The use of an electrothermal bipolar tissue sealing system in the management of lung hydatid disease

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Abstract

Surgery is the treatment of choice for management of pulmonary hydatid cysts. Total pericystectomy provided the best results concerning the recurrence of the disease, but haemorrhagia and air leak during dissection of the pericystic space are the main disadvantages of such a method. To avoid these complications, we proposed the use of an electrothermal bipolar tissue sealing system. After the extraction of the hydatid cyst, a small space is created between the pericyst and normal lung, and the separation between the two zones is joined using the electrothermal bipolar tissue sealing system. This procedure reduces the risk of bleeding and of air leaks because the bronchi and the vessels encountered during dissection are sealed by the electrothermal bipolar tissue sealing system. When the pericystic membrane (inflammatory host reaction) is intimately adherent to the lung, total pericystectomy demands greater technical training because the bronchovascular axes of the healthy segments are situated in the pericyst. In such cases, the electrothermal bipolar tissue sealing system allowed creation of an appropriate plane through the parenchyma close to the pericyst, minimizing the normal lung exposed to resection as much as possible and reducing the resulting bleeding and air leak. This procedure was successfully applied in 4 consecutive patients each with a giant hydatid cyst.

Keywords: Hydatid disease • Cyst • Lung • LigaSure, suction device

INTRODUCTION

Hydatid disease is a parasitic infestation caused by Echinococcus granulosus characterized by cystic lesions in the liver and lungs but rarely in other parts of the body [1]. Operation is the treatment of choice for a lung hydatid cyst (HC). We report the use of an electrothermal bipolar tissue sealing system (LigaSure, Valleylab, Inc., Boulder, CO, USA) to excise the pericystic membrane from normal lung.

TECHNIQUE

A standard lateral thoracotomy is performed under general anaesthesia with one-lung ventilation. After entering the haemithorax, the cyst is identified and a careful aspiration of the fluid is performed using a suction device previously reported by our group [2]. Briefly, the device comprises a plastic cylinder with a large needle to aspirate cystic liquid and a further small needle to create a negative pressure in the cylinder. When the device is applied to the cyst, the negative pressure makes the suction cup adhere hermetically to the cyst wall, thus impeding the extravasation of the content as it is sucked out and eliminating the possibility of intraoperative contamination. After the evacuation has been completed, the edges of the pericyst are enlarged to such an extent that the laminated membrane can easily be taken out. The assistant grasps the edges of the pericyst and the surgeon takes out the laminated membrane. Following this, a small space is created between the pericyst and the normal lung and a pericystectomy is progressively performed using the electrothermal bipolar tissue sealing system. The vessels and bronchi encountered during dissection are sealed off, minimizing the risk of bleeding and air leakages. The residual cavity is irrigated with 10% povidone-iodine solution and cleaned with a suction apparatus. With the application of positive intrapulmonary pressure, air escaping through any bronchial openings is visualized by the formation of bubbles and closed individually with absorbable sutures. If simple alveolar air leakages are still present, they can easily be sealed with the electrothermal bipolar tissue sealing system or during the obliteration of the cavity with imbricating sutures (capitonnage). One chest tube is left in the pleural cavity.

RESULTS

Over the past 5 years, the present technique was applied in 4 consecutive patients (Table 1). Being unproven it required approval by the Institutional Review Board (IRB) of the Second University of Naples; all patients were informed about the pros and cons of such a procedure and the patients’ signed consent was obtained. All patients had a giant cyst measuring 10 cm or more [3] that contraindicated thoracoscopic resection. The indications for surgery...
were rupture of cyst (Patient 1, Fig. 1A), dyspnoea and dry cough (Patients 2 and 3), and thoracic pain (Patient 4). In all cases, a lateral thoracotomy was performed through the fifth and sixth intercostal space, depending on the location of the cyst. A pericystectomy was performed in all cases, preserving as much of the lung tissue as possible; wedge and/or anatomical resection of adjacent lung parenchyma were not performed because no serious damage, infection or irrecoverable area of atelectasis was found. The capitonnage was achieved in 2 patients because the walls of the cavity were too thick to collapse spontaneously. No differences in the surgical outcome were seen between patients who received capitonnage compared with those without. Mebendazole (400–600 mg every 8 h) was administered 7–10 days before surgery and continued for 1 month after. No intraoperative and/or postoperative complications, or persistence of residual cavities or recurrence of disease was observed during follow-up. Histological findings confirmed in all cases the complete sealing of the bronchus and vessels close to the pericystic surface.

**DISCUSSION**

Surgical excision is still the main modality of treatment for HC with the objective of eradicating the parasite, and preventing the rupture and dissemination of the cyst. Despite different procedures having been described, total pericystectomy, proposed by Perez-Fontana, provided the best results concerning the recurrence of the disease. However, haemorrhagia and air leak during dissection of the pericystic space are the main disadvantages of Perez-Fontana's method, especially in the case of a giant HC [4]. To avoid such complications, we proposed the use of an
electrothermal bipolar tissue sealing system. Such technology was successfully applied in several thoracic surgery procedures [5, 6, 7] and in the management of hepatic HC [8], but no papers have evaluated its validity in the resection of lung HC. A novel suction device [2] allowed complete evacuation of the cyst, avoiding cyst content spillage and intraoperative contamination (Fig. 1B). After the extraction of the HC, a small space was created between the pericyst and normal lung, and the separation between two zones, usually performed with blunt dissection, was joined using the electrothermal bipolar tissue sealing system (Fig. 1C and D). This procedure reduces the risk of bleeding and of air leaks because the bronchi and the vessels encountered during dissection are sealed by the electrothermal bipolar tissue sealing system (Fig. 1E). When the pericyst membrane (inflammatory host reaction) is intimately adherent to the lung, total pericystectomy demands greater technical training because the bronchovascular axes of the healthy segments are situated in the pericyst. In such cases, the electrothermal bipolar tissue sealing system allowed creation of an appropriate plane through the parenchyma close to the pericyst, minimizing the amount of normal lung exposed to resection as much as possible and reducing the resulting bleeding and air leak. The limitation of electrothermal bipolar tissue sealing is that it safely closes bronchi up to 3 mm in diameter [7]. Thus, after pericystectomy, the residual cavity should be irrigated with hypertonic saline or povidone-iodine to observe potential air leakages. The major bronchial opening(s) are closed individually with absorbable sutures, whereas the simple alveolar air leakages can easily be managed by approximating and suturing cavity edges with capitonnage. Conversely, if LigaSure is able to close all patent bronchial openings and the walls of the cavity are thin enough to collapse spontaneously, the pulmonary parenchyma can obliter ate the space, and the surface of the lung at the site of residual cavity may be covered by pleura (Fig. 1G). In such cases, capitonnage is not necessary with further advantages, considering that it can cause atelectasis by obliterating the bronchus surrounding the cyst [9].

Conflict of interest: none declared.

REFERENCES