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## An alternative approach for addressing mediastinal tumours through mini-invasive surgery

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## ABSTRACT

**INTRODUCTION:** The treatment of choice for mediastinal tumours is surgical, with the standard approach being sternotomy. Because of the invasive nature of this procedure, the management of these masses through mini-invasive surgery has become an alternative method.

**PRESENTATION OF CASE:** We report the case of a woman with a mediastinum tumour and a new technique used for resection, through an inframammary left incision, using a Thoratrak rib spreader and Rultract Skyhook retractor assisted by a video.

**DISCUSSION/CONCLUSION:** This approach allows a complete visualization of the mediastinum and total dissection of the tumour safely around vascular and nervous structures. The pain is minimal because there is no real rib spread but instead an anterior displacement of the upper rib.

This is the first reported case of resection of a mediastinum tumour by inframammary approach using a Thoratrak rib spreader and Rultract Skyhook.

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## 1. Introduction

Median sternotomy is the long standard approach for mediastinal tumours resection [1]. The mediastinum is a small space containing key structures, consequently any mini-invasive approach is challenging. However, surgical techniques and instruments are becoming increasingly refined, turning this approach possible with excellent outcomes. When compared with conventional sternotomy, this alternative presents less postoperative pain, morbidity, days of hospitalization and a faster return to active life [2].

The management of these masses through video-assisted thoracoscopic surgery (VATS) or robotic-assisted thoracoscopic surgery (RATS) have become alternative methods, with many successful cases reported, but also with some clear disadvantages. VATS is associated with lack of deep perception coupled with the use of long instruments with poor manoeuvrability making it difficult to adopt in surgery of the mediastinum. RATS implies a high level of investment and specific training and adaptation [2–5].

In line with Surgical Case Report (SCARE) criteria, we report the case of a woman with a mediastinum tumour. For tumour resection, we used a new technique that utilizes an inframammary left incision, using a Thoratrak rib spreader (Medtronic, Inc., Minneapolis,

Minn), a Rultract Skyhook retractor (Rultract Inc., Cleveland, Ohio) and assisted by video [6].

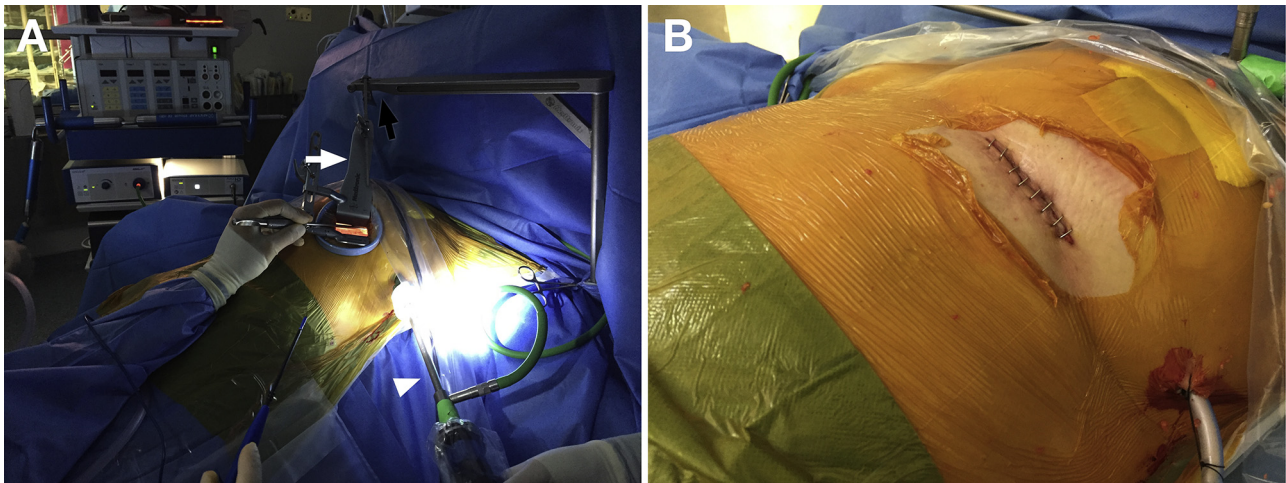
These systems are being increasingly used in mini-invasive coronary surgery. The integration of these techniques enable direct vision from the first rib to the left internal thoracic artery bifurcation and its adaptation allows for the complete resection of anterior mediastinal tumours with advantages associated to mini-invasive approach [7].

## 2. Case report

A 52-year-old woman with no significant medical history was referred to our department due to a chest radiography reporting an opacity incidentally discovered. Non-contrast thoracic computed tomography showed an ovoid lesion in the antero-superior mediastinum, pre-vascular space, surrounded by thymic tissue and measuring 31 × 17 mm. The lesion had intact fat planes with aorta (Video. 1). The patient was planned for surgical resection.

Endotracheal intubation was performed using a double lumen tube, to allow for left lung exclusion. The patient was placed on supination, with arms along the body and elevation of the left half-body between 15–30°, allowing for the expansion of the intercostal spaces. A small incision (around 5 cm) was made in the left inframammary line (4th intercostal space) and a 30° camera was inserted through a 10 mm port at the anterior axillary line/third intercostal space. The Thoratrak was placed and fitted to the Rultract Skyhook retractor, which allowed the exposure of the mediastinum through the elevation of the left costal grid (Fig. 1A).

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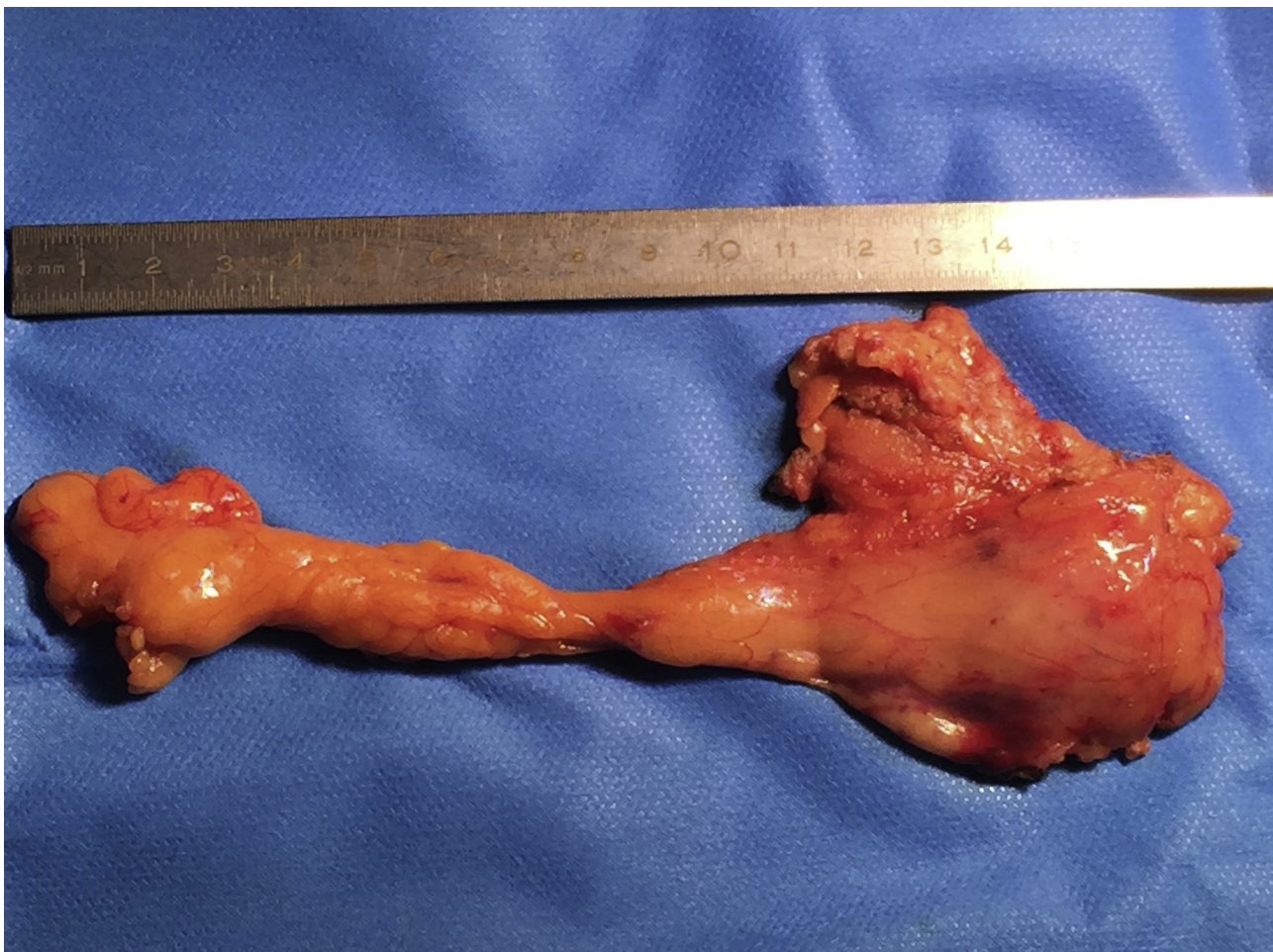
**Fig. 1.** (A) Thoratrak rib (white arrow) fitted to the Rultract Skyhook retractor (black arrow) and 30° camera (arrow head) (B) Postoperative with drainage.

Dissection was performed with endoscopic instruments and started in the caudal portion and progressed cephalically, where the video assistance is essential (Video 2). The exposure achieved with these systems allowed for complete and safe resection of the tumour and isolation of target structures, namely in the most apical area, near the venous trunk and phrenic nerves. The mass was removed (Fig. 2), a thoracic drain was left through the port of the camera and the incision enclosed by planes (Fig. 1B). Afterwards,

the patient was awakened and extubated. Total surgical time was 41 min, without blood loss.

The drainage was removed at the end of the same day, and the patient was discharged the next day. At the 1-month follow-up visit, the patient was clinically well, without physical restrictions.

The pathological anatomy revealed a rare presentation of a bronchogenic cyst occurring within the thymus.



**Fig. 2.** Macroscopic view of the tumour surrounded by timid fat.

### 3. Discussion

Mini-invasive surgery allows shorter post-operative hospital stay, lower *peri*-operative complications, faster recovery and better cosmetic results than the classical sternal approach. Although VATS gives clear benefits in terms of morbidity and minimizing hospital stay relative to open surgery, this minimally invasive technique presents important limitations that dissuade its use for anterior mediastinum lesions [2,5]

Robotic surgery changed the standards of mediastinum surgery and has overcome the limitations of VATS. Excellent 3D visualization of structures, and the use of articulating instruments make this technique safer and more effective. However, RATS is also associated with high acquisition and maintenance costs plus the necessary training and extensive learning curve. Additionally, another RATS disadvantage is the lack of tactile and force feedback to the surgeon [3,4,8].

When compared with the VATS or RATS, the inframammary technique using the Thoratrak rib spreader and Rultract Skyhook retractor, allows safe direct dissection around vascular and nervous structures ensuring complete observation of the anterior mediastinum, and its structures. The use of an auxiliary camera allows a better visualization of the most cephalic area of the mediastinum and a cervical extension, if necessary. The learning curve and investment is minimal, especially if this device is already implemented in other procedures such as mini-invasive coronary grafting.

Because there is no actual rib spread, but instead an anterior displacement of the upper rib, the level of pain is low as is the impact towards respiratory function. This is the first case reported in literature of resection of mediastinum tumour by inframammary approach using this Thoratrak rib spreader and Rultract Skyhook assisted with video and constitutes a low cost, easy and painless alternative approach to this pathology.

#### Conflict of interest

The authors don't have any financial and personal relationships that could influence their work.

#### Funding

Nothing to declare.

#### Ethical approval

This is a case report. Informed consent was obtained from the patient and submitted to ethics committee of CHLN – Hospital Santa Maria according to protocol.

#### Consent

Consent from the patient was obtained

#### Author contribution

**Ricardo Ferreira**, Study conception and design, data collection, revision of the paper

**Nadia Junqueira**, Design, data collection and writing the paper

**André Sena**, Writing and video production

**Ângelo Nobre**, Revision and supervision.

#### Guarantor

Ricardo Ferreira.

#### Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <https://doi.org/10.1016/j.ijscr.2017.11.062>.

#### References

- [1] C. Stremmel, B. Passlick, Surgery of mediastinal tumors, *Chirurg* 79 (2008) 9–17.
- [2] Y.J. Cheng, H.H. Wu, S.H. Chou, E.L. Kao, Video-Assisted Thoracoscopic Management of Mediastinal Tumors, *JSL* 5 (2001) 241–244.
- [3] P. Radkani, J. Devendra, B. Tushar, R. Williams, Robotic video-assisted thoracoscopy: minimally invasive approach for management of mediastinal tumors, *J. Robot. Surg.* (2017), <http://dx.doi.org/10.1007/s11701-017-0692-2>.
- [4] F.M. Melfi, O. Fanucchi, A. Mussi, Minimally invasive mediastinal surgery, *Ann. Cardiothorac. Surg.* 5 (2016) 10–17.
- [5] M.B. Marshall, L. DeMarchi, D.A. Emerson, M.L. Holzner, Video-assisted thoracoscopic surgery for complex mediastinal mass resections, *Ann. Cardiothorac. Surg.* 4 (6) (2015) 509–518.
- [6] R.A. Agha, A.J. Fowler, A. Saetta, I. Barai, S. Rajmohan, Orgill DP and the SCARE group: the SCARE statement: consensus-based surgical case report guidelines, *Int. J. Surg.* 34 (2016) 180–186.
- [7] J.T. McGinn, S. Usman, H. Lapiere, V.R. Pothula, T.G. Mesana, M. Ruel, Minimally invasive coronary artery bypass grafting: dual-center experience in 450 consecutive patients, *Circulation* 120 (2009) 78–84.
- [8] B. Morris, Robotic surgery: applications, limitations, and impact on surgical education, *Medsc. General Med.* 7 (3) (2005) 72.

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