Thus, we tried the immunotherapy based on the following knowledge. It is reported that interferon induces the expression of major histocompatibility complex I antigens as well as tumor-associated antigens on the surface of tumor cells, which may enhance the immune recognition of tumor cells through the generation of cytotoxic T lymphocytes. OK-432, a potent immunopotentiating agent widely used in Japan, has been shown to augment the cytotoxicity of various effector cells, including macrophages, natural killer cells, and killer T cells. Therefore, these two biologic response modifiers are expected to act in a synergistic manner for a tumoricidal effect.

Following the immunotherapy, our patient showed an increased capacity of lymphocyte blastogenesis and increased percentages of cytotoxic T cells (CD-8) and natural killer cells (CD-16, CD-57) among peripheral blood lymphocytes, suggesting the augmentation of cell-mediated immunity. This may be responsible for the tumoricidal effect of the combination immunotherapy in our patient who has a prolonged remission of MFH.

REFERENCES

The Use of a Short-Length Transtracheal Oxygen Catheter in Patients of Small Stature with Restrictive Lung Disease*

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Transtracheal oxygen therapy is being used with increasing frequency because it is an effective mode of oxygen delivery and is well tolerated by patients. An increase in cough and mild intermittent hemoptysis are not uncommon in the early postinsertion period but usually resolve spontaneously. Herein we present two individuals of short stature with restrictive lung disease who had persistence of excessive cough and mild hemoptysis after insertion of a standard catheter (SCOOP). Bronchoscopic evaluation in one revealed erosions of the mucosa over the carina and take-off of the right main-stem bronchus. Symptoms resolved in both individuals following placement of a shorter catheter. We suggest that greater consideration be given to matching transtracheal catheter length to patient lung size, particularly in the face of severe restrictive lung disease.

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Delivery of continuous oxygen therapy through a small-bore indwelling tracheal catheter is becoming widely accepted as an effective mode of oxygen delivery in many individuals. Advantages of transtracheal oxygen include decreased oxygen requirement, improved patient compliance, and increased exercise tolerance. In general, the catheter is well tolerated. However, increased sputum production, cough, and minor hemoptysis have been associated with its use, especially in the early postinsertion period.

Our previous approach for the most commonly used delivery system (SCOOP, Transstracheal Systems, Englewood, CO) involves use of an 11-cm-long catheter in all patients, irrespective of their size or underlying lung disease. We present two individuals of short stature with restrictive lung disease who developed excessive cough associated with hemoptysis shortly after institution of oxygen flow through the transtracheal catheter. In both, the tip of the catheter was identified roentgenographically to be near the carina. These problems resolved following replacement of the usual 11-cm-long adult catheter with a shorter catheter. Thus, we believe we have identified a group of patients who are at increased risk for complications leading to catheter intolerance if the standard-length SCOOP transtracheal oxygen catheter is inserted.

CASE REPORTS

Case 1

Patient 1 is a 52-year-old woman with a 15-year history of mixed connective tissue disease resulting in progressive pulmonary fibrosis and hypoxemia. Her height was 155 cm. Spirometry revealed an FVC of 0.73 L (24 percent predicted) and FEV, of 0.55 L. The FRC by body plethysmography was 1.43 L (55 percent predicted). Medications included prednisone 10 mg daily. She underwent placement of a stent and one week later had oxygen connected to a standard SCOOP I catheter with a flow of 2 L/min at rest and 4 L/min with exertion. A standard chest roentgenogram demonstrated the catheter tip to be 1.0 cm above the carina at full inspiration (Fig 1). After beginning transtracheal oxygen delivery, she developed an intermittent cough associated with expectoration of a small amount of nonpigmented mucus. Three weeks later she developed a more severe cough that was productive of blood-streaked purulent sputum. At this time, the catheter was removed over a J-wire to strip adherent mucus, and a 2-cm blood-streaked mucus ball was expectorated. During the next six weeks, the patient continued to have low-grade hemoptysis (<5 ml) and excessive cough, despite a course of oral cefalosporin, appropriate catheter hygiene, and periodic catheter stripping. Ten weeks after insertion, she experienced an episode of hemoptysis producing 10 ml of blood. Fiberoptic bronchoscopy was then performed. The tracheal catheter was
CASE 2

Patient 2 is a 42-year-old woman with a five-year history of mixed connective tissue disease resulting in pulmonary fibrosis and hypoxemia. She was maintained on a regimen of prednisone, 5 mg/day. Her height was 157.5 cm. Spirometric findings included an FVC of 1.52 L (45 percent predicted) and an FEV₁ of 1.09 L. The FRC by body plethysmography was 1.29 L (43 percent predicted). She had an uncomplicated insertion of the stent and one week later had oxygen connected to a standard SCOOP 1 catheter at 2 L/min at rest and 6 L/min during exertion. During the week following the start of oxygen flow, she developed an increased cough and blood-streaked sputum. These symptoms persisted for two weeks. She was then seen after an episode of hemoptysis (approximately 5 ml). The patient was considering discontinuation of the catheter at this time because of these symptoms. The catheter tip was 1.0 cm above the carina on a standard inspiratory chest roentgenogram. At this time, the 11-cm catheter was replaced with a 9-cm catheter now available commercially from the manufacturer (Transtracheal Systems). Within one day the patient's cough markedly improved and the hemoptysis resolved.

DISCUSSION

We have described two clinically similar individuals who had early intolerance to transtracheal oxygen therapy manifested by cough and low-grade hemoptysis. Both individuals had small lung volumes because of their short stature and pulmonary fibrosis. In both individuals the tip of the catheter was documented on a standard inspiratory chest roentgenogram to be just above the carina. Symptoms resolved in both individuals following replacement of the standard 11-cm SCOOP catheter with a 9-cm SCOOP catheter.

Cough and mild hemoptysis are symptoms that may occur for several days immediately following insertion of the transtracheal catheter. These problems typically decline in frequency and severity following acclimation to the presence of the catheter. During the period when the tract is immature and the catheter is cleaned in place, excessive cough and intermittent blood streaking may occur and be associated with mucus ball formation. Presumably, these mucus balls can abrade adjacent mucosa if they come into contact with it frequently. After one to two months when the tract has matured, such problems are unusual.1,2 While hemoptysis is usually mild, greater amounts occasionally occur. Although such episodes are typically self-limited, hemoptysis totaling 125 ml was reported in an individual whose bleeding was bronchoscopically documented to arise from the stomal site.3

The amount of cough and volume of hemoptysis in our two patients was greater and more persistent than in other patients under our care. This appears to have been the result of irritant effects of the catheter tip or oxygen flow directed at the carina and bronchial mucosa. Stimulation of the carina, which has a high concentration of irritant airway receptors, may have contributed to the increased cough.5 Bronchosity in one individual confirmed mucosal inflammation and bleeding in the area below the catheter tip. This procedure also confirmed a more distal movement of the catheter tip during expiration than was appreciated on the inspiratory chest roentgenogram. The position of the catheter tip, which lay adjacent to the mucosa and was directed into the right main-stem bronchus at end expiration, was in contrast to the usual position of a catheter in a normal-sized

FIGURE 1. Inspiratory posteroanterior roentgenogram of patient 1 demonstrating the proximity of the transtracheal catheter tip to the carina and right main-stem bronchus.

FIGURE 2. Top, View obtained during fiberoptic bronchoscopy in patient 1 demonstrating the position of the catheter tip relative to the carina and right main-stem bronchus. Bottom, View in the same patient at the orifice of the right main-stem bronchus revealing erythema and ulceration in the proximal bronchus, including involvement of the right upper lobe orifice.
individual. During hard coughing, the tip may have descended even lower.

Based on our experience with these two individuals, we believe that a greater consideration should be given to matching transtracheal catheter length to patient lung size. Following placement of the 11.0-cm-long stent, the position of the catheter tip should be assessed relative to the carina. If the catheter tip is nearer than 2.0 cm to the carina on the postinsertion chest roentgenogram, we would recommend placement of a 9.0-cm SCOOP I catheter, rather than the usual 11.0-cm size. In addition, an end-expiratory postinsertion chest roentgenogram may be more appropriate than an inspiratory roentgenogram because it may better assess both catheter position and the presence of a pneumothorax. Furthermore, we would encourage reassessment of any individual with excessive cough weeks after the placement of the catheter since they might benefit from use of a shorter catheter. This would be particularly true in small patients with restrictive lung disease.

In summary, we have identified two individuals of short stature with pulmonary fibrosis who developed intolerance to transtracheal oxygen therapy manifested by excessive cough and mild hemoptysis. The symptoms in both individuals resolved following replacement with a shorter catheter. The initial use of a shorter catheter should be considered in patients using transtracheal oxygen delivery who present with the combination of small stature and low lung volume.

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REFERENCES


Postpneumonectomy Syndrome in Adulthood*

Surgical Correction Using an Expandable Prosthesis

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The postpneumonectomy syndrome is a rare complication occurring after right pneumonectomy and is seen mainly after pneumonectomy in childhood. The presenting symptoms are dyspnea, stridor, and recurrent pulmonary infections. The syndrome is caused by the shifting and rotation of the heart and mediastinum into the right hemithorax, and anterior herniation of the left lung. This causes tortuosity and stretching of the trachea and compression of the left main bronchus and lower lobe bronchus, eventually resulting in secondary tracheobronchomalacia. This report reviews two cases of postpneumonectomy syndrome following pneumonectomy in adulthood. After implantation of an expandable prosthesis, an anatomic correction of the shifted mediastinum was achieved, which in both cases resulted in instantaneous and sustained relief.

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The postpneumonectomy syndrome is a rare, delayed complication following right pneumonectomy. It is caused by a severe shift of the mediastinum to the right, which leads to stretching of the trachea and compression of the left main bronchus and lower lobe bronchus, resulting in compromised ventilation.

In the reviewed literature, the syndrome has been described mainly in children, but rarely in adults. We present two cases of postpneumonectomy syndrome that developed following pneumonectomy in adulthood; in both cases, treatment consisted of intrathoracic implantation of an expandable prosthesis.

CASE REPORTS

CASE 1

A 43-year-old woman underwent a right pneumonectomy at age 41, because of a squamous cell carcinoma of the intermediate bronchus. Postoperative classification was T2N1M0 (stage II). Postoperative recovery was uneventful. Four months after the operation however, she developed a nonproductive cough. After six months, she complained about dyspnea and had developed an inspiratory and expiratory stridor.

At that time, the chest x-ray film showed a severe mediastinal shift to the right and herniation of the left lung (Fig 1). The CT scan showed a marked rightward and posterior deviation of the mediastinum, including the heart and great vessels, and compression of the left lower lobe bronchus between the aorta and the pulmonary

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