How-to-do-it

Thoracoscopical water jet lavage in coagulated hemothorax

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Abstract

We propose the use of a pulsatile high-speed irrigation device during video-assisted thoracoscopy for retained, in part coagulated hemothorax. Blood clots and membranes adhering to intrathoracic structures are easily removed by the water jet without damaging underlying structures. The efficient dilution of the sticky retained blood and the fragmented coagula enable their quick removal over a suction catheter.

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1. Introduction

Insufficiently treated posttraumatic hemothorax carries a number of problems. Large accumulations of fluid and coagula cause compression of the lung and, if untreated, more or less extended pleural callosities in the later course. Super infection of posttraumatic hemothorax either occurring spontaneously or following repeat thoracocentesis is an additional risk [3–5].

Once coagula have formed, both thoracocentesis and chest tube drainage will not be able to evacuate the pleural cavity. Though video-assisted thoracic surgery (VATS) has shown to be effective in such cases [1,2], the removal of coagula adhering to the underlying structures usually proves to be a tiresome work: the vision is poor since the dark coagula absorb a large proportion of light, mechanical crushing of coagula by clamps or suction devices provokes repeat obstruction of the suction tube, since the fluid that can be aspirated is thick and gluey.

Jet lavage, a pulsatile high-speed irrigation device similar to the 'water-pick' systems has been successfully used in the treatment of crushed wounds and in conditioning infected soft tissue [6]. We applied High Speed Pulse Lavage® (MicroAire, Surgical Instruments, Charlottesville, VA 22911 USA) during thoracoscopy for posttraumatic retained hemothorax (Fig. 1).

2. Surgical technique

VATS is performed under general anesthesia using a double-lumen endotracheal tube, bringing the patient into a standard lateral decubitus position. The thoracoscope is inserted through a standard incision in the fifth or sixth intercostal space in the midaxillary line. Two additional incisions are made, the positions of which are determined according to the findings on preoperative CT scan and to the videothoracoscopic aspect of the pleural space.

Fluid components and small, floating clots are evacuated with the help of a wide-bore suction catheter (5 mm diameter), collecting also fluid for microbiological examination. As soon as no further retained material can be removed by suction alone, the jet lavage (physiological saline solution, warmed up to 35°C) catheter is inserted: blood clots or fibrinous membranes adhering to the lung surface or to the parietal pleura are gently and thoroughly peeled from the underlying tissue. They can then be easily removed from the pleural cavity by suction, by gently grasping them with an atraumatic clamp or by crushing them prior to removal by suction. Due to the high flow rate (2 l/min under 1 bar pressure) delivered by the jet lavage system the intrapleural fluid can be quickly cleared from all residual blood, clots or debris, ensuring an excellent view of the surgical team. Moreover, the dilution of the sticky blood oozing from the crushed coagula prevents obstruction of the suction catheter. Two large 28 French silicon chest tubes are inserted. They remain under continuous suction until less than 200 ml/24 h are evacuated. Antibiotic treat-
ment is only administered in case of suspected incipient pleural empyema.

The technique was successfully applied in ten patients with retained and largely coagulated hemothorax following chest trauma sustained 7–19 days before admission. Seven of them had been unsuccessfully treated by chest tube drainage; the others had had attempts of thoracocentesis. In two of the latter, who presented with leukocytosis yet without elevated temperature the thoracoscopical aspect suggested incipient empyema, which was verified in the microbiological specimens. The course of all 10 patients was uneventful with a median drainage duration of 3.4 days (range: 2–5 days) and a median postoperative hospital stay of 4.6 days (range: 3–6 days). Routine follow-up after 6 weeks, including clinical examination and chest roentgenogram showed no recurrences of pleural infusion.

3. Discussion

The rationale of pulsatile jet lavage for the removal of adhering clots or membranes is the ‘air-gap’ within the water jet which enhances its capacity to dissect. In spite of the fact that the jet is sufficiently powerful to detach adhering coagula or fibrinous membranes, there is no danger to supple underlying structures such as nerves or vessels.

References