



Tubeless Uniportal Thoracoscopic Lung Wedge Resection Via Peri-areolar Approach

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Introduction

At present, single-hole/single-hole thoracoscopic surgery is the mainstream surgical method for the treatment of early lung cancer. Its main operating hole is usually located in the 4th or 5th intercostal space of the anterior axillary line. 22-28F chest tube is routinely indwelled after operation. This approach will leave a permanent scar on the chest wall and often damage the intercostal nerve causing postoperative chest wall numbness. The transareolar approach can conceal the traditional incision and effectively solve the scar problem. It has been previously reported that the transareolar incision for the treatment of bullae. However, because it is difficult to operate and difficult to complete the complex lung surgery, it is not applied in the treatment of lung cancer. Sharp irritation of the drainage tube is considered to be the main cause of postoperative pain in patients with lung cancer, tubeless thoracoscopic surgery for lung cancer has been demonstrated to be feasible in previous reports , and has many advantages such as reducing patient pain discomfort, reducing intraoperative blood loss, and shortening the operation table time. However, tubeless surgery on the basis of the transareolar approach has not been previously studied. Based on the above background, we selected appropriate patients and innovatively performed Tubeless transareolar Uniportal Video-Assisted Thoracic Surgery pulmonary wedge resection and lymph node sampling in order to improve postoperative comfort while improving incision aesthetics.

Materials and Methods:

A total of 19 patients hospitalized in the Department of Thoracic Surgery of Yuhuangding Hospital, Yantai from June 2024 to October 2024 were screened, of whom 9 underwent Tubeless transareolar Uniportal Video-Assisted Thoracic Surgery pulmonary wedge resection and lymph node sampling.10 patients in the control group underwent conventional single-port thoracoscopic pulmonary wedge resection and lymph node sampling. The study was reviewed and approved by the Ethics Committee of Yantai Yuhuangding Hospital [2024-033]. Inclusion criteria 1. Patients aged ≤ 65 years old, no other serious underlying diseases; 2. Chest CT showed peripheral pure ground-glass nodules or mixed ground-glass nodules (solid component ratio (CTR) ≤ 0.25); 3. Nodule diameter 0.8cm-2cm. Exclusion criteria: 1. Pathologically invasive adenocarcinoma, lobectomy/segmentectomy and lymphadenectomy; 2. History of ipsilateral chest wall/lung surgery or severe chest wall deformity.

Approximate Procedure:

Nine patients in the Tubeless group were treated with laryngeal mask airway – sparing spontaneous respiratory anesthesia, including: no opioid general anesthesia and local anesthesia (paravertebral nerve block and incision infiltration and pleural surface infiltration and vagus nerve block). Opioid-free general anesthesia protocol: dexmedetomidine 0.5-1μg/kg pump, esketamine 0.7 mg/kg induction, propofol and sevoflurane maintenance BIS 40-60. After successful anesthesia, a 90-degree healthy lateral decubitus position was made, about 1/4 circumference incision was made in the peripheral areola of the operated side (Figure 1), the lateral chest wall was freed along the breast and subcutaneous space, the fourth intercostal space was found after bypassing the breast, the intercostal muscle was incised into the thoracic cavity, an incision protective sleeve was placed into the thoracoscope, after the nodule position was identified, wedge resection was performed using an endoscopic cutter stapler to ensure that the resection margin exceeded the tumor diameter, no active bleeding or air leakage was examined, the incision was closed after the drainage tube was placed in the thoracic cavity, and the drainage tube was sealed with water. After the anesthesiologist was asked to completely expand the lung, the drainage tube was removed, and the muscular layer and skin incision were sutured (Figure 2). In the control group, thoracoscopic wedge resection and mediastinal lymph node sampling was performed under conventional general anesthesia with endotracheal intubation, and a 22F thoracic tube was indwelled after surgery.



Figure 1. Surgical incision via areola approach



Figure 2. Postoperative sutured effect



Figure 3. Incision follow-up effect at 3 months after operation

Table 1 Comparison of patients' basic conditions

Characteristic	Tubeless transareola surgical incision		p-value
	Uniportal VATS, N = 10	Tubeless + Transareolar Uniportal VATS, N = 9	
Gender			0.7
Female	4 (40%)	5 (56%)	
Male	6 (60%)	4 (44%)	
Age	58 (57, 62)	56 (48, 57)	0.2
BMI	25.65 (23.83, 27.40)	23.20 (19.80, 26.50)	0.2
Surgery side			0.6
Left	3 (30%)	4 (44%)	
Right	7 (70%)	5 (56%)	

Table 2 Comparison and analysis of patient-related indicators

Characteristic	Tubeless transareola surgical incision		p-value
	None, N = 10	Yes, N = 9	
Operation time (min)	56±10.7	39.4±5.8	0.113
Blood loss (ml)	7.7±3.4	6.6±2.5	0.333
VAS	6.1±1.9	2.6±0.5	0.010
Postoperative hospital stay (day)	3.3±0.4	1.8±0.3	0.048
PSAS	32.3±5.7	11.2±3.3	0.042
OSAS	28.7±6	14.2±5.8	0.564

Results

All patients were successfully completed the operation, and there was no statistical difference in age, gender, BMI, and surgical site between the two groups (Table 1). Tubeless transareolar group: intraoperative rapid pathology showed 6 cases of AIS and 3 cases of MIA (all solitary ground-glass nodules), with operation time of 39.4 ± 5.8 min, intraoperative blood loss of 6.6 ± 2.5 ml, and postoperative pain score of 2.6 ± 0.5. Eight patients were discharged 2 days after surgery and 1 patient was discharged 1 day after surgery. Chest radiography before discharge showed that lung recruitment was fair without significant pneumatosis effusion. All patients were satisfied with the cosmetic appearance of surgical incision (Figure 3). Scar score at 1 month follow-up after operation: PSAS = 11.2 ± 3.3, OSAS = 14.2 ± 5.8, no obvious effusion or pneumatosis in reexamination of chest CT. Compared with the control group, there were statistically significant differences in postoperative hospital stay, VAS score, and PSAS score (Table 2).

Conclusions

Transareolar tubeless surgery can be used as a surgical treatment for some patients with early peripheral ground-glass nodules, which can conceal chest wall scars and reduce postoperative pain, with good clinical results.