# Robotic free pericardial fat pledget technique for treating pulmonary air leak



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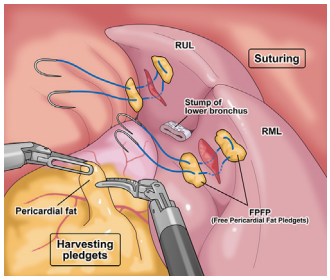



**Robotic free pericardial fat pledget technique for treating pulmonary air leak.**

**CENTRAL MESSAGE**

Free pericardial fat pledget technique is easy and feasible for treating pulmonary air leak during pulmonary resection in robotic surgery.

Video clip is available online.

There is no clear evidence for the ideal technique for treating intraoperative air leak. A previous study showed that the VIO soft-coagulation system (VIO 300D system; Erbe Elektromedizin) is useful for minor air leaks, as the automatically adjusted voltage output does so without causing sparks or tissue carbonization, resulting in covering the pulmonary fistula with a fibrin membrane.[1] Although suturing is required to treat deeper lung injuries, simple suturing of emphysematous lungs may induce further lung injury.

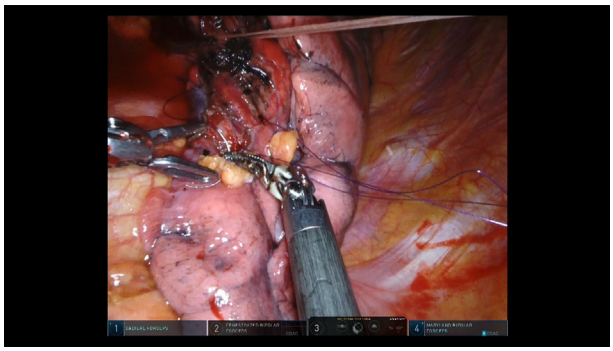
A previous study demonstrated the usefulness of pedicle pericardial fat pad grafts for bronchial coverage and suture-line reinforcement.[2] For pulmonary fistula, a previous study showed the usefulness of free pericardial fat as a sealant.[3] There are no reports of free pericardial fat pledget (FPFP) in robot-assisted thoracic surgery (RATS). Herein, we present the FPFP technique for treating pulmonary air leak in RATS.

## CASE PRESENTATION

A 64-year-old man with a history of 40 pack-years of smoking presented with clinical stage IIA (T2bN0M0) squamous cell lung cancer. This report was conducted in accordance with the Helsinki Declaration and approved by the institutional review board (no. 322-265; February 4, 2021). Written informed consent was obtained from the patient.

### Surgical Technique

The da Vinci Xi Surgical System (Intuitive Surgical) was used for surgery (Video 1). Right lower lobectomy and lower mediastinal lymph node dissection were performed. At our institution, we often divide the low-grade incomplete fissures (Craig and Walker classification grades 1 and 2) using only Vessel Sealer Extend (Intuitive Surgical).[4] In this



**VIDEO 1.** Details of free pericardial fat pledget technique. Video available at: https://www.jtcvs.org/article/S2666-2507(22)00533-8/fulltext.

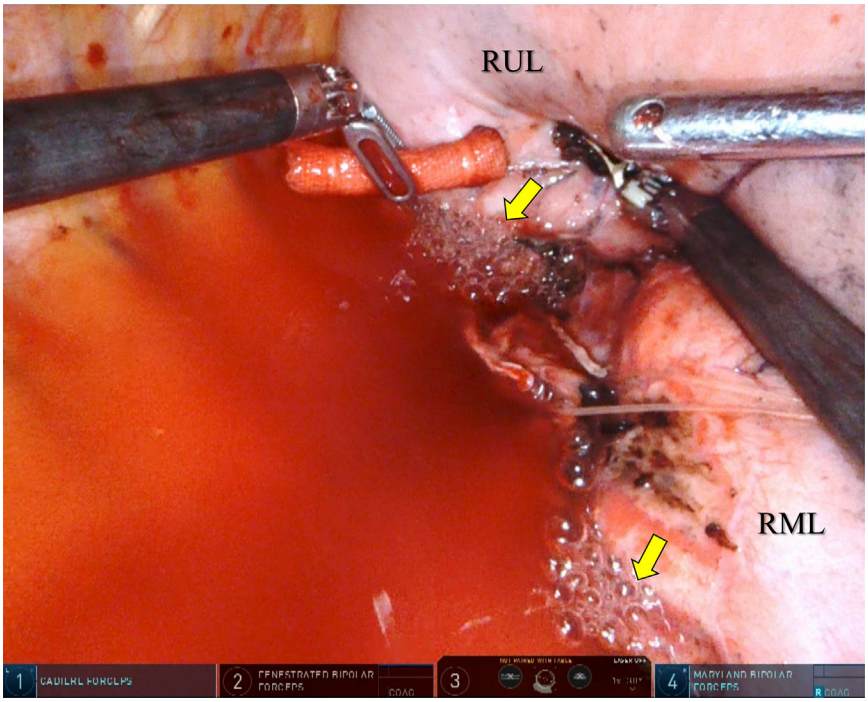



**FIGURE 1.** Sealing test. Two points of air leak due to interlobar fissure division (*arrows*). *RUL*, Right upper lobe; *RML*, right middle lobe.

case, the console surgeon assessed the fissure as grade 2 during surgery and divided the fissures using only Vessel Sealer Extend; however, postoperative review of the video showed grade 3; therefore, a stapler was suitable for this case. We routinely perform a sealing test (two-lung ventilation with 15 $cmH_2O$ pressure).

The sealing test showed 2 air leak points due to interlobar fissure division (Figure 1). First, the console surgeon harvested the required FPFPs (approximately 1 $cm^3$) based on the number of pulmonary air leaks and used 2 FPFPs in one suture to treat the leaks (Figure 2, *A*). The assistant surgeon inserted a double-armed 4-0 polydioxanone suture (PDS) into the thoracic cavity. The console surgeon performed mattress suturing using the PDS to sandwich the injured area of the visceral pleura using the FPFP (Figure 2, *B-F*). In our RATS style, suturing is generally performed using Maryland bipolar forceps instead of a large needle driver for cost-effectiveness. The console surgeon grasps the needle of the PDS with the tip of the Maryland bipolar forceps. If the needle tip is not stable, the fenestrated bipolar forceps are used to improve the stability for suturing. A resealing test showed no air leak. The postoperative course was uneventful. The chest tube was removed on postoperative day 1, and the patient was discharged on postoperative day 8. Due to the Japanese national health insurance program, the length of hospital stays tends to be longer.

## DISCUSSION

Here, we reported the use of the robotic FPFP technique for treating pulmonary air leak. This technique has significant advantages, such as (1) free fat is easier to harvest than the pedicle flap; (2) free fat is faster to harvest than the pedicle flap; and (3) the FPFP technique allows suturing lung injuries that are difficult to reach with a pedicle flap.

In the FPFP technique, 2 FPFPs are required to treat 1 air leak point. We can easily obtain FPFPs using robotic electrocautery. It takes approximately 20 seconds to harvest 2 FPFPs. The FPFP technique is also effective when multiple pulmonary fistulas are located far apart. Pedicle flaps are more complicated and time-consuming than the FPFP technique.[2]

A major concern of free fat is whether the fat will remain viable. A previous study on free pericardial fat showed a high rate of fat survival in approximately 63% of cases at 6 months postoperatively.[3] Considering that most pulmonary fistulas heal during this period, free fat is a reasonable treatment for pulmonary fistulas; however, further studies are needed to confirm the fat-engraftment process and the superiority of free pericardial fat over simple suture. The FPFP technique is easy and feasible for treating air leak in RATS without excess cost and adverse effects of commercial-based nonautologous materials.

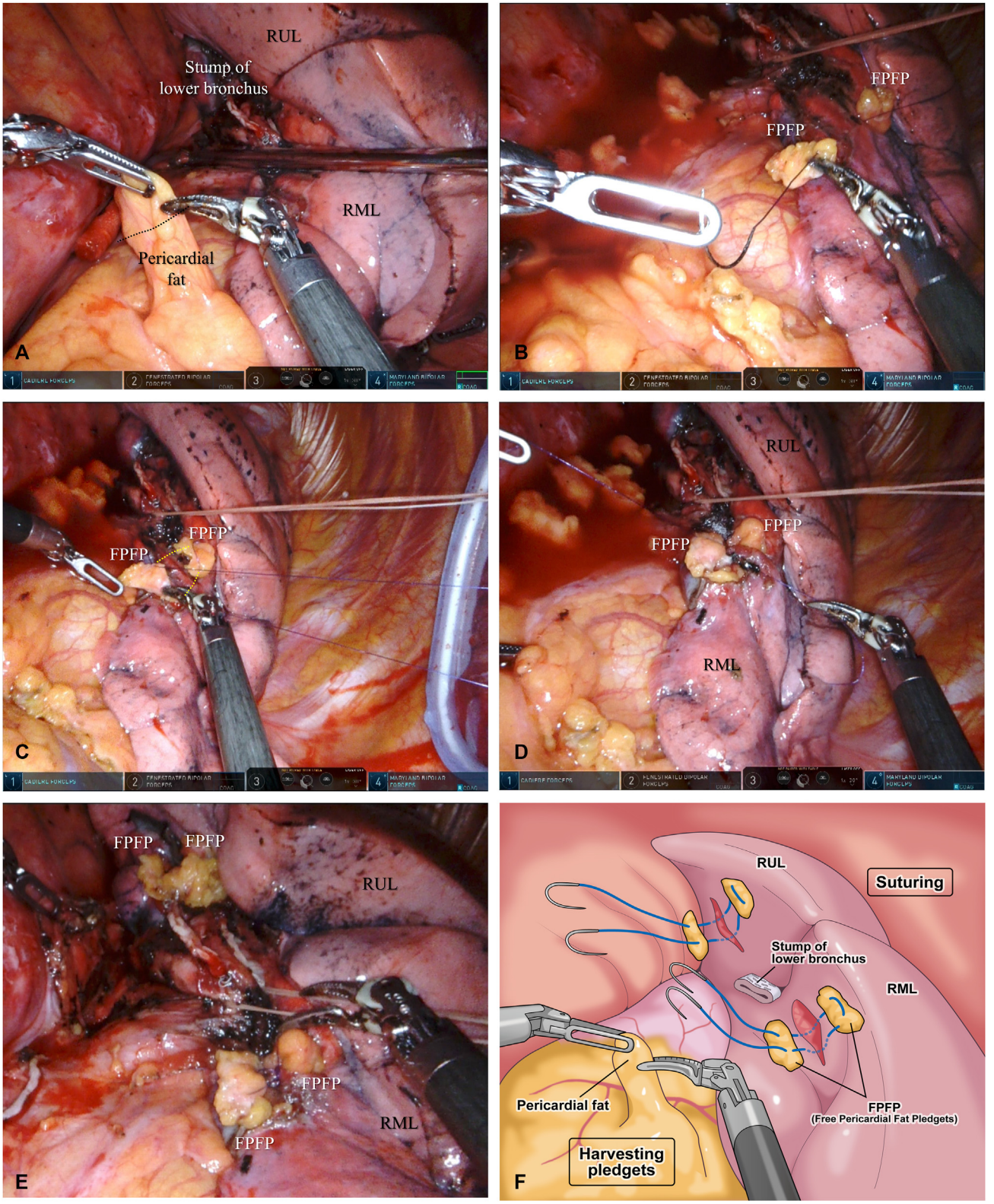



**FIGURE 2.** Details of the FPFP technique. A, Harvesting pericardial fat using Maryland bipolar forceps. The *dashed line* shows the line where the pericardial fat is divided. B, Sandwiching the air leak point with 2 FPFPs. C, Horizontal mattress suturing. The *dashed line* shows PDS in the lung parenchyma. D, Intraluminal ligation. E, Completion of the FPFP technique. F, Main schema of the FPFP technique. *RUL*, Right upper lobe; *RML*, right middle lobe; *FPFP*, free pericardial fat pledget.

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