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Case Series

Video-Assisted Thoracic Surgery (VATS) as First-Line Approach in Thoracic Trauma: A Single-Center Case Series.

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Abstract

Background: Thoracic trauma is one of the major causes of morbidity and mortality among trauma patients worldwide [1,2]. Video-assisted thoracic surgery (VATS) has evolved as a diagnostic and therapeutic approach for hemodynamically stable thoracic trauma patients [3–5]. This study aims to evaluate clinical outcomes and feasibility of early VATS as a first-line surgical option for thoracic trauma in selected cases.

Methods: We present a case series of seven patients with thoracic trauma undergoing VATS between 2023 and 2025. Collected variables included demographics, injury mechanisms, intraoperative findings, need for conversion, complications, and hospital stay. Primary outcomes were technical success and safety; secondary outcomes included duration of hospital stay and postoperative complications.

Results: In all cases, undetected pulmonary parenchymal injuries were identified and repaired thoracoscopically. No conversions to thoracotomy were required. Patients demonstrated shorter hospital stays (8.7± 3.4 days) and no postoperative infections or major complications.

Conclusions: Early VATS appears to be a safe, minimally invasive, and effective first-line option for selected stable thoracic trauma, allowing accurate diagnosis, targeted intervention, and rapid recovery with minimal morbidity. Major multicenter studies are required to validate these preliminary results.

INTRODUCTION

Thoracic trauma accounts for up to 25% of trauma-related deaths and frequently coexists with multisystemic injuries [1,6]. The conventional management of thoracic injuries relies on tube thoracostomy for drainage or open thoracotomy for uncontrolled bleeding. Video-assisted thoracic surgery (VATS) has emerged as a valuable diagnostic and therapeutic alternative approach for trauma management [3,7–9]. Several studies suggest that early thoracoscopic intervention (<72 hours) reduces postoperative complications such as retained hemothorax, empyema, and pneumonia [10–13]. The aim of this study is to describe a single-center experience to evaluate the clinical efficacy and safety of early VATS as the initial surgical strategy in hemodynamically stable thoracic trauma.

MATERIALS AND METHODS

This retrospective case series included seven adult patients with thoracic trauma who underwent VATS between January 2023 and March 2025 in Moscati Hospital, Italy. Our institution is a second-level emergency care center with a high annual volume of thoracic elective surgery procedures performed via VATS, amounting approximately 220 cases per year. Inclusion criteria were hemodynamic stability (systolic blood pressure ≥ 90 mmHg), absence of massive hemothorax (>1500 mL), and no indication for emergency thoracotomy [14,15]. All patients underwent preoperative chest radiography in shock room and CT total body to confirm diagnosis (**Figure A, B**). Written informed consent was obtained before surgery. Procedures were performed under general anesthesia with single-lung ventilation. A standard thoracoscopic three-port

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technique was used: one 10-mm thoracoscope port and two 5-mm working ports. Injuries were managed with hemostasis, clot evacuation, parenchymal repair, or foreign body removal. No conversion to thoracotomy was needed for uncontrolled hemorrhage or inadequate visualization [16]. Primary endpoints were technical success and conversion rate; secondary endpoints were postoperative complications, ICU stay, and hospital length of stay [17].

Figure A. Evidence of a gunshot wound in the subcutaneous tissue.

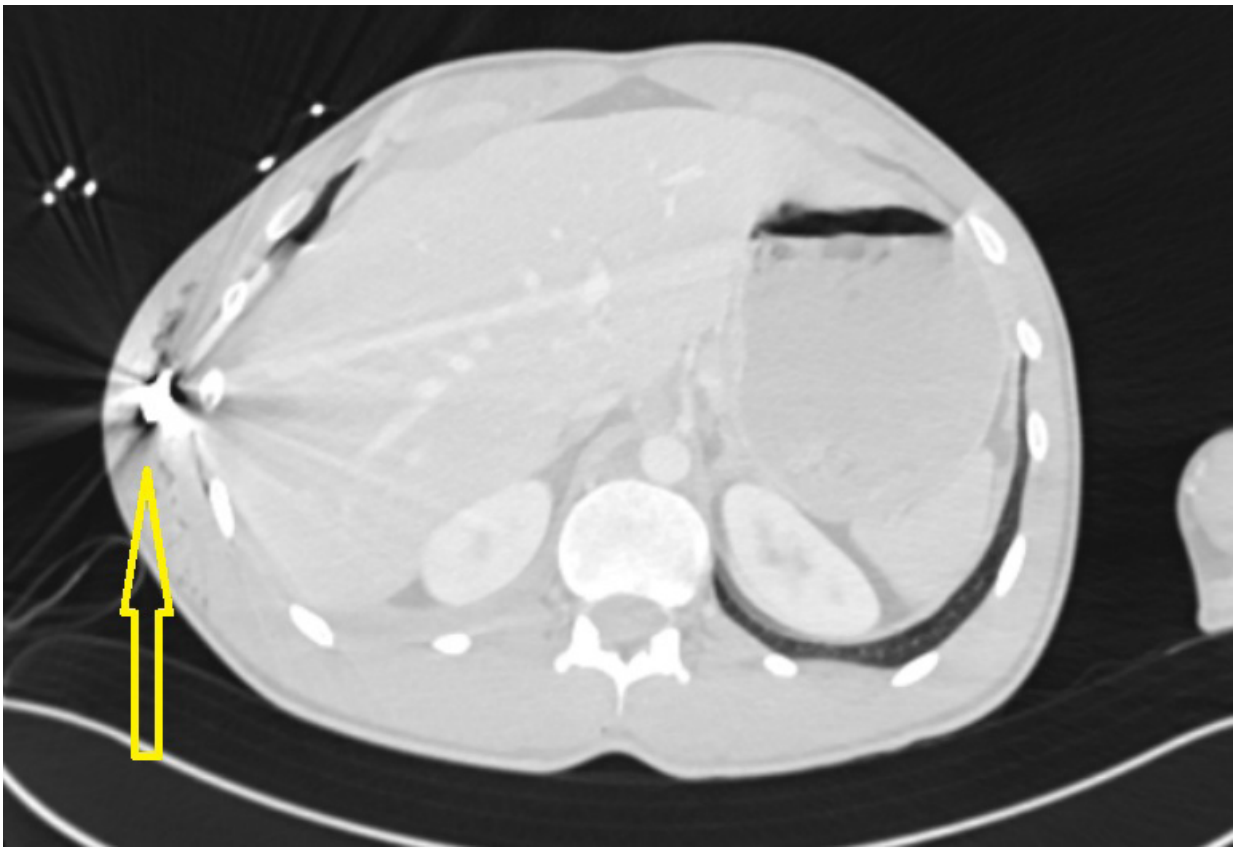
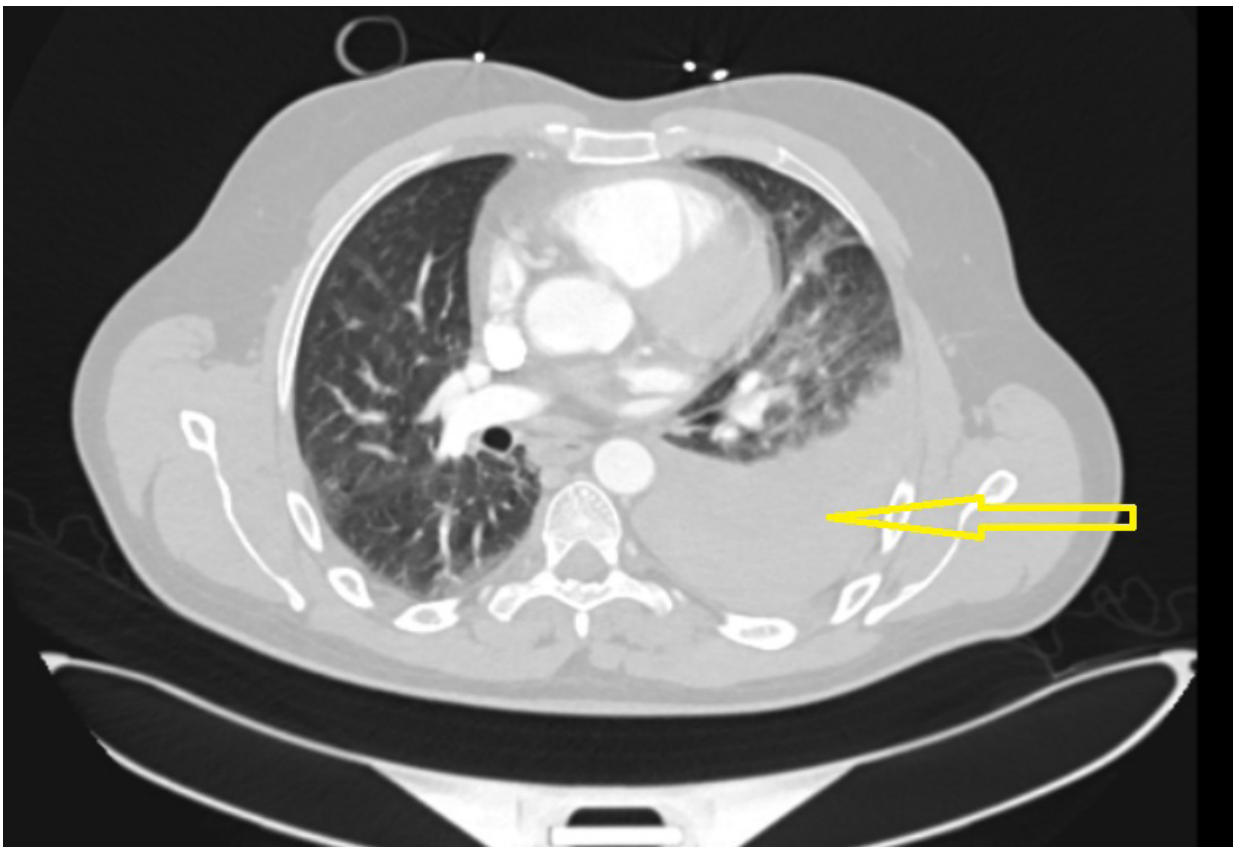


Figure B. Evidence of hemothorax in a stabbed patient.



RESULTS

Data were analyzed using descriptive statistics, including means, ranges, and frequencies. Seven male patients (mean age 42.3 years, range 18–73) underwent early VATS following thoracic trauma. Mechanisms included stab wounds (n=4), gunshot wounds (n=2), and multiple penetrating injuries (n=2). Preoperative CT demonstrated pneumothorax in all and hemothorax in four patients. Two retained metallic fragments were identified and removed thoracoscopically. Mean operative time was 83 ± 22 minutes, estimated blood loss 180 mL (range 80–700), and no intraoperative conversions. Postoperatively, chest tubes were removed after a mean of 3.6 ± 1.2 days. No patients developed empyema, air leaks, or respiratory failure. Two patients required short-term ICU observation for comorbidities prior to the trauma (48 hours). All patients were discharged in good condition with radiographic confirmation of lung re-expansion [18–20], (**Table 1**), see Video in Supplement Material Section.

Table 1. Variables included of the selected patients.

Patient	Age	Sex	Injury Mechanism	Imaging	VATS Findings	Conversion	LOS (days)	Complications
M.C.	73	M	Multiple sharp injuries	Left pneumothorax	Apical lobe laceration + hemothorax	No	8	None
L.F.	42	M	Stab wound	Hemopericardium + hemothorax	Lingula laceration	No	11	None
S.G.	18	M	Gunshot	Retained bullet	Foreign body removal	No	4	None
H.A.	47	M	Multiple penetrating wounds	Pneumo-hemothorax	Multiple parenchymal lacerations	No	14	None
D.G.A.	59	M	Stab wound	Active blush	Apical subsegment injury	No	5	None
C.S.	36	M	Stab wound	Pneumothorax	Apical subsegment injury	No	9	None
R.L.	21	M	Gunshot	Pneumo-hemothorax	Bullet retrieval	No	10	None

COMMENT

Our experience supports the growing evidence that early VATS is a valid alternative to thoracotomy for hemodynamically stable thoracic trauma patients. The absence of conversions and major complications aligns with reports from multicenter series [21,22]. Early thoracoscopic evacuation of hemothorax shows significant advantages in terms on empyema rates, pulmonary complications, and hospitalization stay [10,12,23]. In experienced hands and in a high-volume center performing thoracic surgery procedures via VATS, this procedure offers diagnostic clarity, identifying occult diaphragmatic or parenchymal injuries not visible on imaging [24]. Indeed, in our series, postoperative pain was reduced, mobilization was faster, opioid use was lower, pulmonary function was improved [25–27]. Future multicenter prospective studies are needed to establish standardized algorithm for timing and indications of early thoracoscopic intervention in trauma care.

CONCLUSIONS

Our single center experience shows that early VATS is a safe and effective minimally invasive technique for managing selected hemodynamically stable thoracic trauma patients in center with a high volume of these thoracic procedures. Compared to thoracotomy and the placement of the only chest drain, it provides definitive diagnosis and treatment in a single procedure reducing morbidity and hospital stay by improving prognosis and long-term outcomes. Larger studies are recommended to consolidate these findings and establish guidelines for the widespread use of VATS in thoracic trauma management.

Declaration of interests

✉ The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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