Peer reviewed article

Successful embolization of Rasmussen's aneurysm for severe haemoptysis

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Case report

A 56 year old man with a history of smoking related COPD was admitted to our hospital with a one week history of worsening chronic cough with the recent development of haemorrhagic phlegm and a subfebrile state. Chest x-rays showed a cavitary infiltrate in the left upper lobe, a right pleural effusion and bilateral mediastinal partially calcified enlarged lymph nodes. Direct sputum examination was positive for M. tuberculosis and was confirmed by culture. Eight days after initiation of a standard four drug antituberculosis treatment regime the patient presented with repeated and major haemoptysis of up to 200 ml/event. Chest x-ray showed a new air fluid level in the left superior cavity. A CT-scan of the thorax disclosed a voluminous Rasmussen's pseudoaneurysm (figure 1). Selective catheterization using a femoral approach to the left apical superior pulmonary artery showed the pseudoaneurysm arising from a subsegmental branch (figure 2). The branch was selectively embolized with 3 coils (0.035 inches 5–3 mm in diameter [COOK, Bloomington, Indiana, USA]) resulting in occlusion of this segmental branch and no filling of the pseudoaneurysm (figure 2). Haemoptysis stopped and over the next few days sputum became negative for acid fast bacilli. No further surgical intervention was performed. Chest x-ray after one year follow-up showed resolution of the cavitary lesion and no recurrence of haemoptysis. Standardized tuberculosis treatment with a four drug regime (isoniazid – rifampicin – pyrazinamide – ethambutol) over two months followed by four months of a two drug regime (isoniazid – rifampicin) was successfully completed and the patient was declared cured at the end of the treatment (1 direct exam and 2 negative cultures before the end of the treatment) [1].

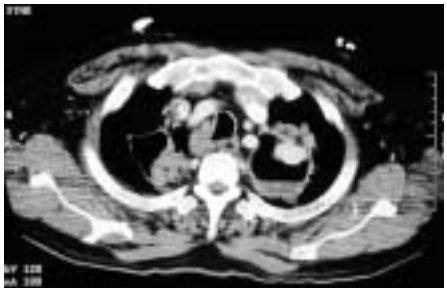

Figure 1

CT Scan shows enhancement by contrast of a voluminous Rasmussen's pseudoaneurysm of the left superior cavity wall.

Discussion

Numerous sequelae and complications occuring in pulmonary tuberculosis can give rise to haemoptysis [2]: parenchymal lesions (aspergilloma invading an open healed cavity, scar carcinoma), airway lesions (bronchiectasis, broncholithiasis) or vascular lesions (pulmonary or bronchial arteritis and thrombosis or dilatation). Up to one third of patients with pulmonary tuberculosis will develop haemoptysis during the course of their illness [3] and before the advent of antibiotic therapy massive haemoptysis was the cause of 4–7% of deaths [4]. In the United States tuberculosis is responsible for 7 to 16 percent of all cases of haemoptysis [4]. In approximately 80% of cases the hemorrhagic source is found in the bronchial or other systemic arteries supplying the lung and in the remaining 20% in the pulmonary arteries [5]. Most bleeds are caused by vascular erosion without development of a pseudoaneurysm. In 1868, in a series of autopsies performed on tuberculous patients with a fatal haemoptysis, Rasmussen described nine cases of ruptured aneurysmal vessels originating from branches of the pulmonary artery in a tangential position to the cavity wall [6]. Systematic autopsies performed on patients who died with cavitary lesions has shown the presence of a pseudoaneurysm of Rasmussen in four percent of cases [7]. Inflammatory response and destruction due to the spread of tuberculosis into the adventitia and media of pulmonary or bronchial artery walls results in the weakening of the arterial wall, allowing the development of a herniation of the vessel into the lumen of the cavity (pseudoaneurysm). The risk of rupture is then high due to the development of the aneurysm and the inflammatory processes in the arterial wall.

The indication for radiological or surgical intervention is considered when major (>200 ml per 24 hours) haemoptysis occurs. No randomised study has compared the results of interventional radiology with surgical resection. Surgical resection of the bleeding site (usually lobectomy) allows a definitive recovery when the patient is operable [4]. Alternatively, bronchial or pulmonary embolization is considered first-line treatment in the case of massive haemoptysis or when a patient is not a candidate for surgery, either as a temporary measure before surgery or as a definitive therapy [8]. Contrast-enhanced CT-scan is the cornerstone procedure to localize haemoptysis and also to detect any obvious vascular anomalies such as Rasmussen's pseudoaneurysm. If systemic and pulmonary angiographies fail to supply the diagnosis, bronchial or other systemic arteries supplying the lung may be electively embolized either on the side of bleeding or in their totality. Selective angiographic embolization of the supplying pulmonary arteries may also be performed when the haemorrhagic source is obviously from the pulmonary circulation (Rasmussen's pseudoaneurysm), or in the case of recurrent bleeding after embolization of the systemic circulation, having excluded a

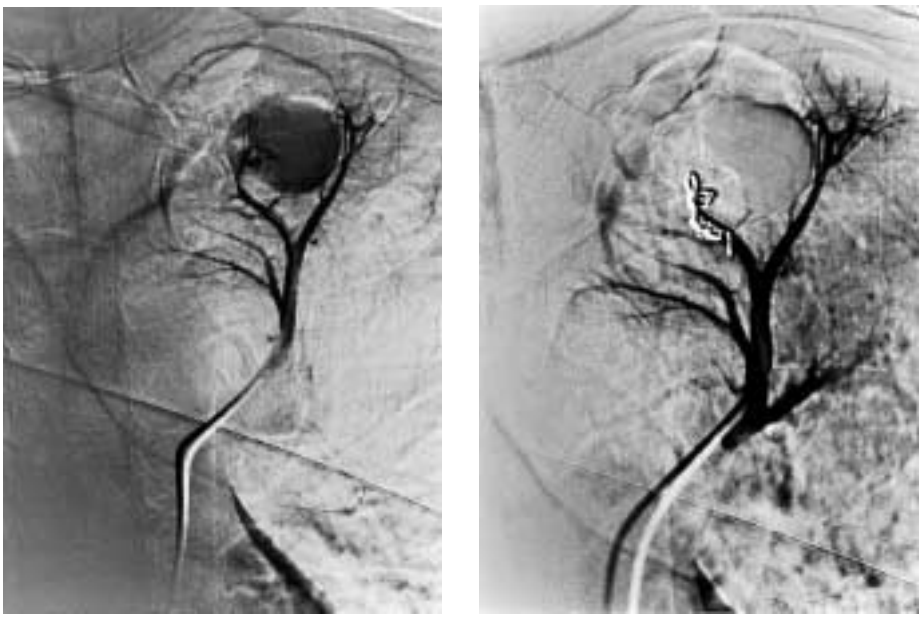

Figure 2

On the left side, selective catheterization of the apical left superior pulmonary artery demonstrates a voluminous pseudoaneurysm deriving from a subsegmental branch. On the right side, angiography shows complete occlusion of the involved branch and no filling of the pseudoaneurysm after the embolization with coils.

recurrence in the territory already treated. While conservative pulmonary transcatheter occlusion is generally a safe procedure, a small number of major complications cannot be avoided, as for example, the rupture of an aneurysm or of fragile vessels caused by increased pressure during hyperselective injection [9]. These complications cannot always be managed conservatively so that the availability of a thoracic surgeon on site is necessary during the procedure [10].

Conclusion

Rasmussen's aneurysm is a rare condition that may lead to life threatening haemoptysis during the course of pulmonary tuberculosis. Selective angiographic embolization of arteries supplying the aneurysm is a safe alternative to surgery for stopping the haemorrhage with minimal risk.

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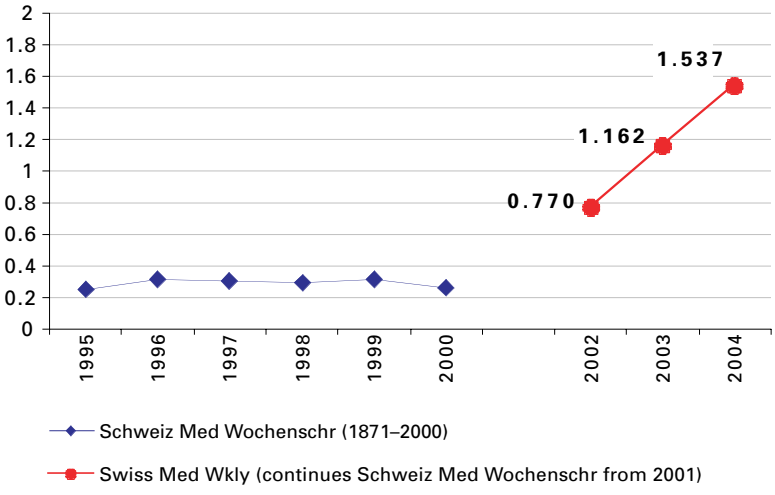

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