



A Case of Diaphragmatic Plication with Surgeon-Powered Robotic Surgery

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Abstract

In this article, we evaluated our experience with plication using surgeon-powered robotic surgery (sPRS) for diaphragmatic eventration in the light of the literature.

Case: A 70-year-old male patient was admitted to hospital with the complaint of increasing dyspnea after trauma. Right diaphragmatic eventration was detected in the thorax computed tomography (CT) and then right diaphragmatic plication was performed with sPRS.

Conclusion: Minimally invasive operations are getting more accessible as technology develops. We think that "wristed-instrument technology" will become increasingly widespread as it provides more mobility in operations and is cost effective.

Keywords: Diaphragmatic Eventration; Diaphragmatic Plication; Robotic Surgery; Surgeon-Powered Robotic Surgery

Introduction

Diaphragmatic eventration (DE) is an abnormal elevation of the diaphragm resulting from atrophy or paralysis of muscle fibers. The main purpose when treating it is to flatten the raised diaphragm and provide lung expansion by preventing displacement of the mediastinum to the opposite side and paradoxical movement as much as possible. Today, video-assisted thoracic surgery (VATS) interventions are performed instead of open surgical techniques for DE [1].

One of the main problems in VATS is the limited flexibility and maneuverability. Robotic surgical procedures have been developed due to these problems in VATS. However, because of the high costs and limited availability of robotic surgery, different technologies are needed currently.

In this article, we evaluated our experience with plication using surgeon-powered robotic surgery (sPRS) for DE in the light of the literature.

Case

A 70-year-old male patient was admitted to hospital with dyspnea. He had coronary artery disease and diabetes mellitus as comorbidities and had had a traffic accident 30 years before. Dyspnea continued to increase afterward. Diaphragmatic elevation was detected on the right in the posterior-anterior chest X-ray. In his thorax CT, right DE was observed (Figure 1). On physical examination, respiratory sounds were decreased in the middle and lower regions of the right hemithorax. Oxygen saturation was 90%. FVC was 1900 ml (57%) and FEV1 was 1710 ml (62%) in the pulmonary function test. The patient underwent sPRS. A 1-cm port was opened in the 4th intercostal space (ICS) on the midaxillary line for 30-degree 10-mm camera optics. For wristed instruments (Artisential® Wristed Instruments), additional 1-cm ports were opened in the 6th ICS on the anterior axillary line and the 7th ICS on the posterior axillary line (Figure 2). Plication was applied to the diaphragm with nonabsorbable polypropylene no 1 sutures parallel to each other, crossing the phrenic nerve fibers from posteromedial to anterolateral (Figure 2). The patient was discharged 3 days postoperatively. The follow-up chest X-ray at 2 months postoperatively was evaluated as normal (Figure 3).

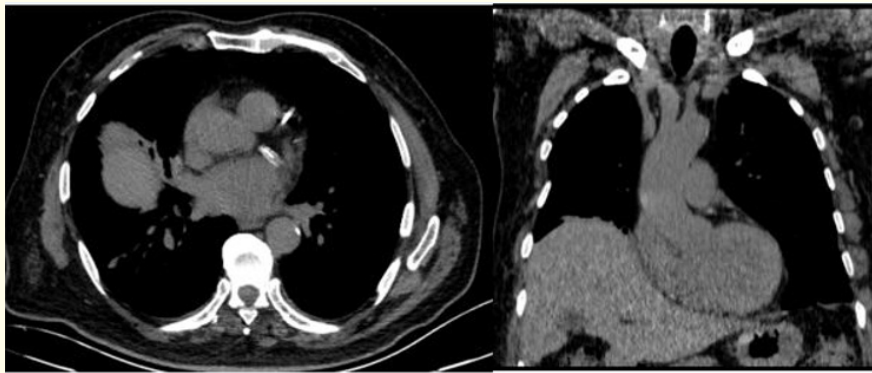


Figure 1



Figure 2



Figure 3

Discussion

Mouroux, *et al.* obtained results similar to those obtained using conventional surgery in diaphragmatic plication using VATS, but they found that VATS caused lower morbidity and postoperative pain. Therefore, they predicted that open surgery would be replaced by VATS [2].

Xu, *et al.* [3] stated that robotic plication is more minimally invasive than conventional thoracoscopic operations and is more ergonomic for “suturing” and “free knot typing.” However, there are also authors who argue that the operation time and setup time are longer in surgeries performed with RATs compared to conventional operations [4].

Travis, *et al.* [5] stated that for sPRS tactile feedback is better with wristed instruments, less training time is needed, and the operations are performed faster due to flexibility. Similarly, we chose this surgical technique because of the high flexibility in movements, the sense of tactile impulse, and the combination of VATS and robotic surgery.

Conclusion

Minimally invasive operations are getting easier as technology develops. We think that “wristed-instrument technology” will become increasingly widespread as it provides more mobility in operations as well as being cost effective.

Ethics Approval and Consent to Participate

Informed consent was obtained for this case report.

Consent for Publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Conflict of Interest

The authors declare that there is no conflict of interest.

Declarations

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Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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