How-to-do-it
Cold coagulation of blebs and bullae in the spontaneous pneumothorax: a new procedure alternative to endostapler resection
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Abstract
Further improvements in the thoracoscopic treatment of spontaneous pneumothorax may reduce the already low invasiveness of the procedure. We have recently experimented with a new device for the coagulation of blebs as an alternative to endostapler resection. Patients with recurrent or persistent spontaneous pneumothorax underwent thoracoscopic treatment. Those with blebs or small bullae were treated with a new device, based on coupling saline solution perfusion with radiofrequency energy. Most operations were performed making only two incisions, in some cases under awake epidural anaesthesia. Results are comparable to those of a series of standard thoracoscopic treatments already reported in the literature.
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1. Introduction
Primary spontaneous pneumothorax is defined as a pneumothorax occurring without a preceding event and with absence of underlying pulmonary disease. Despite that, the advent of thoracoscopy has revealed the presence of blebs and small bullae in 75—95% of patients [1,2].
Today, there is a good or very good general consensus to treat persistent or recurrent primary spontaneous pneumothorax by thoracoscopic technique and, in case of blebs or bullae, to perform staple bullectomy [3].
We recently employed a new device that offers the opportunity to coagulate blebs and bullae, without tissue burning, as an alternative to endostapler resection.
2. Technique
The procedure starts as a standard thoracoscopic procedure, which is performed under general anaesthesia and single lung ventilation. Two small incisions are made in the axillary triangle: one for the 7 mm thoroscope and the other for a 5 mm thoracoscopic instrument. After exploration, patients with blebs or small bullae (stage III/IV according to Vanderschueren’s classification) undergo treatment with the new device. This is a 5 mm endoscopic instrument called Endo Floating Ball (Salient Surgical Technologies Inc., Dover, NH) which allows coagulation of blebs and bullae without charring and burning, thanks to a system which allows irrigation with saline solution through the tip of the instrument (Figs. 1 and 2). With the same device, stopping the saline solution perfusion, pleurodesis is then performed with standard hot coagulation over the first eight costal arches. At the end of the procedure two pleural drainages are inserted through the same operative incisions.
We performed such operation on 25 patients. There were 22 males and 3 females with a mean age of 27.7 years (range of 16—56). In the last seven cases, because of its lesser invasiveness, we utilised thoracic epidural anaesthesia with the patients awake and spontaneously breathing. Mean operation time was 23 min (range of 11—50). Postoperative drainage period and hospital stay were on average 2.5 days (range of 1—11) and 3.1 days (range of 2—11), respectively. Prolonged air leakage occurred in two patients, one requiring reoperation after 8 days. At a mean follow-up period of 17 months (range of 6—37) only one recurrence of pneumothorax was reported, which did not require reoperation.

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3. Comment

Stapler resection of blebs and bullae is widely performed for thoracoscopic treatment of spontaneous pneumothorax [2—4]. Nevertheless, it presents some disadvantages. First of all, it necessitates a larger incision to introduce the device into the pleural cavity. Then its insertion, often repeated many times through the intercostal space, produces a significant trauma and, as a consequence, postoperative chest pain. Moreover, there is the common observation of prolonged air leak, probably due to infiltrations along the staple line, and a recurrence rate that, ranging from 2% to 9.5% in the literature, is still far from being ideal.

At the beginning of the era of thoracoscopic treatment of pneumothorax, some authors tried to coagulate blebs and bullae, mainly with laser beam, but with poor results, probably due to charring and burning of the bulla’s wall which led to prolonged air leaks [5,6].

The main advantage of our procedure for coagulation of blebs and bullae in respect to the other proposed systems (electrocautery and laser) is that it avoids burning of the tissue, thus preserving continuity of the visceral pleura, which is the condition required to avoid air leaks. The system works by coupling radiofrequency energy from a standard electrosurgical generator with saline solution perfusion (Video 1, Appendix A). The saline becomes the electrode and couples the energy to tissue, increasing the contact area and keeping the surface cool (100 °C or below). At this temperature we assist in the collapse of the bullae walls, without desiccation, scarring and smoke (Video 2, Appendix A). The procedure is very simple and generally lasts a few seconds, with the only recommendation being to pay attention that irrigation with saline solution stays adequate and continuous, in order to avoid charring.

Although our experience includes a small number of patients over two years, it seems that cold coagulation of small bullae and blebs is feasible and safe. It presents clear advantages: less invasiveness (just two very small surgical incisions), no retained foreign body and a quicker surgical procedure. The results in terms of prolonged air leaks and recurrences are actually comparable with those reported in the literature [4—6], even if it is to consider that both prolonged air leaks and the recurrence of our series occurred in the first ten patients. Moreover, this procedure seems particularly suitable to be performed under awake epidural anaesthesia, as has been recently suggested by other authors [7]. In this case, in fact, handling of the pulmonary parenchyma is significantly reduced, thus reducing coughing reflex, which represents one of the main limitations of this anaesthesiologic technique.

Although we made a significant effort to select patients on the basis of identical criteria that would be utilised for stable bulllectomy, the foremost limitation of our experience is that of any non-randomised, retrospectively analysed cohort of patients. In this sense, further experiences and randomised studies can be expected. In case they will confirm our preliminary encouraging results, the procedure could be investigated for the treatment of bullous emphysema.

References


Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.ejcts.2008.06.046.