artery embolization of recurrent massive hemoptysis due to septic pulmonary embolism in a patient with recurrent tricuspid infective endocarditis.

**Case Report**

A 46-year-old man, a chronic heroin abuser, was transferred to the University of Illinois Hospital in March 1981 with recurrent Pseudomonas tricuspid endocarditis and episodic hemoptysis. In April and June 1980, separate episodes of *Staphylococcus aureus* infection of the tricuspid valve developed. Despite appropriate antibiotic therapy, recurrent infective endocarditis developed in November 1980, with *Pseudomonas aeruginosa*, and again, antimicrobial therapy was instituted.

In February 1981, he was readmitted with fever and chills. Blood cultures again were positive for *P aeruginosa*. There were physical findings of significant tricuspid insufficiency, and coarse rhonchi were audible in both lung fields. The ECG showed atrial fibrillation, and a chest x-ray film disclosed bilateral infiltrates. Subsequently, he had two episodes of expectorating 500 to 700 ml of bright red blood within a 24-hour period. Two-dimensional and M-mode echocardiograms showed large tricuspid vegetations. While preparations were being made for surgery, the patient had a 1,000-ml hemoptysis requiring transfusion to achieve hemodynamic stabilization. Results of bronchoscopic examination showed diffuse tracheobronchitis, and although blood was seen in both major bronchi, the specific site of bleeding could not be identified. The next day, he had recurrent hemoptysis and was brought to the arteriography suite. The pulmonary angiogram showed peripheral filling defects consistent with multiple emboli. A selective bronchial arteriogram showed two tortuous vessels leading to the left lower

**Massive Hemoptysis and Recurrent Tricuspid Infective Endocarditis in a Heroin Addict***

**Successful Treatment by Bronchial Artery Embolization and Valvullectomy**

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A 46-year-old man had recurrent infective tricuspid endocarditis and massive hemoptysis. When conventional modes of localizing and controlling the pulmonary hemorrhage failed, selective bronchial arteriography and transcatheter embolization were used successfully, allowing the systemic heparinization needed for subsequent surgical excision of the tricuspid valve. The results illustrate the expanding role of bronchial artery embolization in the treatment of life-threatening hemoptysis.

The delineation of the bronchial arterial anatomy and the recognition of the systemic origin of most pulmonary hemorrhages have allowed the application of transcatheter embolization techniques to be used in selective cases of life-threatening hemoptysis.*-5 We describe the successful control by selective bronchial

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**Figure 1.** Selective bronchial arteriogram. Two tortuous vessels leading to left lower lobe with extravasation of contrast into bronchus.
However, median hemoptysis persisted and may result in further intrabronchial extravasation and cardiac extravasation, necessitating therapeutic intervention. Moreover, the embolic material is reabsorbed, allowing potential recanalization of the occluded artery. Long-term success depends on effective medical or surgical treatment of the underlying disease.

In the case reported, persistent sepsis, deteriorating renal function, and recurrent septic emboli mandated urgent excision of the infected tricuspid valve. However, the systemic heparinization required for cardiopulmonary bypass was contraindicated until the pulmonary hemorrhage could be localized and controlled. In this instance, when conventional measures proved ineffective, selective bronchial arteriography and transcatheter embolization served as precise diagnostic and effective therapeutic means of temporarily controlling hemoptysis and thus allowing surgical intervention to excise the primary source of infection.

**REFERENCES**

3. Harley JD, Killien FC, Peck AG. Massive hemoptysis controlled by transcatheter embolization of the bronchial arteries. AJR 1977; 128:302

**COMMENTS**

Since its introduction in 1974 by Remy and associates, bronchial artery embolization has proved efficacious in two clinical circumstances: the obliteration of systemic pulmonary artery collaterals in cyanotic congenital heart disease and the control of massive or recurrent hemoptysis. Large bronchial collateral arteries can complicate the operative correction of certain cyanotic cardiac lesions by flooding the operative field with blood during cardiectomy and reducing the effective flow rate infused from the pump oxygenator. In addition, postoperative cardiac failure and continued hypoxemia may result from the large left-to-right shunt via the persistent collateral circulation. When attempts to surgically control these bronchial vessels through a preliminary thoracotomy or simultaneously at the time of median sternotomy prove ineffective or are thought to be perilous, transcatheter embolization with Gelfoam or stainless steel wire coils have been successfully used.

The customary means of managing life-threatening hemoptysis is bronchoscopic localization of the bleeding site followed by thoracotomy and pulmonary resection. However, many patients have chronic lung disease with severely compromised pulmonary function, making them poor candidates for pulmonary resection. Remy and co-workers treated 49 such patients actively bleeding from tuberculosis, bronchiectasis, aspergilloma, pneumoconiosis, and carcinoma by transcatheter Gelfoam embolization, achieving initial cessation of bleeding in 84 percent of the cases. These results have been successfully reproduced in several smaller series of patients.

In addition, Fellows and co-workers have applied bronchial embolization to children with cystic fibrosis and with recurrent, major hemoptysis. Life-threatening pulmonary hemorrhage was stopped in 93 percent of cases. This, it should be stressed, is a palliative, therapeutic intervention. The primary cause of increased vascularity remains, and revascularization by way of other vessels can occur. Moreover, the embolic material is reabsorbed, allowing potential recanalization of the occluded artery. Long-term success depends on effective medical or surgical treatment of the underlying disease.

**FIGURE 2.** After transcatheter embolization, bronchial artery branches occluded; no further intrabronchial extravasation noted.