



A novel suture technique in closing the single drainage tube hole in uni-portal video-assisted thoracoscopic surgery

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Minimally invasive surgery, such as video-assisted thoracoscopic surgery (VATS), for early-stage lung cancer has replaced open approaches because these approaches have several advantages including the following: less pain, less complications, and shorter hospital stay (1). In 2010, the first uni-portal VATS lobectomy was performed (2), and the rapid adaptation of uni-portal VATS lobectomy in Asia and Europe has been mostly based on the short recovery after this technique compared with that after multi-portal VATS techniques (3).

In the paper entitled “*Simple continuous suture to strengthen the closure of intra-muscle used in the removal of uni-portal video-assisted thoracoscopic surgery thoracic drainage tube*” (4), Xu *et al.* conducted a prospective study in 50 patients who received uni-portal VATS, and they introduced a novel and unique technique, that is, simple continuous suture, to strengthen the closure of the intra-muscle combined with removal-free stitches on the skin. In the study, the mean drainage volume on the first day after operation was 236.56±141.50 mL, and only 18 patients remained on drainage on the second day post operation. Among the 50 patients, only two experienced subcutaneous emphysema. The average length of postoperative hospitalization was 2.64±0.56 days.

Surgical approaches, such as uni-portal VATS, have improved overtime; however, suture techniques in closing the wound and/or drainage tube hole have not developed (4). Recently, barbed suture materials have been introduced into a variety of surgical areas, expecting

their efficacy without increasing morbidity (5). The barbed knotless sutures have a character of spiral or unidirectional barbs along the strands arranged in a helical pattern to anchor into the tissue. These materials deliver all the benefits of a knotless tissue control device, with a possibility of greater wound closure strength than traditional running sutures of the same size and polymer. In leg wound closure in patients who underwent coronary artery bypass surgery, using a knotless barbed suture showed significantly lower incidence of knot-related leg wound complications compared with conventional monofilament knotted sutures (6). Xu *et al.* utilized the barbed knotless sutures in closing the muscle layer and skin in uni-portal VATS, and the 5–10 cm threads were left outside the skin in both layer sutures (4). When they removed a thoracic drainage tube, the both barbed knotless wound-closure threads for muscle layer and skin were quickly tightened just after removing the tube. This novel suture technique using barbed knotless sutures in uni-portal VATS strengthened the closure of the muscle layer to avoid fluid or air leaks and to close the drainage tube hole of the skin without additional stitches.

Readily leaks of intrathoracic fluid or air into the subcutaneous tissue around the chest tube is one of the specific issues associated with uni-portal VATS because those may be caused by the loose chest muscles closure due to the direct insertion of the chest tube into the single surgical incision (7). Thus, uni-portal VATS may more frequently cause wound infection or subcutaneous

emphysema than conventional multi-portal VATS. Xu *et al.* demonstrated that only 2 of the 50 patients developed subcutaneous emphysema after tube removal in uni-portal VATS using the barbed knotless sutures in closing a single incision (4). Because subcutaneous emphysema was the most common reason for 30-day readmission after pulmonary resection for lung cancer (8), the prevention of postoperative subcutaneous emphysema following thoracic surgery is considered to be important even in uni-portal VATS. The novel suture technique using the barbed knotless sutures introduced by Xu *et al.* seemed feasible for the prevention of postoperative subcutaneous emphysema.

The uni-portal VATS technique has more potential advantages compared to the multi-portal VATS technique based on the previous reports (2), including a significant reduction in postoperative pain (9,10). Considering that only one intercostal space is involved in uni-portal VATS, less postoperative pain is expected in this technique. A previous study demonstrated decreased postoperative pain after uni-portal VATS, with higher patient satisfaction compared with the conventional three-port VATS (9). Moreover, a significantly lower incidence of post-thoracotomy pain syndrome was observed in uni-portal VATS compared with that in multi-portal VATS (10). Based on Xu *et al.*'s study (4), the pain scores assessed using Numerical Pain Rating Scale on the first to third postoperative days suggested that the patients were able to tolerate the procedure; and thus, their new approach did not affect the potential advantage of less postoperative pain in uni-portal VATS, and did not entail additional pain.

Uni-portal VATS is more commonly used because of its potential benefits and advantages compared with multi-portal VATS techniques. However, the wound induced by the direct insertion of the chest tube into the surgical incision is one of the differences between the uni-portal VATS and multi-portal VATS, and suture technique in closing the wound and/or drainage tube hole have not improved. Xu *et al.* applied the novel simple continuous suture technique to strengthen the closure of the intra-muscle combined with removal-free stitches on the skin using the barbed knotless sutures, and this novel method was considered safe and feasible for the management of postoperative complications and pain (4). It is expected that the novel suture technique introduced by Xu *et al.* will be beneficial in overcoming some of the disadvantages of

uni-portal VATS, resulting in the wide-spread use of uni-portal VATS.

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Footnote

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