

Surgery for primary spontaneous pneumothorax

Christophoros N. Foroulis

Department of Cardiothoracic Surgery, Aristotle University School of Medicine, AHEPA University Hospital, Thessaloniki, Greece

Correspondence to: Christophoros N. Foroulis. Assistant Professor of Thoracic Surgery, Department of Cardiothoracic Surgery, AHEPA University Hospital, 1 Stilponos Kyriakidi Street, 54636 Thessaloniki, Greece. Email: cforoulis@otenet.gr or foroulis@auth.gr or foroulis@med.auth.gr.

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I read with great interest the innovative technical article published recently in *Journal of Thoracic and Cardiovascular Surgery* by Lin *et al.* (1). The authors of the above mentioned article propose to access the pleural space in order to perform bullectomy/pleurodesis for primary spontaneous pneumothorax (PSP) through two small periareolar incisions with the patient in a semi-sitting position. Pleurodesis was performed by the combination of pleural abrasion and chemical pleurodesis using a piece of gauze immersed in iodopovidone solution that it was mounted in a grasper. The main conclusion of the study is that the transareolar video-assisted approach has several advantages over the other established thoracoscopic or open approaches in use for the surgical treatment of PSP. The proposed by the author's technique poses some issues to address with, such as the best access to the pleural cavity for bullectomy/pleurodesis and the best method to get a strong, permanent pleurodesis. The authors do not report in their article the indications to proceed with surgery in patients with PSP and a short review of the indications for surgical treatment in PSP will be made.

The optimal treatment of PSP still remains debatable (2). The first point of discussion is the appropriate time to proceed with surgery in patients with PSP. There is an agreement that a final solution should be offered to the patient in case of recurrent ipsilateral PSP, simultaneous bilateral PSP, episode of PSP following a previous episode of contralateral PSP, first episode of tension pneumothorax, significant spontaneous hemopneumothorax at first episode, persistent air leak through the chest tube for more than

5–7 days or failure of the lung to re-expand despite adequate pleural space drainage in the first episode (3-6). In addition, surgery at first episode of PSP should be offered in specific groups or individual patients with certain characteristics. According to the published clinical guidelines or consensus statements during the last 15 years, surgery at first episode of PSP should be offered in patients with a profession at risk for developing a hazardous or complicated recurrence such as pilots and scuba divers, patients who live at long distances from the nearer hospital or in small islands and the ocean mariners (3-6). Indications for surgery at first episode can be further extended to elite (top) athletes because they should continue their hard training the sooner possible. Surgical treatment at first episode could also be suggested in young sport persons, especially in those who train in the mountains (i.e., climbers or skiers) or in the air (i.e., parachutists) or in the sea (i.e., open sea sailors). Finally, personal desire of the patient should play a central role in the decision-making to proceed with surgery at first episode, because the available minimally invasive procedures are all associated with short hospital stays, zero mortality and insignificant morbidity (4).

The second point of debate concerns the best access to proceed for surgical pleurectomy/pleurodesis. Video-assisted thoracoscopic surgery (VATS) with all its modifications (standard 3-port, 2-port or uniportal), axillary mini-thoracotomy (AMT) and formal anterolateral or posterolateral thoracotomy, are all acceptable and well tested options for the surgical treatment of PSP (5-9). VATS and AMT are both minimally invasive procedures, as the incision length in AMT never exceeds 7 cm. In addition, AMT is performed

through the axillary fat, leaving that way intact all the chest wall musculature. Recurrence rate after surgery for PSP was connected in the near past with the surgical access. Open thoracotomy plus pleurectomy were reported to be associated with the lower recurrence rate (less than 1%), while VATS procedures had a recurrence rate of 4–5% (4). In the recently published statement by the European Respiratory Society and the guidelines published by the Spanish Society of Pulmonology and Thoracic Surgery on diagnosis and treatment of PSP, it is well noted that VATS bullectomy/pleurodesis has similar recurrence rates with that of open thoracotomy. This fact is explained by the larger experience obtained with the VATS procedures throughout the years (4,6).

Currently, VATS is the access of choice for the treatment of PSP for most of the thoracic surgeons worldwide. The reported advantages of VATS procedures are the less physiologic embarrassment, the better cosmetic result and the faster recovery (3,7). I could agree if one's compare VATS with standard open thoracotomy, however, the advantages of VATS over AMT concerning the cosmetic result are not so obvious, because the scar of AMT is very small and well hidden within the axilla. According to a prospective randomized study published in 2012, the main obvious advantage of VATS over AMT is the better patient satisfaction with treatment which it was connected with the earlier full dependent arm mobilization and the earlier return to full daily activities (7). The main technical advantage of VATS over AMT is the fact that the surgeon can proceed with subtotal pleurectomy if necessary, while pleurectomy with AMT is limited to the accessible through this small incision parietal pleura in the apex of the hemithorax. Standard thoracotomies can nowadays be applied only as the last choice in exceptional recurrent VATS cases. The proposed technique of periareolar incision in the semi-sitting position seems to offer some advantages, such as the excellent cosmetic result with minimal or not at all scarring in the chest wall. However, the small scars left in the chest wall after the classic VATS procedures are not always the case in patients with PSP undergoing surgery, because their chest wall has usually some scarring from possible previous chest tube insertions. I have to point out here that in the two-port VATS access (7), scarring from chest tube insertion can serve as the first port, while a second port is inserted within the axilla; this second port does not damage at all the chest wall musculature and it offers a perfect access for biportal VATS bullectomy/pleurodesis. Periareolar incision is one of the three popular

incisions among plastic surgeons for breast augmentation surgery (10). Periareolar incision has been sporadically used by thoracic and cardiac surgeons to perform thoracoscopic sympathectomy or to repair atrial septal defect, however, the periareolar access did not gain wide acceptance and popularity among cardiothoracic surgeons (11,12). Indeed, the use of periareolar incision for bullectomy/pleurodesis has some obvious disadvantages which are the incision through the pectoralis major muscle which damages the muscle and the limited movement of the thoracoscopic instruments through this incision in muscular patients. Finally, as the authors also state, the incision is unsuitable for women, for obese patients and for cases with a lot of adhesions within the pleural cavity (1).

It is quite difficult to extract conclusions from the reported recurrence rates after surgery for PSP in the various published series, because the applied surgical procedure varies from series to series. The main important variances are first, the resection or not of the lung apex in the absence of obvious blebs/bullae and second, the technique used to obtain a permanent pleurodesis. Parietal pleurectomy of various extent (apical or subtotal or of any other extent), pleural abrasion, chemical pleurodesis with talc or other agent (i.e., povidone-iodine, as described in the commented article) are the acceptable and commonly employed techniques to perform pleurodesis (3-8,13,14). Parietal pleurectomy is considered the best technique to achieve pleurodesis, however it has the disadvantage of possible bleeding resulting in the formation of clotted hemothorax (7). Another theoretical disadvantage of pleurectomy is the complete obliteration of the extrapleural plan in the area of pleurodesis which can make very hard any other future procedure within the operated hemithorax. The surgeon should leave intact the pleura which cover the superior vena cava and the subclavian vein on the right side or the aortic arch and subclavian artery on the left side, allowing that way a safe dissection around these vessels in a future procedure. A future prospective comparison between pleurectomy, talc poudrage and pleural abrasion could answer the question on the best method to perform surgical pleurodesis for PSP. Surgical access via uniportal or periareolar VATS procedures does not allow extensive pleurectomy, while efficient talc poudrage can be applied by any of the existing accesses. Talc poudrage of the pleural cavity is also connected with specific complications, such as talcoma formation (15,16). The reported in the past sporadic cases of pneumonitis and ARDS after talc poudrage of the pleural cavity were not observed in the

relatively recent large multicentre European study of 418 patients who underwent thoracoscopic talc pleurodesis for the prevention of PSP recurrence (16). Talc is definitely considered to be a safe agent to perform pleurodesis, even in benign pleural diseases such as PSP (16,17).

A surgical access should be safe and easily reproducible in order to be adopted by the community of thoracic surgeons as a routine access. The promising transareolar access of the pleural space for the thoracoscopic treatment of PSP needs further investigation by other groups of surgeons and should be tested for its reproducibility, safety and acceptable long-term results concerning prevention of recurrences.

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Footnote

Conflicts of Interest: The author has no conflicts of interest to declare.

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