

## A worldwide overview on minimally-invasive techniques in thymic surgery: time for a paradigm shift

Since the introduction of minimally-invasive techniques (MIT) in thoracic surgery in mid-90s, it was clear that the mediastinum would represent a privileged anatomical region for a rapid expansion of the techniques. The standard surgical approach so far, median sternotomy, although less painful than other thoracic accesses, is maximally invasive, and it is associated with a not negligible rate of possible complications, mostly observed in elderly patients. Last but not least, the cosmetic effects are certainly suboptimal particularly in young patients. The initial experience with VATS for thymic lesions were limited to thymectomy for the treatment of Myasthenia Gravis, since it was believed that minimally-invasive resection of thymic tumors could not provide the same oncologic results as open approaches. The tremendous advancement in technology and the accumulating experience in the techniques progressively convinced some authors that resection of early stage thymic tumors could be accomplished with minimal risk, similar oncologic outcome and excellent cosmetic results. The recent introduction of the robotic approach in thoracic surgery further pushed forward the indications to resection of thymic lesions, and many robotic educational programs confidently state that mediastinal surgery is the most successful, cost-effective and satisfactory application of robotic surgery in thoracic surgery.

Due to the unprecedented accumulation of new information and the rapidly progressive advancements of the MIT in thoracic surgery, we thought that a collection of contributions from surgeons who have been at the front line in the development and the application of the minimally-invasive surgical resections of thymic tumors (VATS and RATS) would be of interest.

The present supplement is intended to offer an updated snapshot of the role of MIT in the management of thymic tumors. The first contribution illustrates the definitions and standard indications of MIT in thymic surgery. Then, an overview of the different VATS procedures to optimally approach the thymus is provided, including the new subxiphoid approach and the extended resections for invasive thymomas. A dedicated contribution to robotic resection is also presented. The second part of the supplement offers the state-of-the-art of MIT for thymic tumors in Europe, Asia, Central/South America and Russian Federation, along with the point of view of our junior colleagues which will be the tomorrow's users and implementers of these exciting new techniques.

We sincerely hope that this collaborative work across the continents will be of interest for the thoracic surgeons dealing with thymic tumors who would like to start a VATS/RATS program or who would look for new ideas to implement their experience.

By addressing and incorporating these new technologies we can provide an optimal quality in our clinical practice and we can offer our patients the best treatment with the minimal perioperative risk and excellent oncologic results.

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