Surgical Management of Tuberculous Broncholithiasis with Hemoptysis: Experience with 5 Operated Cases

Bagheri Reza, MD and Haghi Ziaollah, MD

Introduction: Broncholithiasis is often seen after chronic granulomatous diseases such as tuberculosis and histoplasmosis and leads to a wide spectrum of signs and symptoms; including hemoptysis which often needs surgical management. The goal of this study is evaluation of surgery in patients with tuberculous broncholithiasis who present with hemoptysis.

Materials and Methods: In this study all patients with tuberculous broncholithiasis had been operated on between 1991 and 2005, followed up at least 6 months and at most 9 years, and studied relating to age, sex, clinical symptoms, diagnostic methods, type of surgical treatment, complications and mortality.

Results: Overall 5 patients have been studied (male:female=2:3, mean=31 years); 2 with severe and 3 mild to moderate and recurring hemoptysis, lesion at left in 80% and at right in 1, in 3 patients some degree of bronchiectasia was seen, in 4 the lesion was visible in bronchoscopy and endoscopic removal of the lesion failed in all. Three of patients underwent pulmonary resections and in 2 broncholithotomy has been done. In follow-up, patients treated with pulmonary resection have had no subsequent problems, but in patients treated with broncholithotomy due to occurring late bronchiectasia, re-operation and pulmonary resection was inavoidable. There was no mortality.

Conclusion: Regarding the dangers of hemoptysis and excellent results of surgery and possible occurrence of late bronchiectasia after broncholithotomy, the results of our study show that pulmonary resection distal to the lesion and as the retention of lung of parenchyma is preferable. Broncholithotomy should be done only in patients in whom pulmonary resection is not technically possible. Because of the very low occurrence of this complication complete studies are needed. (Ann Thorac Cardiovasc Surg 2007; 13: 185–190)

Key words: broncholithiasis, tuberculosis, hemoptysis, surgery
lem is endemic tuberculosis. The goal of this study is the evaluation of surgical management of patients with broncholithiasis and hemoptysis due to tuberculosis.

Materials and Methods

In a descriptive (case series) study between 1991 to 2005, all patients with tuberculous broncholithiasis and hemoptysis in Quaem and Omid hospitals in Mashad, have been evaluated. Age, sex, the duration between lesion occurrence and diagnosis of tuberculosis, the duration between first hemoptysis episode and surgery, bronchoscopic and radiologic diagnosis of lesion, tests for defining tuberculosis bacilli in spectrum, the type of surgery, and complications of surgery and mortality have been studied.

Results

Overall 5 patients were included in this study: 2 males and 3 females. The mean at admission was 31 years (the youngest 18 years and the oldest 58 years). The mean duration between occurrence of hemoptysis due to broncholithiasis and of tuberculosis treatment was 8.5 years (6 to 10 years); 2 patients with massive hemoptysis in the last refer have been operated and completion in the other 3 patients with mild to moderate recurring hemoptysis surgery has been done.

All the cases have been under medical treatment before surgery, but none of them had successful medical treatment. Due to severe attack hemorrhage, they were candidates for surgery. As patients with asymptomatic broncholithiasis do not present for treatment, we did not have a comparative group.

In all patients chest X-ray and computed tomography (CT)-scan showed broncholithiasis clearly.

The site of the lesion in 4 patients was left sided. In 3 patients there were some degrees of bronchiectasia in segments distal to the lesion. Figures 1 and 2 demonstrate chest X-Ray and CT-scan of a 29 years old female with tuberculosis, bronoliths and hemoptysis.

Diagnostic fibroptic bronchoscopy was done in all patients and in 4 patients erosion of broncholithiasis into
the airway were clearly visible. Figure 3 shows the broncho-scopic view of the lesion in these patients.

Attempting bronchoscopic removal was unsuccessful in all patients. In all patients the sputum tests for tuberculosis bacilli were negative.

All patients underwent open surgery using posterolateral thoracotomy approach in the 5th intercostal space. Three patients who had moderate to severe hemoptysis and had some degree of bronchiectasis distal to lesion. In 2 patients left lower lobectomy and in 1 patient resection of 2 segments of the left lower lobe has been done. Figure 4 shows the gross pathologic image of the resected specimen.

Figure 5 shows the radiographic image of the same patient after operation.

In the other 2 patients who had mild hemoptysis with no distal bronchiectasia on radiographic studies, only broncholithotomy and adjacent bronchial vessel ligation have been done. Figure 6 shows a large bronchiolith in the inferior lobe bronchi.

At follow-up 3 patients with pulmonary resection (followed between 6 months to 9 years) there have been no problem and they were virtually cured. In 2 patients with broncholithotomy alone, 1 patient at 3 years and the other
at 6 years reoperation was done due to severe symptomatic bronchiectasis. In 1 patient left lower lobectomy plus linguecтомy and in the other right lower lobectomy has been done. These 2 patients have had no further problems.

Figure 7 shows a CT scan of the patient in Fig. 6 that had broncholithotomy due to large broncholithiasis. The CT scan shows bronchiectasis in left lower lobe and lingula.

In all patients histopathologic examinations have demonstrated tuberculous broncholithiasis. Figure 8 shows the microscopic image of tuberculous broncholithiasis. There has been no mortality in our patients.

Discussion

Broncholithiasis is ossified or calcified material which has penetrated the bronchial lumen. The common cause of this lesion is tuberculosis and histoplasmosis. It has a wide spectrum of clinical manifestations: forms with mild symptoms of cough and sometimes lithoptysis to more complicated forms.

The chemical composition of broncholith is very similar to bone; it has 85–95% calcium phosphate and 7–10% calcium carbonate.

Complications of broncholithiasis are various from a mild lithoptysis to more severe symptoms. One of the most dangerous complications of this lesion which almost needs surgery is hemoptysis. In most researches due to have few patients, and this complication has been reported as case report. For example Stocia has reported a 51 years old man with massive hemoptysis and broncholithiasis who has been operated on. Similar cases have been reported by Meyer et al. They mention that the cause of hemoptysis is erosion of broncholithiasis through adjacent bronchial vessels which leads to severe and lethal hemoptysis in patients. Other complications that lead to surgery are obstructive pneumonia and secondary bronchiectasis, which may be present with fever and chills and purulent sputum.

Another complication of broncholithiasis which often needs surgery is bronchoesophageal fistula. This is dangerous and the operation may be difficult.

Broncholithiasis in some patients presents as middle lobe syndrome, and in all patients with such a presenta-
Radiographic and CT-scan images of tuberculous broncholithiasis are various but often sufficient to make the diagnosis. These lesions are clearly found on chest X-ray and CT-scan. Broncholithiasis is suggested on CT-scan when endobronchial or peribronchial calcified nodes are associated with findings of bronchial obstruction. Volume data acquisition by means of helical CT with sections less than 3 mm in thickness and multiplanar reformation along the bronchial tree may be helpful in confirming the endobronchial location of the calcified material. Primary endobronchial infection with dystrophic calcification and hypertrophied bronchial arteries with intramural protrusion and calcified endobronchial tumors and trachobronchial disease with mural calcification may mimic broncholithiasis.

In addition to above radiographic findings, primary endobronchial actinomycosis rarely has very similar images to broncholithiasis. In the report of Seo et al., they have undertaken bronchoscopy and biopsy in 2 patients presenting as broncholithiasis without a history of granulomatous disease and the diagnosis of actinomycosis was approved in these.

Endoscopic findings consist of tracheobronchial distortion, inflammation, a visible broncholith, bleeding and occasionally a patient may have the endoscopic finding of a fistula in either the esophagus or the tracheobronchial tree.

Treatment guidelines are controversial due to very few case reports. It is usually agreed that in asymptomatic forms or mild forms patients may be observed only or broncholithiasis can be removed bronchoscopically. Huang et al., have reported successful removal of broncholithiasis. Similar results have been reported by Minivale et al. which in asymptomatic or mild forms they removed these lesions bronchoscopically. This method is considered the ideal treatment in this group of patients.

In our group, endoscopic removal of lesion was not successful.

The most report on indications surgery by Trastek et al., discussed 54 patients with broncholithiasis. The indications for surgery are: severe or recurring hemoptysis, symptoms of distal obstruction (infection with fever and purulent sputum) or esophagobronchial fistula. Other investigators also mention the same indication for surgery.

There are different opinions about surgical technique, from simple broncholithotomy to pulmonary resection and published maximum saving of living parenchyma.

Trastek et al., the most complete study, believe that operating on these patients is very dangerous due to severe adhesions. The goal of surgery is removal of calcified masses with destroyed lung or bronchi because of late complications of bronchial destruction (pneumonia, pulmonary abscess or bronchiectasia) pulmonary resection and saving maximum lung parenchyma is preferred to broncholithotomy.

Cole et al. mention attempting pulmonary resection in these patients should be with control of proximal pulmonary vessels where pulmonary resection is not possible due to severe adhesions, opening of the mass capsule and cauterizing its contents can prevent lethal complication during surgery.

In our study, we performed pulmonary resection saving maximum lung parenchyma in 3 of our patients and in 2 simple broncholithotomy was done. In follow-up of these patients with secondary bronchiectasia, we had to re-operate and lobectomy was done in both. Simple broncholithotomy without pulmonary resection is insufficient treatment and is accompanied with late complications leading to re-operation.

In very ill patients unfit for surgery where lesion cannot be removed bronchoscopically use of yttrium-aluminum may have some benefit. Success with this procedure has been reported.

Conclusion

Hemoptysis is a dangerous complication in tuberculosis broncholithiasis. We recommend surgery in all patients because endoscopic removal is often unsuccessful and leads to delay in treatment. Due to chronicity of lesions and the effects in the a bronchi, prevention of secondary bronchiectasia is by pulmonary resection distal to lesion with saving of maximum paronelyma. Broncholithotomy alone suitable only in patients in whom pulmonary resection is technically impossible. Due to the very low occurrence of this complication more complete studies are needed.

Acknowledgments

Special thanks to Mozhgan Bahadori, MD and Mahammad Kalantary, MD for their cooperations.

References

1. Haine JD. Coughing up a stone. What to do about