CLINICAL OUTCOMES FOR THE ELDERLY PATIENT RECEIVING A TRACHEOTOMY

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Abstract: Background. Tracheotomies are routinely performed for severely ill and elderly patients with respiratory failure. This intervention is questioned, given the poor survival rate in this group. Outcomes analysis is performed after tracheotomy.

Methods. This is a retrospective study of 78 elderly patients, who received tracheotomies for respiratory failure. Pretracheotomy data (age, length of oral intubation, and DNR status) were collected. Outcomes analyzed during the same admission as the tracheotomy included death versus discharge, ventilator dependence, vocal function, route of feeding, decannulation, and ICU discharge disposition.

Results. The mean age was 77.6 ± 11 years (median, 79 years), and patients were intubated for 16.7 ± 9 days. Forty-two percent (n = 33) obtained DNR orders after tracheotomy, and 8% (n = 6) before tracheotomy. Seventy-one percent of patients (n = 55) had gastrostomy tubes placed. Fifty-six percent of patients (n = 44) died after tracheotomy; median time from tracheotomy to death was 31 days. After tracheotomy, 53% (n = 41) remained at least partially ventilator dependent, 18% (n = 14) regained consistent vocal function, and 13% (n = 10) were decannulated. For those who died, 27% (n = 12) died without leaving the ICU.

Conclusions. These data demonstrate that a large proportion of elderly, severely ill patients with respiratory failure suffer poor outcomes after tracheotomy. More stringent criteria are necessary for performing the tracheotomy in this patient population. © 2004 Wiley Periodicals, Inc. Head Neck 26: 71–76, 2004

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In the last several years, the number of tracheotomies performed on elderly, chronically ill patients with respiratory failure has dramatically increased. Reasons include the increasing success of critical care treatment and the growing elderly population in the United States. Currently, there are at least 4 million adults 85 years or older.1 This number is expected to double by the year 2030. Health care costs in the United States for the over-65 population was $1740 billion (38% of total expenditures) in 1996. This figure is estimated to jump to $15,970 billion (74% of total expenditures) by 2030.2 As care improves and more elderly patients survive in the acute-care setting, the number of patients with prolonged respiratory failure will continue to increase.
In the intubated patient with prolonged ventilator dependence, it is fairly well established that the advantages of doing a tracheotomy outweigh the disadvantages in airway management.\textsuperscript{3,4} The indications for performing a tracheotomy in a ventilator-dependent patient are many and include medical and cost considerations. A tracheotomy facilitates nursing respiratory care, allows for better pulmonary toilet, reduces dead space and airway resistance, and contributes to increased patient comfort. Furthermore, a tracheotomy reduces the risk of self-extubation, is more stable than an oral airway, and, theoretically, would allow the patient to eat and talk while the patient is on a weaning protocol.\textsuperscript{3,5} It also expedites the weaning process and the transfer from a highly monitored setting, which significantly contributes to cost reduction. At present, the creation of a tracheotomy is standard airway management in the group of patients with respiratory failure unable to tolerate extubation beyond 7 to 14 days.

Clearly, many elderly patients benefit greatly from the tracheotomy for the reasons just described.\textsuperscript{6} However, often the sole criterion for determining the appropriateness of a tracheotomy is a diagnosis of prolonged oral/nasal intubation and not a realistic appraisal of the patient’s overall outcome. The patient and his or her family may be given unrealistic expectations of what a tracheotomy can accomplish in a very sick, elderly, and ventilator-dependent patient. Little attention is focused on the question of whether the tracheotomy extends dying and suffering rather than prolonging life. Because the procedure relates to costs, one study even reported an increase in cost of patient care initially after a tracheotomy.\textsuperscript{5} Therefore, if the patient is not benefiting from the tracheotomy, it may actually increase the cost of medical care.

Few studies have properly evaluated the outcomes after tracheotomy in the chronically ill and elderly patient with respiratory failure. The goal of this study was to analyze outcomes for patients in this group.

**PATIENTS AND METHODS**

Subjects were selected from a pool of patients who received tracheotomies for respiratory failure and illnesses not directly associated with major surgery. Patients who had procedures for which respiratory failure was not considered a risk factor of the procedure but who nonetheless had this complication develop, in delayed fashion, were included in the study. Other important inclusion criteria, aside from respiratory failure and tracheotomy, were age and severity of illness. Most patients selected were 65 years of age or older, and all of the patients included in the study had chronic and severe illness. Although there was a strong preference for patients older than the age of 65, patients who met the rest of the criteria but were younger than age 65 were not necessarily excluded. For instance, a 52-year-old patient with Down syndrome and advanced Alzheimer’s disease who had respiratory failure and multiple other advanced medical problems was included in the study.

The charts of 78 patients, from two similar institutions, who had been tracheotomized between the years of 1998 and 2000 were randomly selected from a pool of patients meeting the preceding criteria. One institution was an urban community hospital with tertiary services, and the other was a large tertiary medical center. Most patients came from the former.

Demographic, patient, and diagnostic pretracheotomy data were collected. These data included age, sex, length of time intubated, DNR status, and pretracheotomy diagnoses. Outcomes during the same hospital admission as the tracheotomy were evaluated. These included death versus discharge rate, length of time from tracheotomy to either death or discharge, success in weaning from the ventilator, ability to decannulate, return of vocal function, and for those who died, whether they left the ICU. This last outcome was highly institution dependent. At one of the hospitals studied, a tracheotomized patient sustained on the ventilator could be discharged from the ICU to a floor unit. In the second hospital, patients could not be discharged from the ICU until they were weaned from the ventilator. Note was also made of whether the patient received a feeding gastrostomy tube during the same admission as the tracheotomy.

Data were analyzed descriptively, and median values are presented for variables that are not normally distributed. Chi-square analysis was used to compare the proportion of patients who were weaned, decannulated, or recovered vocal function between the discharged group and the group, who died. A \( p \) value of 0.05 was considered statistically significant.

**RESULTS**

Of the cohort, 53% of patients studied (\( n = 41 \)) were men. The average age was 77.62 ± 11.5
years (median, 79; range, 52–99). Patients were intubated for an average of 16.7 ± 9 days. Of the cohort group, 42% of patients (n = 33) had DNR orders on record during the same admission as their tracheotomy, and 18% of those patients (n = 6) had obtained DNR orders before their tracheotomies (Table 1). The most commonly recorded diagnoses were pneumonia (n = 28), congestive heart failure (n = 28), coronary artery disease (n = 21), renal failure (n = 12), and cerebrovascular disease (n = 10). The reason given for most tracheotomies was prolonged intubation with the facilitation of nursing respiratory care comprising the rest.

In only one patient was the tracheotomy procedure itself associated with a major complication. That patient had a severe hemorrhage, and his subsequent death was partially attributed to that complication. Of the total cohort group, 56% (n = 44) died in the same admission as their tracheotomy. The remaining 44% (n = 34) were either discharged to their homes or to a chronic care facility. The median length of time from tracheotomy to death was 31 days (range 2–256 days). The median length of time from tracheotomy to discharge from the hospital was 62 days (range, of 8–235 days) (Table 2). Of the cohort, 47% of patients (n = 37) were successfully weaned from the ventilator, but 32% of these patients (n = 12) still died in the same admission as their tracheotomy. Eighteen percent of all patients (n = 14) regained consistent vocal function, and 13% of patients (n = 10) were decannulated in the same admission as their tracheotomy. Seventy-one percent of patients (n = 55) had gastrostomies placed during the same admission as their tracheotomy (Table 3).

For those patients who died during the same admission as their tracheotomy (n = 44), 73% (n = 32) were discharged from the ICU, and the remainder died having never left the ICU after their tracheotomy. Five of six patients died in the ICU at the institution where policy dictated that ventilator-dependent tracheotomized patients could not leave the ICU. Seven of 38 patients died in the ICU in the hospital where ventilator-dependent patients with a tracheotomy could be sent to a lower monitored setting. The data showed an increase in functionality in patients who were eventually discharged relative to patients who ultimately died. Discharged patients had more success in weaning from the ventilator (**p < .001**), in regaining vocal function (**p = .002**), and in decannulation (**p = .03**).

**DISCUSSION**

Few studies have evaluated outcomes in elderly, severely ill patients requiring tracheotomies. At least one other study reported data similar to those presented here, namely, that a tracheotomy may not always constitute the best airway management in the elderly and severely ill patient with respiratory failure.

The results of this study showed that this patient population had very poor outcomes. Fifty-six percent of the patients reviewed died in the same admission as their tracheotomy, and one half of those patients died within 31 days of their procedure. Greater than 50% of the patients could
not be weaned from the ventilator during the same admission as their tracheotomy. For those patients who were successfully weaned from the ventilator, most did not regain vocal function and could not be decannulated. A large proportion of patients had gastrostomy tubes placed and were not able to enjoy the benefit of eating, which is theoretically afforded the tracheotomized patient. As expected, at the hospital that did not allow a ventilated patient to be discharged from the ICU, a large proportion of tracheotomized patients who died did so without ever having left the ICU. Relative to the group that died, the discharged group showed greater improvement in weaning ability, decannulation, and vocal function. This was most significant for ability to wean from the ventilator. This is noteworthy, because it demonstrates that little benefit is accrued from the tracheotomy by individuals in the group that died. It also indicates that there are true differences between the two groups that justify efforts to discriminate one from the other on the basis of expected outcome.

On the basis of these data, most of the goals of a tracheotomy are not realized in the elderly severely ill patients. In most patients, the tracheotomy did not lead to ventilator independence, and long-term survival was not achieved. For those patients with severely depressed mental status, the increased comfort afforded by the tracheotomy is of questionable relevance given the scarcity of sensory input. In addition, many of these patients were not able to eat or speak after the procedure—most required gastrostomy tube placement around the same time as the tracheotomy. As far as the cost benefit is concerned, it seems that it would not be attained in those patients who could not be discharged from a highly monitored setting or in those patients who died soon after the tracheotomy. Clearly, there is a greater degree of cost savings in the hospital that allows ventilator-dependent patients with tracheotomies to be discharged to a lower monitored setting. Given the aforementioned considerations, elderly and severely ill patients with prolonged respiratory failure often derive questionable benefit from the tracheotomy.

These data do not mitigate the value of the tracheotomy in all elderly ICU patients. Intangible benefits are recognized, such as the increased comfort that a family member might experience in the presence of a patient who has had an oral tube converted to a tracheotomy. In addition, age by no means predicts outcome. Although Zilberberg et al demonstrated that chronologic age is an independent predictor of death, Boult et al found age to be less important as a determinant of outcome. On the other end of the spectrum, Ely et al showed, in a prospective study, that elderly patients requiring intermediate-term ventilatory support were weaned as quickly and used less resources than younger patients with similar dispositions. In contrast to Ely’s study, patients in this study had more severe and prolonged respiratory failure and tended to have more severe medical problems. However, it is clear that age is only one component of a complex equation, and several factors contribute to predisposing an elderly patient to a poor outcome after tracheotomy.

It is clear that there are degrees of severity of illness in the elderly, ventilator-dependent, ICU patient. An important follow-up study would seek to identify those factors that might assist the physician in determining which candidates for the tracheotomy might have a reasonable outcome. Predictive factors, such as severity of illness scores or neurologic status, might be helpful in stratifying patients are the basis of expected outcome.

Limitations of this study need to be addressed. Namely, this study had a small sample size and was restricted in its lack of long-term patient follow-up beyond the admission in which their tracheotomy was performed. In addition, because this is a retrospective study, it is difficult to assess certain qualities of life such as comfort level while orally intubated or after tracheotomy. A prospective study, although difficult to execute, would be ideal for evaluating the true long-term and short-term benefits of the tracheotomy in this patient population. This study also raises ethical questions surrounding end-of-life issues that are not addressed here.

CONCLUSION

It is commonplace among physicians to tracheotomize any patient with respiratory failure who has been orally or nasally intubated for a given length of time. This is done regardless of age and presence of severe illness. The data in this study demonstrate that a large proportion of elderly, severely ill patients with respiratory failure have poor outcomes soon after tracheotomy. Furthermore, the tracheotomy often fails to enhance the quality of life. The data presented support the policy of greater scrutiny in determining who in
this patient population is an appropriate candidate for a tracheotomy.

REFERENCES


EDITORIAL COMMENT

COMPLEX QUESTIONS EMBEDDED IN TRACHEOTOMY DECISIONS

Performing a tracheostomy on patients who require prolonged mechanical ventilation is a standard practice in many institutions. Many patients with prolonged ventilator dependence have better outcomes when they receive a tracheostomy instead of continued endotracheal or nasotracheal intubation.1,2 Clinical consensus also seems to be that patients who receive a tracheostomy are more comfortable than those who require prolonged translaryngeal intubation; however, no clinical evidence from the patients’ or families’ perspectives was found to support this assumption.2 Nevertheless, as Baskin and colleagues’ study clearly illustrates, a good outcome in terms of survival is in no way assured in elderly patients requiring tracheostomy after prolonged mechanical ventilation.3

Although rarely the cause of poor outcomes, the need for a tracheostomy in this select group of patients is likely an important marker of poor outcomes. According to Baskin, more than half of their tracheostomy patients (56%) died in the hospital. Of the 44% of the patients who survived to be discharged, what proportion went home versus were transferred to long-term care facilities was not specified. Almost three fourths (71%) received a gastrostomy tube during their hospitalization. Although their prehospital or postdischarge quality of life or level of function were not described or compared, the vast majority of the patients probably did not return to their premorbid conditions.

When a decision of whether to “trach” a patient is approached, it is often in opposition to other choices, namely to leave an endotracheal tube in place indefinitely (with increasing likelihood of local complications) or to extubate the patient with a high probability of death. Although 56% of Baskin’s patients died despite receiving a tracheostomy, clinical evidence supports a claim that some quality of life outcomes might have been even worse if patients were to remain with an endotracheal tube indefinitely.1,2 Therefore, if a patient is to remain intubated indefinitely, tracheostomy indeed seems to make sense. However, to conceptualize this decision as tracheotomy versus continuous endotracheal tube is to conceptualize the decision too narrowly.

Missing in this narrowly formulated decision is an opportunity to discuss the ultimate outcomes of prolonged intubation with the particular patient in light of his or her clinical condition, goals, and values. The decision about tracheostomy is a clear marker in a time-limited trial of mechanical ventilation and a decision point in terms of the risks and benefits of a more prolonged trial. It is a time to revisit complex questions about prognosis, patient values and goals, and what can be expected terms of quality of life after hospitalization. These vital questions remain unasked when tracheotomies are presented (only) as routine standard practice. In our own experience, "trach, PEG, then nursing home" are closely linked elements of this decision, and there might be value in considering them together at the time of tracheostomy. The potential linkage of these decisions means that the patient and family will need to take a critical look
at the patient’s prognosis and the likely outcomes of continued aggressive life-sustaining therapy. If the patient has lost capacity to express his or her own wishes this is an additional adverse prognostic marker and should be added to the mix of what a patient would request if cognizant of his or her medical circumstances and prognosis.

In the Baskin study, the need for a tracheotomy was indicative of a probable poor outcome, but there were some patients who survived to be discharged home or to a nursing care facility. Their study was not large or comprehensive enough to identify other markers of a poor prognosis, but other studies suggest that the number of comorbid conditions, the number of hospitalizations in the prior year, poor functional status, severe limitations of pulmonary function, as well as the existence of other severe end-stage illnesses does not bode well for the patient.4,5

In our opinion, most invasive life-prolonging interventions should be presented to patients and families in terms of time-limited trials. Although there is much debate in the literature about the benefits of performing tracheostomies earlier versus later in a patient’s mechanical ventilation course, in most instances, the inability of com to come off of mechanical ventilation within 2 weeks bodes poorly for those with severe chronic illnesses and poor pre-hospital functional status. In such circumstances, the decision about tracheostomy would be an ideal time to revisit goals and expected outcomes with the patient and family. In developing as wide a range of options as possible, a decision to perform a tracheostomy need not necessarily include indefinite mechanical ventilation. Depending on clinical circumstances and patient values, the clinician might suggest further clinical or time-based markers to revisit the issue of continued aggressive treatment.

Baskin’s study is but a snapshot of a domain where there are minimal data. What are the prehospital and during-hospitalization clinical markers of those patients who survived and returned to a prehospital functional status, those who survived but required long-term continued ventilator support, and those who died? What were the views of the benefits and burdens of treatment of patients after these prolonged clinical courses when they survived (for those with capacity), and what were the views of their families for those who survived to discharge and those who did not? Continued study of this black box is vitally important as we develop a wider range of more effective aggressive interventions that have the potential to prolong life on the one hand, and prolong suffering and dying on the other.

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