Occlusive Endobronchial Stent Placement as a Novel Management Approach to Massive Hemoptysis from Lung Cancer

Johann C. Brandes, MD, PhD, Eric Schmidt, MD, and Rex Yung, MD

Abstract: Massive hemoptysis in patients with advanced thoracic malignancies can be difficult to manage. Frequently, the bleeding source is not amenable to either bronchial artery embolization or surgical resection. Isolation of the bleeding source by endobronchial tamponade is an alternative management option. This is commonly achieved by the use of double-lumen endotracheal tubes or the placement of endobronchial balloons. Although effective, these approaches are not permanent solutions and may require prolonged intubation. We describe here an alternative, novel approach to endobronchial tamponade that does not require prolonged mechanical ventilation. We present a case in which massive hemoptysis from a left lower lobe cavitary lung cancer was successfully tamponaded and ultimately stopped by the placement of 2 covered self-expanding bronchial stents, allowing the patient to be extubated and to undergo further palliative therapy. No recurrent episodes of hemoptysis occurred throughout the patient’s lifetime.

Key Words: Massive hemoptysis, Lung cancer, Endobronchial stent, Tamponade.

(J Thorac Oncol. 2008;3: 1071–1072)

Massive hemorrhage from lung cancer may lead to exsanguination and asphyxiation. Management includes localization of the bleeding source with subsequent vascular embolization or surgical resection. To protect the contralateral lung, patients may be selectively intubated or ventilated with a double-lumen endotracheal tube, but these measures offer only temporary relief. Endobronchial stent placement with isolation of the bleeding site, while not commonly used for this indication, offers more permanent protection of the uninvolved lung without the need for prolonged mechanical ventilation. We present a case in which emergent deployment of self-expanding airway stents produced a successful tamponade of massive hemorrhage from a lung cancer, allowing time for follow-up palliative therapy.

CASE PRESENTATION

A 72-year-old female was diagnosed with metastatic nonsmall cell lung cancer 17 months prior. The primary cancer was located in the left lower lobe (LLL) with metastasis to the contralateral lung. Her past medical history was only remarkable for moderate chronic obstructive pulmonary disease with a forced expiratory volume in 1 second of 60% of predicted. Prior treatments had included Carboplatin and Taxol, Erlotinib and Pemetrexed. She presented with several weeks of increasing blood tinged sputum, progressing to frank hemoptysis, dyspnea and fatigue. Initial evaluation revealed tachypnea, tachycardia, and severe anemia [hemoglobin drop from baseline 10 g/dl to 5.8 (Hct 19.8%)]. There was no evidence of coagulopathy. A computed tomography scan revealed progression of a LLL cavitary lesion. A diagnostic bronchoscopy revealed continuous blood welling up from the LLL orifice. Urgent bronchial and pulmonary arteriography did not reveal feeding vessels amenable to embolization. Surgical resection was not thought to be a viable option based on the large size of the mass, the advanced metastatic disease and borderline pulmonary function. Because of ongoing significant bleeding, she was taken for therapeutic bronchoscopy. Two covered self-expanding airway stents were deployed under direct visualization. First, a Polyflex 8 mm × 2 cm stent was deployed in the LLL bronchus with deliberate expansion against LLL segmental branches. This yielded transient cessation of bleeding and provided time to visualize the distal LLL. When the hemorrhage became brisk again, a covered nitinol Ultraflex 14 mm × 6 cm stent was deployed bridging the proximal left main-stem bronchus across the LLL opening into the left upper lobe bronchus, effectively blocking the bleeding site (Figure 1A). The LLL stent was not removed since it provided reduction in the intensity of the hemorrhage. Bleeding into the central airway stopped after this intervention, although fresh blood could be seen pooling behind the semiopaque stent covering (Figure 1B). The patient was successfully extubated afterward, with resolution of hemoptysis. After initiation of palliative radiotherapy, she remained stable without further significant bleeding into the central airways and without respiratory difficulties in the final 4 months of her life.
DISCUSSION

Massive hemoptysis from nontraumatic causes has a high risk of mortality. Common airway interventions include selective main-stem bronchial intubation or surgical resection; there are occasional reports of successful tamponade by airway balloons deployed by bronchoscopy. A major disadvantage of these approaches is the potential need for prolonged endotracheal intubation. This is particularly a concern with bleeding sources that are unlikely to resolve spontaneously, such as hemorrhage from a cavitary cancer. In this case rapid extubation was achieved after successful tamponade of the bleeding utilizing covered stents. Endovascular stenting for the management of pulmonary hemorrhage due to vascular-bronchial fistulas has been reported. Airway stenting is usually performed for the primary purpose of maintaining airway patency at areas of stenosis, either malignant or benign. Covered airway stents may also be used to cover over pathologic openings such as in tracheo-bronchial-esophageal fistulas. Others have reported that airway stents can occasionally cause massive hemoptysis (through mucosal damage or erosion into major vessels). A thorough Pubmed search (http://www.ncbi.nlm.nih.gov/sites/entrez) with the following search parameters: (“endobronchial stent” OR “airway stent,”) AND (hemoptysis OR bleeding OR hemorrhage) indicates that this is the first report of the use of self-expanding airway stents to treat a source of pulmonary hemorrhage. This treatment was achieved by both tamponade and the isolation of the bleeding source, so that the proximal large airways were protected. Possible complications of this approach include the typical side effects of airway stent deployment as well as an increased risk for postobstructive pneumonia or cavity infection in the walled-off part of the lung. In this case, stent removal would be an easy intervention. No complications were observed in this patient.

CONCLUSION

Selective airway stenting with the goal of tamponade and isolation of a pulmonary bleeding source is a novel approach for the management of massive hemoptysis from lung cancer. This approach may be considered in selected patients when interventional vascular embolization and surgical repair are not immediate options.

REFERENCES