Thoracoscopic Water Pleurectomy for the Treatment of Recurrent Spontaneous Pneumothorax

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We describe a new technique for thoracoscopic pleurectomy for the treatment of spontaneous pneumothorax. This is performed by percutaneous subpleural infiltration of 0.9% saline solution from the second to the seventh or eighth intercostal space, the so-called water pleurectomy. The extrapleural infiltration allows gentle separation of the parietal pleura by the division of its natural adherence to the endotoracic fascia. This technique reduces the trauma of the procedure and decreases bleeding. Technical details and preliminary results are reported.


The videothoracoscopic approach represents the gold standard for surgical treatment of primary recurrent spontaneous pneumothorax [1], although some surgeons still prefer the open surgery for a quicker and safer accomplishment of the operation, especially when a mechanical pleurodesis is planned. However, at present there is still no consensus regarding the best technique for pleurodesis.

Although mechanical pleurodesis techniques have reached wide acceptance, such operations may imply increased operative time and higher trauma, especially when pleurectomy is performed [2–4], when compared with chemical modalities. We have recently devised an original technique for thoracoscopic pleurectomy showing a number of technical advantages that may facilitate the surgical procedure, allowing reduced operative time and decreased risk of perioperative complications. This technique has been defined as water pleurectomy. Technical details and preliminary results are reported.

Technique

The technique is performed with the patient in the lateral decubitus position and the arm abducted at 90 degrees. General anesthesia with selective bronchial intubation is required. The first surgical incision (1 cm) is made at the seventh or eighth intercostal space. Infiltration of local anesthetic is performed before the skin incision to reduce postoperative pain. We prefer to use a 5-mm and 0-degree optic. When necessary, a second 5-mm incision is made at the second intercostal space. If subpleural blebs or active air leaks are identified they are resected using an endoscopic linear stapler.

A percutaneous subpleural infiltration of 0.9% saline solution using an overlock 50-mL syringe is performed under direct visualization in each intercostal space starting from the second down to the space of the lowest surgical incision (generally seventh or eighth) according to a triangular scheme (Fig 1). This is obtained by progressively increasing the number of subpleural infiltrations from each intercostal space to the lower one. The extrapleural infiltration of water produces an extensive dissection of the natural adherence between the parietal pleura and the endotoracic fascia, thus creating a more favorable condition for the pleurectomy, allowing for reduced trauma and bleeding. This makes the procedure easier and quicker. The parietal pleura is pierced with an endoscopic dissector from the pleural cavity to enable drainage of the previously infiltrated extrapleural fluids and to create free pleural margins for the subsequent pleurectomy. The parietal pleura is completely detached and removed with a ring-type or Kelly-type clamp; its free edges are grasped and torn down in large sheets (Fig 2B). The total removal of the parietal pleura from the apex to the costodiaphragmatic recess can generally be performed. Because the pleurectomy is simplified by this technique, the operation can be performed even through a single-port incision (2 cm) without significant technical difficulties.

Patients

Between December 2006 and August 2012, we have treated 215 patients with recurrent spontaneous pneumothorax using a thoracoscopic approach. One hundred twenty-nine patients (group A) underwent water pleurectomy and 86 (group B) underwent standard pleurectomy. Associated bullectomy was performed in 70 patients of group A and in 48 of group B. In group A, 59
patients underwent thoracoscopic water pleurectomy without lung resection. In 39 (66.1%) of these patients, the operation was performed through a single-port access of only 2 cm. In group B, 38 patients underwent standard pleurectomy only through two thoracoscopic ports. The remaining 48 patients underwent standard pleurectomy and bullectomy with three incisions.

To comparatively evaluate results of the water pleurectomy technique, we have analyzed short- and long-term outcomes of patients undergoing pleurectomy only in both groups. Patients receiving associated bullectomy were not considered, as the additional lung resection could represent a factor potentially influencing results. The study was approved by our ethical committee.

Results
There was no perioperative mortality in both groups. In group A, no case of bleeding (>200 mL/h for 3 hours consecutively) was observed versus 2 cases (5.3%) in group B (p = 0.16; Fisher’s exact test). One of these required surgical reexploration through minithoracotomy. Mean pleural fluid drainage in 24 hours was 180 ± 29 mL in group A versus 380 ± 32 mL in group B (p < 0.001; Student’s t test). Mean surgical time of water pleurectomy was significantly less than that of standard pleurectomy: 28 ± 2 minutes (range, 20 to 35 minutes) versus 45 ± 3 minutes (range, 30 to 60 minutes; p < 0.001; Student’s t test). Mean chest drain duration was 6.9 ± 1.1 days in group A and 7.1 ± 0.4 days in group B (p = 0.08; Student’s t test). A pneumothorax recurrence occurred in 1 patient of group A at 24 months (1.7%), whereas no recurrence occurred in group B (p = 0.4; Fisher’s exact test).

Comment
Different techniques are currently used for surgical pleurodesis in the treatment of recurrent spontaneous pneumothorax, although there is still no consensus regarding the best option in terms of safety and efficacy [2-4]. We and others [5-8] have standardized the use of a mechanical technique (pleurectomy) for pleurodesis. In a recent
literature overview by Sepehripour and colleagues [5], when considering mechanical pleurodesis techniques, statistically significantly lower recurrence rates have been observed after pleurectomy, but this technique is associated with longer operation time, higher postoperative bleeding, and reexploration rates in comparison with pleural abrasion [5–8].

The water pleurectomy described herein provides some technical advantages that may contribute to make the pleural removal easier and quicker. The subpleural infiltration of water enables us to gently detach the parietal pleura with minimal trauma, thus reducing the risk of postoperative bleeding. Our technique is simpler when compared with the standard procedure and may allow performing total pleurectomy with a single thorascoscopic access of only 2 cm without significant technical difficulties. In our series, patients undergoing water pleurectomy showed reduced operative time and lower postoperative fluid drainage; they also showed no difference in terms of efficacy in comparison with patients undergoing the standard technique.

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References