Atresia of the Trachea Following Repeated Percutaneous Dilational Tracheotomy*

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Percutaneous dilational tracheotomy (PDT) and conventional tracheostomy are still competing methods to provide an airway for intensive care patients requiring assisted ventilation. Tracheal stenosis is a late complication for any tracheostomy and long-term intubation. However, late complications in PDT have not been extensively studied. This article is the first to report on total atresia of the subglottic larynx and cervical trachea after PDT. The dimension of the lesion is visualized by three-dimensional reconstructed CT scan. The etiology of this condition is discussed.

(CHEST 2001; 119:961–964)

Key words: percutaneous; tracheal stenosis; tracheostomy; tracheotomy

Abbreviation: PDT = percutaneous dilational tracheotomy

Percutaneous dilational tracheotomy (PDT) is a relatively new technique and has replaced conventional tracheostomy for long-term intubated patients in many ICUs. The reported advantages of PDT are that it is simpler, more quickly accomplished, and more cost-effective than conventional tracheostomy. Several different techniques exist for percutaneous tracheostomy, but Rapitrace (Surgitech Medical Pty. Ltd.; Sydney, Australia) and PDT have been the most extensively studied. Perioperative complication rates of PDT are comparable to those of conventional tracheostomy. However, only few randomized, controlled trials have evaluated the safety of PDT. Perioperative complications of PDT include desaturation and false insertion, but fatal intratracheal bleeding and tension pneumothorax have also been reported. Postoperative complications involve hemorrhage, tube displacement, subcutaneous emphysema, stoma infection, vocal cord paralysis, and tracheoesophageal fistula. Tracheal stenosis is an important late complication after tracheostomy and usually develops 2 to 12 weeks after decannulation. The incidence of symptomatic tracheal stenosis after conventional tracheostomy occurs in 1 to 8% of the cases reported. Late complications from PDT have not yet been studied extensively. A few studies, all of which consist of a small series of cases, have reported a zero to 5% occurrence of tracheal stenosis following PDT.

Complete atresia of the subglottic region and the cervical trachea as a serious complication of PDT has not yet been reported in the literature.

**Case Report**

A 59-year-old woman was admitted to a general hospital with the acute onset of increasing dyspnea. Her medical history was significant for COPD. Respiratory insufficiency required orotracheal intubation of the patient. A chest radiograph revealed a right tension pneumothorax requiring immediate needle decompression and tube thoracostomy. After 4 days, the pneumothorax significantly improved and the tube thoracostomy could be removed. However, pneumonia with the Proteus organism required prolonged intubation and intensive antibiotic therapy. Therefore, after 10 days of intubation, a PDT was performed by an experienced surgeon. The technique described by Ciaglia et al was performed at the third tracheal interspace under bronchoscopy. Assisted ventilation was used throughout the intervention. Improvement of the respiratory situation after 2 weeks allowed the tracheal tube to be removed. Unfortunately, 4 days later an unexpected relapse into respiratory insufficiency and pneumonia occurred, requiring a renewed PDT. Bronchoscopic control revealed no tracheal stenosis at that time. Finally, after 2 more weeks, the respiratory situation allowed definitive removal of the tracheal tube. However, short-term closing of the tracheostoma caused severe dyspnea. Therefore, the patient was suspected of having a tracheal stenosis and was referred to the department of otolaryngology.

To determine the exact localization and length of the stenosis, the patient underwent microlaryngoscopic evaluation that revealed a normal glottic region with some granulation tissue in the posterior subglottic space (Fig 1, top) and a complete subglottic atresia somewhat caudally (Fig 1, bottom). During open tracheotomy, further examination confirmed the lack of any tracheal lumen above the tracheostoma. CT scans (Fig 2) of the neck and three-dimensional reconstruction (Fig 3) demonstrate these findings.

Further operative evaluation revealed that resection of the stenosis and end-to-end anastomosis was not feasible since the stenosis reached high in the subglottic larynx. Other reconstruction techniques (eg, laryngotraheal reconstruction with cartilage grafting) were considered inadequate for the patient, since it was believed that she would not tolerate aspiration, which is sometimes encountered following such procedures. Therefore, it was decided that the patient would have to remain tracheotomy dependent, which remains the condition to date.

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Percutaneous tracheostomy has been used for > 10 years as an alternative to conventional open tracheostomy. Different techniques exist, but PDT is the most popular and well-studied method. The main indication is the need for ventilation in intensive care patients. The procedure gives the ICU doctors the possibility to perform tracheostomy by themselves without organizing efforts such as transporting the patient to an operating theater and coordinating with other specialists. The incidence of perioperative and postoperative complications, specifically under bronchoscopic control, are not significantly higher than conventional tracheostomy, although several fatal complications have been reported.6,7,12–14 The few studies

**FIGURE 1.** Microlaryngoscopic views of the glottic level (top), indicating granulation tissue in the posterior subglottic, and of the subglottic region (bottom), demonstrating the total stop of the upper airway.

**FIGURE 2.** CT scan at the corresponding levels to Figure 1 (top and bottom) demonstrating the total destruction of the subglottic region.

**DISCUSSION**

Percutaneous tracheostomy has been used for > 10 years as an alternative to conventional open tracheostomy. Different techniques exist, but PDT is the most popular and well-studied method. The main indication is the need for ventilation in intensive care patients. The procedure gives the ICU doctors the possibility to perform tracheostomy by themselves without organizing efforts such as transporting the patient to an operating theater and coordinating with other specialists. The incidence of perioperative and postoperative complications, specifically under bronchoscopic control, are not significantly higher than conventional tracheostomy, although several fatal complications have been reported.6,7,12–14 The few studies
investigating the frequency of late complications of the PDT method reported a low incidence of tracheal stenosis.\textsuperscript{11,15} An important factor related to the complication frequency of PDT is the experience of the surgeon with this method; several authors have reported a significant learning curve for PDT.\textsuperscript{15} Furthermore, technical details of the PDT method should be noted.\textsuperscript{16} van Heurn et al\textsuperscript{17} emphasized that surgeons should not perform PDT at the subcricoid level, as well as avoiding oblique insertion of the cannula, which can lead to a protrusion of the anterior tracheal wall. In our case report, PTD was performed at the third tracheal interspace by a surgeon experienced with this technique. The mechanisms that caused this critical outcome remain unclear. However, it can be hypothesized that three different mechanisms may have contributed to the final trachea atresia. First, a postoperative infection probably caused by the Proteus organism may have occurred, leading to destruction and necrosis of the cartilaginous rings. Second, a fracture of one or more tracheal rings during PDT may have happened, causing major mucosal tears and consecutive cicatricial obliteration of the tracheal airway. Third, the trachea may have been torn off completely at the tracheostoma level, probably because the respiratory situation of the patient required urgent airway management on the occasion of the second PDT due to impending respiratory distress. Since the bronchoscopic examination during the second PDT revealed no tracheal stenosis or luminal pathology, it is likely that in this case the second PDT intervention was the significant contributor to tracheal damage. Repeated PDT intervention may be more risky and difficult due to altered anatomy, concurrent infection, and frequent trauma. No studies are yet available dealing with the complications of repeated PDT. However in cases requiring continual extubation and intubation, a stable and epithelial tracheostomy may have advantages. This case demonstrates that this minimally invasive approach can lead to the total destruction of the trachea.

\textbf{REFERENCES}


\begin{figure}
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\includegraphics[width=\textwidth]{CT_scan.png}
\caption{Three-dimensional reconstruction of the CT scan showing the lack of any airway from the subglottic to the tracheostoma level.}
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Somatostatin in the Treatment of Chylothorax*

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A case report is presented of spontaneous chylotho-
rax successfully treated by conservative means. The
helpful role of the inhibitory peptide, octreotide, is
discussed. (CHEST 2001; 119:964–966)

Key words: chylothorax; octreotide

Abbreviation: TPN = total parenteral nutrition

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ince thoracic duct ligation was introduced in 1948 by
Lampson1 for the surgical treatment of chylothorax, no
new invasive or noninvasive definitive therapy has been
available.2 We report the first case of prompt cessation of
lymphorrhea in an adult patient with chylothorax using
octreotide, a long-acting somatostatin analog.

CASE REPORT

A 79-year-old woman was admitted to St. Mary Hospital in
Hoboken, NJ, complaining of progressively debilitating weakness
and dyspnea. Her non-Hodgkin’s lymphoma had been in remis-

dion with chemotherapy off and on for > 8 years. She admitted
having a heavy sensation in her chest. She was alert, and the only
physical findings were the absence of breath sounds and dullness
to percussion on the left chest. On chest radiography, she had
almost complete opacification of the left hemithorax. Laboratory
tests revealed hemoglobin level of 8.5 g/dL. The serum albumen
level was 2.9 g/dL on admission and 1.7 g/dL on the 25th day
after admission. The chest fluid culture revealed no growth.
Chemical analysis of the chest fluid revealed cholesterol, 89
mg/dL, and triglycerides, 640 mg/dL. Cytologic smear of the fluid
showed granulocytes, reactive mesothelial cells, and copious
lymphocytes highly suggestive of lymphoproliferative disease.
ECG indicated a “borderline ECG.” CT scan revealed large
nodes at the left thoracic inlet and confluent periaortic adenopa-
thy from diaphragm to pelvis.

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