Thoracoscopic closure of distal bronchopleural fistulas, using tissue glue

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ABSTRACT: Three patients with distal bronchopleural fistulas, in whom chest tube and drainage did not lead to closure of the fistulas, were successfully treated with tissue glue (Histacryl), delivered through a thoracoscope. The fistulas were identified by injecting methylene blue through the suction canal of a fiberoptic bronchoscope. Patient 1 had multiple fistulas, needed several treatment sessions, and the effect lasted for 18 months, after which the fistulas recurred. The other two patients showed no sign of recurrence of the fistulas; in one patient until death from other causes after 4 months; and in the other for a follow-up period of 18 months.

The management of spontaneous pneumothorax is usually successful with tube thoracostomy and suction. If the air leakage is prolonged, and does not respond to drainage and suction, surgery is usually indicated. In patients with chronic lung diseases, such as chronic obstructive pulmonary disease and emphysema, surgery may be contraindicated. This report describes the successful closure of distal bronchopleural fistulas in three consecutive patients, in whom tissue glue (N-butyl-2-cyano-acrylate) was delivered through a thoracoscope.

Patients and methods

The following procedure was employed in four patients. The patients underwent transnasal fiberoptic bronchoscopy according to standard procedures. Methylene blue, 2.5–5 ml, was injected through the suction canal of the bronchoscope, at the entrance of the lobar bronchus. Thoracoscopy was performed simultaneously through the thoracostomy made for the tube drainage. This procedure was performed under local anaesthesia. The fistula opening(s) was indentified by the appearance of the blue dye on the visceral pleura. A bronchoscopic suction catheter was attached to the thoracoscope by micropore tape, and 1 ml of tissue glue was allocated to each fistula opening. The tube drainage was continued for 24 h, at which time the thoracostomy was closed.

Patient 1

A 56 yr old man with rheumatoid arthritis was admitted to hospital with a right-sided empyema and a bronchopleural fistula. A chest tube and suction were started, and antibiotic irrigation of the empyema was performed, according to bacterial resistance. The infection was controlled, but the fistula did not close. The patient was given a permanent thoracostomy and drainage. His condition deteriorated due to chronic infection, and he was readmitted after 4 months. The infection was treated with antibiotic irrigation of the empyema. Thoracoscopy showed multiple fistulas in the right lower lobe, indentified by methylene blue. The tissue glue was deposited at each fistula opening, in all seven depositions. The lower lobe did not unfold, and a pleural space persisted. The empyema recurred after 18 months.

Patient 2

A 70 yr old man presented with a left-sided empyema. Bacteriological examination revealed mycobacterial infection, and treatment with isoniazid, rifampicin and pyrazinamide was started. The empyema was treated with chest tube and suction. The patient was also found to be suffering from a stage IV non-Hodgkin lymphoma. Chemotherapy with cyclophosphamide, Adriamycin, vincristine and prednisone was started. The empyema and fistula did not clear upon treatment for 3 wks. On thoracoscopic inspection, a single fistula opening was indentified in the left lower lobe. One ml of tissue glue was deposited at the opening. The fistula and empyema cleared, and the treatment effect lasted for 4 months, at which time the patient died from his malignant disease, due to failure to respond to chemotherapy.
Patient 3

A 75 yr old man, suffering from serious pneumococosis, presented with a spontaneous left-sided pneumothorax. He did not respond to treatment with chest tube and suction applied for seven days. A single distal bronchopleural fistula was identified in the left lower lobe, and 1 ml of tissue glue was allocated to the opening. Eighteen months of follow-up showed no recurrence of the fistula.

Patient 4

The same technique was employed in a fourth patient, and was unsuccessful. At thoracotomy, this patient was, however, found to have two fistulas and the treated fistula was found to have fresh granulation tissue at the opening. It was not, unfortunately, tested for leakage.

Discussion

Open window thoracostomy or other major surgery has been the traditional treatment for chronic empyema, when irritation combined with prolonged pleural suction does not seal the bronchopleural fistula [1-3]. In patients with chronic pulmonary disease, with lung functions too marginal to offer surgery, there has in the past been no alternative to permanent thoracostomy and drainage. Recently, there have been several reports describing closure of bronchopleural fistulas, employing the fiberoptic bronchoscope to deliver tissue glue to the fistula opening [4-7]. The tissue glue initially plugs the hole, whilst permanent closure is a result of an inflammatory process, ultimately leading to epithelialization [8]. The tissue glue has the advantage that it polymerizes very quickly. This allows it to be used through a thoracoscope during direct vision. In our patients, the fistula openings were all small and just allowed the tip of the catheter to be introduced. We have not yet employed this technique in larger fistulas.

Pleurodesis with talc or tetracycline [9] may be a procedure to close a distal bronchopleural fistula when the lung expands on suction. This technique requires contact between the visceral and parietal pleura. As the lung did not expand on suction in our patients, it was not possible to apply this technique.

The thoracoscopic procedure could be an alternative to thoracostomy and drainage in patients with chronic pulmonary disease, or might be contemplated before major surgery.

References


Occlusion thoracoscopique d'une fistule broncho-pleurale distale, grâce à une glu tissulaire. U. Aase, B. Holvik.

RÉSUMÉ: Trois patients porteurs de fistule broncho-pleurale distale, où le drainage intrathoracique n'entrainait pas d'occlusion de la fistule, ont été traités avec succès par de la glu tissulaire (Histoacryl), administrée par voie thoracoscopique. Les fistules ont été identifiées par injection de bleu de méthylene dans le canal de succion du fibroscope. Le patient numéro un avait des fistules multiples et a nécessité plusieurs sessions de traitement; l'effet a duré 18 mois. Après quoi les fistules sont réapparues. Les deux autres patients n'ont pas récidivé: le premier jusqu'à sa mort (pour d'autres raisons) après 4 mois, et le second pendant une période d'observation de 18 mois. Eur Respir J, 1989, 2, 383-384.