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Case Report

Robotic-assisted video-assisted thoracic surgery decortication using the Cambridge medical robotics versius system in a chronic kidney disease patient

Ved Prakash, Anirudh Agrawal*, Ashutosh Pandey, Shivangi

Department of General Surgery, Asian Institute of Medical Sciences, Faridabad, Haryana, India

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***Correspondence:**
Dr. Anirudh Agrawal,
E-mail: aniruudh222@gmail.com

ABSTRACT

Empyema thoracis in patients with chronic kidney disease (CKD) presents a unique therapeutic challenge due to increased bleeding risk and impaired host immunity. This report presents a case of a 45-year-old male on hemodialysis with right-sided multiloculated empyema who underwent robotic-assisted video-assisted thoracic surgery (VATS) decortication using the Cambridge medical robotics (CMR) versius system. The procedure was successfully completed with minimal blood loss, no intraoperative complications, and favorable postoperative recovery. The patient was re-listed for renal transplant after recovery. Robotic-assisted decortication using the CMR versius platform proved to be a safe and effective modality for complex thoracic interventions in high-risk patients.

Keywords: CMR, Robotic, VATS, Thoracic surgery

INTRODUCTION

Empyema thoracis, defined as pus in the pleural space, often results from complicated parapneumonic effusions. While video-assisted thoracoscopic surgery (VATS) is considered the gold standard for decortication in chronic empyema, robotic-assisted thoracic surgery (RATS) has emerged as a promising alternative due to enhanced 3d visualization, wristed instrumentation, and improved ergonomics.[1-3]

The Cambridge medical robotics (CMR) versius robotic system, a modular and compact surgical robot, has been increasingly adopted in minimally invasive thoracic procedures due to its flexibility, reduced footprint, and affordability.[4,5]

This report highlights the use of versius for robotic-assisted decortication in a complex patient with chronic kidney disease (CKD).

CASE REPORT

A 45-year-old male with end-stage renal disease on haemodialysis presented with progressive dyspnea and intermittent fever. He had been under evaluation for renal transplantation but was found to have persistent right-sided pleural effusion with systemic signs of infection.

Investigations

Chest X-ray shows homogeneous opacity in the right hemithorax (Figure 1).

Contrast-enhanced computed tomography (CECT) chest shows loculated empyema with thickened pleura and collapsed right lung with pigtail in situ (Figure 2).

Initial management with antibiotics and percutaneous pigtail catheter drainage showed limited improvement. Given his transplant-ineligible status due to active thoracic infection, he was referred for surgical decortication.

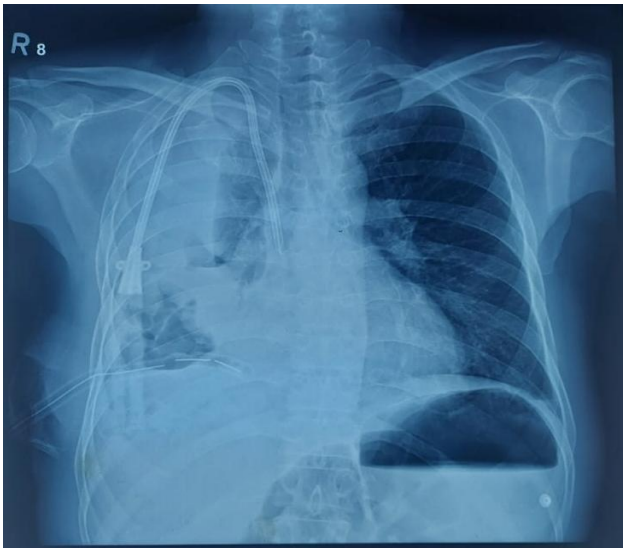

Figure 1: Chest X-ray.

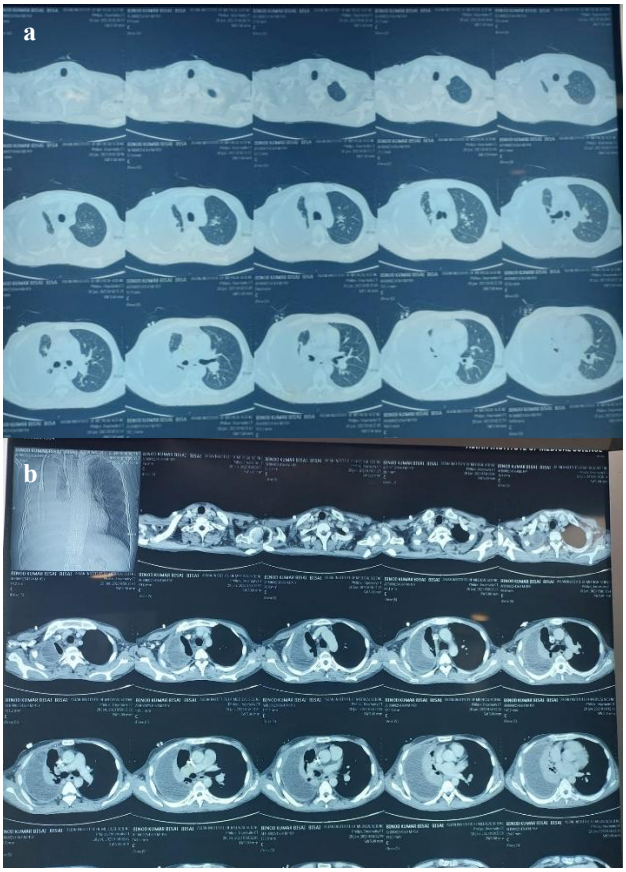

Figure 2 (a and b): Contrast-enhanced computed tomography of chest.

Preoperative planning

The patient was optimized for surgery with dialysis, nutritional support, and pulmonary physiotherapy. Informed consent was obtained. Ethical approval was waived for single-case reporting.

Surgical technique

The patient was positioned in the left lateral decubitus position with a table break as shown in Figure 3, and the procedure was performed using the CMR versius robotic system (CMR surgical, UK). Three robotic ports, including one for the camera, along with an assistant port, were placed (Figure 4).

Figure 3: Left lateral decubitus with table break.

Figure 4: Three robotic ports (including one camera) and one assistant port were placed.

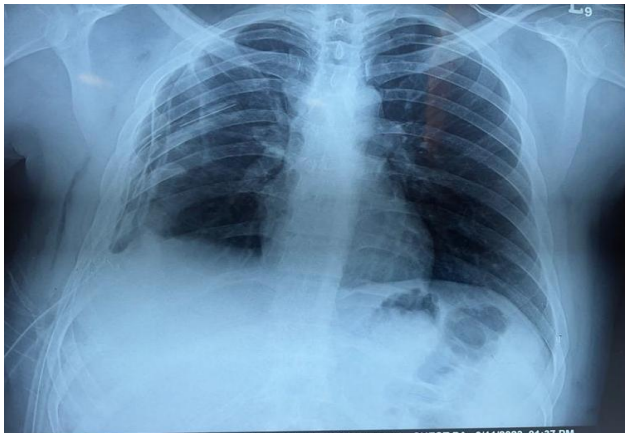

Figure 5: Lung re-expansion was achieved, and two intercostal drains were inserted.

Dense adhesions were carefully dissected, multiloculated pus was evacuated, and a thick pleural peel was removed with the aid of wristed robotic instruments. Following this, satisfactory lung re-expansion was achieved, and two intercostal drains were inserted (Figure 5).

The total operative time was 180 minutes, with an estimated blood loss of 100 ml. There were no intraoperative complications, and the postoperative recovery was uneventful. The intercostal drains were removed on the 10th postoperative day, and the patient had a hospital stay of 12 days. At the 6-week follow-up, complete clinical and radiologic resolution was noted, and the patient was subsequently reactivated on the transplant list.

DISCUSSION

Empyema thoracis remains a serious complication of pulmonary infections, often requiring surgical decortication in the organized stage. In patients with CKD, the risk of infection is compounded by uremia-related immune dysfunction and platelet abnormalities, making surgery both challenging and high risk.[1,3,7]

VATS is well-established as the preferred approach in chronic empyema due to reduced postoperative morbidity and shorter hospital stay compared to open thoracotomy. However, RATS offers further advantages, particularly in complex cases. These include tremor filtration, enhanced dexterity via wristed instruments, and 3D high-definition visualization, which together allow for meticulous dissection in densely adherent pleural spaces.[2,4,5]

The CMR versius system, with its modular design and small footprint, allows operating room flexibility and improves ergonomics for the surgeon. Unlike conventional robotic platforms, its open-console setup enhances team communication and situational awareness during surgery.[4,6] Additionally, the individual bedside units (BSUS) can be placed independently to optimize port positioning in various anatomical regions—including the thoracic cavity—making it well suited for empyema surgery.

In our case, the versius platform enabled safe dissection of dense pleural adhesions and thick cortex, essential for effective lung re-expansion. The minimally traumatic entry, precise manipulation, and controlled tissue handling likely contributed to the patient's low intraoperative blood loss, lack of complications, and early recovery, despite the high-risk CKD background. These outcomes are consistent with other studies reporting the feasibility of robotic thoracic surgery for infectious and inflammatory thoracic pathology.[1,2,5] Robotic surgery also holds particular promise in developing countries, where the adoption of minimally invasive surgery is often limited by cost and infrastructural constraints. The versius system, developed with scalability and affordability in mind, offers a more accessible alternative to larger robotic platforms, potentially allowing expansion of robotic programs in tier-2 and tier-3 surgical centers across Asia.[4,6]

However, it is important to acknowledge the learning curve involved with robotic thoracic surgery, as well as the current lack of randomized trials comparing versius to established robotic platforms like da Vinci. Furthermore, cost-effectiveness data specific to thoracic procedures using versius are still emerging. Despite these limitations, early experiences such as this case provide encouraging evidence for its broader use in thoracic surgery.

CONCLUSION

This case report illustrates the successful application of the CMR versius robotic system for thoracoscopic decortication in a patient with multiloculated empyema thoracis and chronic kidney disease. The procedure was completed safely with minimal bleeding, early lung re-expansion, and favourable recovery, despite the patient's high-risk comorbid condition.

Compared to conventional vats or open thoracotomy, robotic decortication using versius provided the advantages of enhanced surgical precision, ergonomic efficiency, and minimized tissue trauma. The patient was discharged without complications and re-listed for renal transplantation within six weeks.

Given these outcomes and the unique system features of Versius—including its modularity, affordability, and adaptability to thoracic surgery—it holds promise for wider implementation in complex thoracic cases, especially in patients who may otherwise be deemed inoperable due to comorbidities.

Future studies should aim to compare robotic platforms, long-term outcomes, and cost-efficiency across different healthcare settings. Until then, this case adds to the growing body of evidence supporting the use of compact robotic systems in advanced thoracic surgical practice.

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