomized trials comparing PDT with surgical tracheotomy showed a lower incidence of wound infection, bleeding, and death in patients who underwent PDT [17]. PDT is not practiced at our institute, and all patients who required prolonged ventilation underwent tracheotomy. Since all these procedures were performed in the operating room, this translated into mobilization of significant hospital resources and personnel compounded by consumption of OR time and instrumentation. Despite low rate of complications and zero mortality associated with tracheotomy, careful follow-up of patients in the present study showed a high rate of cancer-related mortality.

Upper airway obstruction due to head and neck tumors and prolonged intubation for long-term mechanical ventilation were the most common indications of tracheotomy in the present study. Cancer patients on mechanical ventilation are usually terminal patients and represent a unique subset of patients in need of a secure airway with a high risk of subsequent mortality. A prospective study perhaps a randomized trial between tracheotomy and less invasive procedures for the establishment of a secure airway in cancer patients can guide selection of patients suitable for either of these interventions.

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