

Quality of Life After Tracheostomy. A Retrospective Study in a Tertiary Care Centre

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Abstract

Introduction: Tracheostomy changes the lives of the patients as well as of their relative. As care of the patients, their tube, and is full of challenges. Aim of study to highlight challenges and recommendations were suggested to improve the same.

Material and Methods: 108 subjects were enrolled in the study. 67 participant were assessed after 2 ½ month for quality of life using SF 36 questionnaire on follow up visit or using online web method by what Sapp and telephonically conversation using online link (<https://orthotoolkit.com/sf-36/>). After analysis of the result recommendations were suggested to improve quality care of these patients.

Result: Among the 108 patients only 67 were included after their consent in the study. 31 patients were decannulated successfully whereas rest 36 were still tracheotomised. The SF-36 questionnaire consists of 36 items measuring eight multi-item domains in a 0–100 scale, a higher score representing a better condition: physical (PF) and social functioning (SF), role limitations due to physical (RP) or emotional problems (RE), mental health (MH), vitality (VT), bodily pain (BP) and general health (GH). The reliability and validity of the SF-36 has been evaluated in the critically ill population. It was found that tracheostomized patient's quality of life was badly affected in all the eight multi-item domains. So after analysis recommendations were suggested to improve quality care of these patients which is often neglected.

Conclusion: Present study analysed the challenges faced by this group of people and accordingly recommendation were suggested to improve their quality of care.

Keywords: Trachea; SF-36 Questionnaire; Decannulation; Global Tracheostomy Collaborative; Percutaneous Tracheostomy

Introduction

Tracheostomy is defined as creating a surgical stoma on the anterior wall of the trachea and its fixation with the overlying skin [1]. It is a life-altering event both for the patients and their relative with high impact quality of life (QOL) in many ways. As tracheostomies impair communication and personal relationship, can lead to dysphagia, restrict physical and social activity and neck mobility. Adult tracheostomy are mainly performed to overcome upper air-

way obstruction, for prolonged endotracheal intubation, and airway protection whereas pediatrics tracheotomy usually performed in the first year of life mainly for congenital anomalies of airway and in case of prolonged mechanical ventilation [2,3]. It is known to be one of the oldest performed procedure as about 3600 BC as it was depicted on Egyptian tablet. According to the Aretaeus (2nd century AD) and Galen (2nd to 3rd century AD) tracheostomy was performed by Asklepiades (Greek physician) about 100 BC [4]. Only 28 suc-

cessful tracheostomies were recorded in the time period of 1546 to 1833 which was done to relieve upper airway obstruction. In 20th century, Chevalier Jackson not only refined the procedure but also made it technically safe [5,6]. There are two techniques for tracheostomy surgical and percutaneous. Percutaneous remain the preferred technique, the reason may be easy insertion of tube, small wound size, less infection and complication rate. Sheldon, *et al.* introduced percutaneous technique in 1955, other approaches like Griggs, Fantoni, Ciaglia, and Seldinger with relative merit of each technique [7-9]. Freman conducted a metaanalysis on comparison of both the techniques. He found the percutaneous technique was far better less time consuming, less perioperative bleeding, and cost-effective. But mortality rate remain same [10]. Complication rates range between 4% and 31% for PT and between 6% and 66% for surgical tracheostomy [11]. Percutaneous tracheostomy (PT) usually done at the bed side of patient. Nowadays different modalities of PT are available unassisted PT and assisted by fibro bronchoscopy or by ultrasound guided with very low rate of complication as compared to unassisted and surgical tracheostomy.¹² So the challenge of improving and measuring the quality of life and tracheostomy care for this diverse patient population has remained.

How challenging the life of a tracheostomized patients is: Tracheostomy changes the lives of the patients as well as of their relatives. As care of the patients, their tube, and have to come up with the changes in their lives. Their new selves decrease their working capacity, and limit their social life. It is very essential to recognise the patient adverse event related to tracheostomy so as to improve quality care, and this realization has led to development of tools to capture outcomes that affect the patients. As tracheostomy adversely affect the physical and mental health of the patients with negative impact on their quality of life. The most common event is tube blockage. In the present study one patient died due to tube blockage. One more patient presented with respiratory distress and almost complete blockage but successfully revived with immediate tube changed and 100% oxygen, within about half an hour patient status was improved.

So the tube blockage remain the most common and notorious problem among the tracheostomized patients. Other conditions that affect the life of tracheostomized patients is dysphonia, as it is interfering with the professional use of voice posing significant challenge to patient own self. Their social communication was totally hampered due to loss of verbal communication, as it is very

tiresome and laborious to communicate because both mental and physical effort are required. Not only this patient having difficulty for telephonic conversation and difficulty in speaking in noisy and crowded places. This develop social avoidance and reluctance to participate in social activities, and ultimately patients landed up with social withdrawal which has its own health implication. Next major problem was mucus production through stoma that not only limit their social outing but also their frequency to visit their relatives. These secretions are sometimes foul smelling may be due to crusting or added infection. Pain and irritation in neck is also very common because of the tube and shield around it.

Patients outdoor play activities are restricted badly specially among sportsperson. Water activity like swimming and diving become the thing of past for them. Tracheostomized patients even have difficulty during bathing as water used to get in the tube so they have to be very vigilant. They feel difficulty for long walk, walking upstairs, stooping and bending forward. Employed people find it difficult to continue their job. Other restrictions are inability to drive vehicle, unable to go too far place alone. The disfigurement of anterior neck cause depression and anxiety among tracheostomy patient. At last but not the least financial burden of procedure, cost of hospitalization and nursing care at home remain troublesome for the patient and their relatives.

After the procedure patients usually discharged in satisfactory condition expect ventilated patients or associated serious comorbidity. Once patient discharged and send back to community patients family members become the main caregiver. In the community the caregiver have to manage their substantial daily commitment that affect their freedom for a normal life. Relatives were taught about tracheostomy tube care, which include tube suctioning, humidification, cleaning of secretion coming out of the stoma. Even they were instructed for regular follow up in outpatient's clinic (mainly otorhinolaryngology department) for tracheostomy related adverse event, for its change, or to visit nearby health institute in case of any emergency.

So the present study was done to highlight the various challenges faced by tracheostomized patient by assessing quality of life with aims to recommend the novel approach to facilitate the development and dissemination of good practices to overcome these challenges and to provide them quality of life especially in the developing country like India.

Material and Methods

The study design was prospective cohort on 108 patient (including both adult and pediatric) of either sex admitted in ENT ward and ICU of government medical college and hospital two year duration presented with indication of tracheostomy.

Inclusion criterion: patients of all age group of either sex, with indication of tracheostomy and willing to give informed written consent for participation.

Exclusion criterion: not giving informed consent, infection at tracheostomy site, altered neck anatomy like big thyroid growth.

Procedure were explained to the patient and relatives (in case of minor, debilitated, illiterate, critical ill patient) in their own vernacular language. Complication related to procedure and type of anesthesia were explained before surgery. Written consent was obtained, patient operated under local or general anesthesia as an elective or emergency procedure. Mostly horizontal incision were given as it was cosmetically better.

Both surgical and percutaneous technique were used. Patients were assessed for health related events and limitation, and postoperative complication. Survivors patients were assessed at 1 week, 2 week, 1, 2, 3, 6, and, 12 months. Quality of life was assessed in tracheostomized patients using Short Form Health Survey (SF-36) questionnaire that was done at 2.5 month after tracheostomy. Survival data collected at the end of November 2020. Their consent to participate in the QOL was taken then the SF-36 questionnaire filled either by patients themselves or by their relative. Surveys were completed by filling SF-36 forms after 2.5 months either direct communication on the patient visit, by what Sapp, telephonically depending upon the education and understanding level of the patient. At the time of survey patient were conscious, cooperative, and fully oriented. For what Sapp and during telephonically conversation online link was used (<https://orthotoolkit.com/sf-36/>). The SF-36 questionnaire consists of 36 items measuring eight multi-item domains in a 0-100 scale, a higher score representing a better condition: physical (PF) and social functioning (SF), role limitations due to physical (RP) or emotional problems (RE), mental health (MH), vitality (VT), bodily pain (BP) and general health (GH). The reliability and validity of the SF-36 has been evaluated in the critically ill population [13-15]. The score was assessed and analyzed.

Results

108 patients of either sex and with indication of tracheostomy like; prolonged intubation (on ventilator support/ventilator weaning), for managing pulmonary secretions, for upper airway obstruction like stridor, air hunger, retractions obstructive sleep apnea with documented arterial desaturation, bilateral vocal cord paralysis, inability to intubate, and adjunct to major head and neck surgery/trauma management, and for airway protection in case of neurologic diseases, traumatic brain injury to overcome airway obstruction were enrolled in the present study. The group with minimum age less than 1 year and maximum age of 80 years were included. Written consent were obtained from patients or their relatives in case of minor or illiterate patient. Patients of all age group were included in the study from 0-80 years with mean age 31.4 years. 80 patients were male including 2 male child, 28 female patient which include 3 female child. 22 (11 male and 11 female) patients were on mechanical ventilation for not more than 15 days.

Procedure was done as an emergency in 52 (44 male and 8 female) patients whereas in 56 patients (44 male and 12 female) elective surgery was done. Only 2 patients underwent percutaneous tracheostomy. Type of Anesthesia varied depending upon patient general condition. Elective procedure mostly done in young children under general anesthesia. Patient were assessed for medical and surgical profile especially for elective procedure. Portex (polyvinyl chloride) cuffed tracheostomy tubes were used in all patient. Cuff pressure should be low with high volume and not to exceed above 25 cm of water. Complication were more common during emergency tracheostomies as compared to elective procedure.

Figure 1: Age and Sex wise distribution of patients.

Most common indication for tracheostomy was upper airway obstruction due to growth of laryngeal apparatus commonly involving supraglottic (30.55%) followed by glottis (5.55%), AF fold and epiglottis (3.70%). Than CA of hypopharynx (4.62%), CA oesophagus (2.77%), patient on mechanical ventilation (20.37%), trauma (14.8%), patient requiring tracheobronchial toilet (CVA ± Autoimmune disorder ± burn 7.40%).

----Sr.	
Indication	No. of patients (% age)
Upper airway obstruction	
Tumors: malignant	
Laryngeal	
Supraglottic	33 (30.55 %)
Subglottic	02 (1.85 %)
AF Fold	04 (3.70 %)
Epiglottis	04 (3.70 %)
Glottis	06 (5.55%)
Hypopharynx	
Pyriform sinus	02 (1.85%)
Post cricoid	03 (2.77%)
Oropharynx	01 (0.9%)
Oesophagus	03 (2.77%)
Lymphoma	01 (0.9%)
Trauma	
Neck + maxillofacial	11 (10.18%)
Cut throat	05 (4.62%)
Subglottic stenosis	01 (0.9%)
Mechanical ventilation (infection)	22 (20.37%)
post-surgery complication	02 (1.85%)
B/L abductor palsy	02 (1.85%)
For tracheobronchial toilet	
(CVA +Autoimmune disorder + burn)	08 (7.40%)

Table 1: Showing indication of Tracheostomy.

Sr. no.	Complication	No. of patient (% age)
A	Intraoperative	
	Haemorrhage	03
	Apnoea	02
B	Early postoperative (1-10 days)	
	Emphysema + Pneumothorax	04
	Infection (periostomal)	03
	Tube displacement + blockage	07
	Tracheo-esophageal fistula	01
	Delayed bleeding	01
C	Late postoperative (>10 days)	
	Difficult Decannulation	02
	Excessive granulation	01
	Myaisis	01
	Tracheal stenosis	02

Table 2: Showing complication of tracheostomy.

As the procedure is lifesaving but not free from complication. It was divided into intraoperative, early and late postoperative. Most common and notorious complication was tube blockage seen in 7 patients mostly during early postoperative period, followed by emphysema and pneumothorax during operative period in 4 patients. Intraoperative haemorrhage and periostomal infection seen in 3 patients each. Followed by intraoperative apnoea and late postoperative tracheal stenosis in 2 patients each. Other complication were trachea-oesophageal fistula, delayed stenosis, excessive granulation, Myaisis. 2 patients died during procedure with primary mortality rate 1.85% due to associated comorbidities as 1 patient had terminal stage lymphoma and the other had COPD with cardiac disease. 22 patients died during follow up period of 2.5 months due to the underlying disease and associated comorbidities with secondary mortality rate of 20.37%. Intraoperative complication like hemorrhage and apnea were managed by proper heamostasis and 100% oxygen inhalation respectively. Sometime bleeding from the medium sized vessels goes unrecognized, culprit should be identified and ligated, skin bleeders are easily managed by cautery. Early postoperative complication tube blockage required suction cleaning using mucolytic agent, humidification, and changing of tube whenever needed. Subcutaneous emphysema seen in one patient because of tight stay suture. It was relieved once suture was removed. Pneumothorax is more common in young children as pleural dome is high in neck and more prone to injury. However it is preventable event with minimal dissection of pretracheal fascia. It was seen in two children, one was managed conservatively as it was minimal and resolved spontaneously whereas in the other one closed intercostal chest tube drainage was done.

Periostomal infection can occur at site of stoma, near tip of tube or even around area of cuff. All the 3 patient were treated by appropriate antibiotic, meticulous antiseptic dressing around the stoma, adequate antiseptic suction cleaning of tube. Trachea-esophageal fistula seen in one patient, that occurred due to erosion of posterior wall of trachea because of excessive cuff inflation. But was managed successfully by keeping the patient nil by mouth and stenting of both trachea and esophagus. Difficult Decannulation observed in 2 patients due to granulation around the stoma that was managed by surgical excision and applying trichloroacetic acid. Tracheal stenosis commonly seen after 6 weeks of decannulation. Stenosis can occur at, or above the site of stoma sometime below the vocal cords. Usually it is proceeded by chondritis or superadded bacterial infection. This complication is very much preventable by avoiding cartilage fracture or preventing mechanical irritation of tube on trachea and keeping the cuff pressure below 20 cc of water or less then was managed conservatively with dilatation using bouginage. But if stenosis extend more than 2.5 cm in length, it is

managed by mediastinal mobilization through sternal splitting incision. Myiasis was managed by using proper antiseptic care and removal of maggot it was managed successfully. All complication were almost manageable and also preventable by early intervention and performing the procedure in elective manner. Among 108 patients 31 patients were successfully decannulated after gradual downgrading of tube without any uneventful episode. Most of the patients who were decannulated were free from any comorbid disease and they were comparatively young and healthy people. Their quality of life was affected a little bit in form of speech as quality and strength of voice was changed a little. Among the 108 patients 24 patients died, 11 patients refused to participate and 6 patients were lost during follow up. 67 patients were assessed at the end of 2 ½ month of tracheostomy for quality of life using SF-36 QOL score.

	Still tracheostomised	Successfully decannulated
Physical functioning	53.47 ± 13.38	93.71 ± 3.10
Role limitation due to physical health	58.33 ± 28.87	83.06 ± 5.63
Role limitation due to emotional problem	76.85 ± 14.36,	33.91 ± 19.61
Energy/fatigue	71.35 ± 8.68	53.61 ± 10.64
Emotional well being	46 ± 14.92,	89.55 ± 2.81
Social functioning	61.46 ± 14.84	90.48 ± 8.19
Pain	85.11 ± 15.97	34.19 ± 4.93
General health	44.30 ± 16.46	75.48 ± 6.77
Health changes	43.75 ± 20.72	90.97 ± 10.11

Table 3: Post tracheostomy assessment of quality of life after 2 ½ month using SF-36 QOL score in still tracheostomised and decannulated group.

Physical functioning was very much improved in successfully decannulated 93.71 ± 3.10 whereas it was significantly decreased in tracheostomized patients (53.47 ± 13.38), role limitation due to physical health very much restricted 58.33 ± 28.87 but only partially effected by 83.06 ± 5.63. Role limitations due to emotional problems was very much affected in tracheostomized patients but it was less than half effected in decannulated group (33.91 ± 19.61). In still tracheostomized group energy/fatigue was 74.35 ±

8.68, emotional well-being 46 ± 14.92, social functioning was decreased 61.46 ± 14.84, pain was highly significant 85.11 ± 15.97 may be because of the underlying diseases or associated comorbidities, general health 44.30 ± 16.46, and health change 43.75 ± 20.72 respectively. Energy/fatigue was 53.61 ± 10, emotional well-being 89.55 ± 2.81, participation in social function was near normal 90.48 ± 8.19, pain was very less 34.19 ± 4.93 as compared to tracheostomy in situ group, general health was far better 75.48 ± 6.77, and health change 90.97 ± 10.11 respectively.

Health status of patient	No. of patient	Percentage
Successfully decannulated after treatment	31	28.70
Still tracheostomised	36	33.33
Patient not interested to participate	11	10.18
Lost during study	06	5.55
Patient died	24	22.22

Table 4: Patient health status assessed at the end of 2 ½ month after tracheostomy.

Discussion

Tracheostomy patients are critically ill group having significant morbidity and mortality with compromised quality of life. Our literature is very much lacking in quality care of a tracheostomized patient, though enough data is available regarding its indications, surgical technique, its complications and management [16]. The present study was done to highlight the various challenges faced by tracheostomised patient and aims to recommend the guidelines to facilitate the development and dissemination of good practices to overcome these challenges and to provide them quality of life. Recommendations include well-coordinated multidisciplinary team work between operating surgeon, intensive care physician, ward physician, nursing staff and other involved helpers. In addition to this physiotherapists, speech therapist play crucial roles. Multidisciplinary patient care should include critical care, inpatient management till patients is discharged, and is followed up in outpatient clinic for further management and decannulation, and all should be in continuity. Every event related to patients should be well documented. Some institute collect data about tracheostomy outcome like its related mortality, complications, hospital stay, repeated admissions, and decannulation. This will provide additional sense of responsibility and ownership for the patient’s problem.

Other important pillar of tracheostomy care are patient's family members who are equally important as health care worker. As family members not only motivate the healthcare workers for future changes but also help in improving the quality care for the patients by getting education, hands-on, and emergency management training at the time of discharge [17]. Many successful studies of single institute are available on quality improvement of tracheostomized patient. One such study conducted by Cameron, *et al.* in Australia implemented multidisciplinary consultation program on tracheostomy review and management service (TRAMS) that showed favorable outcome in view of decreased length of acute hospital stay that decreases cost of hospitalization. They also concluded that the patients start speaking early by using speaking valve, and had early decannulation [18]. Similar institutional study conducted in USA by Pandian, *et al.* suggested that the multidisciplinary percutaneous tracheostomy team decreased the time lag between tracheostomy request to its insertion and hence decreasing its related complications [19]. There are bunch of institutes that work on data analysis and share learning in a cost effective manner and methodology for purpose to improve quality work of the concerned health care team [20]. Speed and Harding had a meta-analysis that suggested low quality evidence regarding multidisciplinary team's contribution in decannulation time or increase speaking valve usage. Similarly insufficient evidence are available to comment on hospital or intensive care stay of patient [21]. One such global alliance, Global Tracheostomy Collaborative (GTC), is a non-profit organisation formed in 2012 first of its kind with primary aims to improve quality of care in tracheostomized patients throughout its journey with tube till its decannulation and community care [21,22]. In developing country like India institutional data is lacking as only few multicentre trial were done. There are plenty of reason for this insufficient data, as there is wide variation among the institutes regarding place of procedure (intensive care unit, bedside or operation theatre as elective procedure), surgery technique (open surgical, percutaneous dilation or endoscopically guided) even the speciality of the doctors also varies. In United State almost 2/3rd tracheostomy was done by otorhinolaryngologists rest was done by other surgical specialities. [23] in India also most of the tracheostomies was done by otorhinolaryngologist, and rest was by intensive care physician and surgeon. Moreover the clinical heterogeneity of the patients and infrequency of the procedure make the outcome evaluation difficult. Because of these limitation our traditional research methodology fail to assess the quality care.

From all this discussion we able to conclude that limited data is the main reason that badly affect the quality care of tracheostomized patients. One such guideline was issued in 2012 by American Academy of Otolaryngology- Head and Neck Surgery (AAO-NHS) about best practices regarding tracheostomy care.²⁴ These are few recommendations to improve quality care:

- In future to improve the quality care; well-co-ordinated multidisciplinary team care for inpatient, and outpatient clinic with standardized protocol need to be develop.
- Clinical outcomes measure should be evaluated in view of tracheostomy indication, choice of technique (incidence of complications and cost effectiveness), comparison of various techniques of percutaneous dilatation technique its related complication, duration for which the ventilator support and tracheostomy needed, total time of hospitalization, discharge disposition, and tracheostomy related primary or secondary morality. So this collected data should be further analysed, for the purpose to educate the working staff as well as family members to deliver patient centred care, and to disseminate high quality information for the sharing of best practices.
- Skill and experience of operating surgeon should be enhanced by providing them training with recent advance in technique, encouraging them to counsel and offering support to the patient. Multidisciplinary team should ensure to deliver all the necessary information that help the patient and care giver to deal with tracheostomy tube in situ.
- "Support groups" should be created at the community care level. These are forum or interaction platforms of the group of people with tracheostomy tube and their care giver who will share their information and experience with each other's (communication medium may be, direct talk, telephone, email etc.) that act as a valuable coping mechanism to find out the solution of their common problem and offering support to each other.

One such group was advised Blue and Frings in 2016 that play important role in improving mental wellbeing among the tracheostomized patients [25]. We are able to formulate the above mentioned recommendations to improve the quality care for tracheostomized patients.

Conclusion

The present study tried to highlight the most common challenges faced by tracheostomized patients based on their day to day life experience with few limitation like small sample size and 2 ½ month assessment time for quality of life. As we all know the complication and the challenges of tracheostomy as well physician perceived poor quality of life often give negative bias. After considering the various guideline for the quality care of tracheostomized patient we able to form the above mentioned recommendation that are the first of its type specially in India for the betterment and improvement of the quality care for tracheostomized patients.

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Competing Interest

No competing interest to declare.

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