



Minimally invasive or open surgery: is this the question?

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Comment on: Burt BM, Yao X, Shrager J, *et al.* Determinants of Complete Resection of Thymoma by Minimally Invasive and Open Thymectomy: Analysis of an International Registry. *J Thorac Oncol* 2017;12:129-36.

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Thymic malignancies, including thymoma and thymic carcinoma, are a relatively rare; they usually grow in the anterior mediastinum and show a peculiar behavior, varying from indolent forms to invasive neoplasms (1,2). The Masaoka-Koga staging system and histology according to the WHO classification are currently considered the most effective prognostic factors (3). The TNM staging system is currently gaining new acceptance (4,5). Surgery is the gold standard for early stages; a multimodality approach with induction therapy or adjuvant chemo/radiotherapy represents the best choice of treatment for invasive tumors, particularly B3 and C lesions (6-8). Historically, the resection of thymic tumors has been almost always performed through median sternotomy, sternal split, cervicotomy and, rarely, clamshell or combined incisions. Standard thymectomy includes the complete removal of the thymus and the perithymic mediastinal fat tissue. Stage III tumors always require the resection and, if required, the reconstruction of the surrounding structures (9-12).

During the last 10 years minimally invasive techniques (MIT) received a huge boost in all surgical specialties, with the intent to reduce the surgical impact, improve the postoperative quality of life, still maintaining oncological criteria of R0 resection. Also, thymic surgery has been involved in this “political” shift of techniques, particularly at early stages. A number of studies suggested that MIT may favor a shorter hospitalization and lower blood loss compared to open surgery; furthermore, it has been repeatedly reported that the rate of R0 resections is similar with these two approaches (13,14). However, many surgeons are still reluctant to use MIT because of concerns

about the risks of capsular damage during manipulation of the tumor, seeding, and incomplete resection with increased risk of local recurrence (15,16).

The paper by Burt and associates (17) reports data from the database of the International Thymic Malignancy Interest Group (ITMIG) “to determine whether thymectomy performed by minimally invasive techniques (MIT) has equivalent rate of complete thymoma resection as thymectomy performed by sternotomy or thoracotomy”.

There are some important points in this paper. The choice to consider as primary end point the rate of complete resection instead of the recurrence rate or long term survival has certainly been correct; in fact, due to the peculiar behavior of thymomas, a long follow up is required to obtain a robust statistical analysis including disease-free survival; this is often missed in studies assessing minimally invasive approaches to thymic tumors. Another good point it has been to perform a propensity match score analysis to compare similar patients. Finally, the large sample size has strengthened the results. The authors concluded that the rate of complete resection was similar with MIT and open surgery.

However, over the limitations reported by authors, there are some criticisms that should be considered.

The authors stated that clinical staging has been voluntary not inserted in the statistical analysis because data was missed in 28% of the patients. Since often the decision concerning the most appropriate surgical approach is made on the base of radiological images and clinical staging, the lack of this information doesn't allow to know the real indications to choose the approach. Obviously, this data has

no impact about the end points assessment; however, in a study that has the purpose of clarify the role of two different techniques, all information about the indications should be included. There is currently no paper on thymoma that does not include staging.

The second point is probably the most important. The authors performed a propensity match score analysis that was not able to find differences in R0 resection between the two groups. However, the multivariate logistic regression showed that two variables associated with R0 were the lower Masaoka stage and “total” thymectomy. We should remember that almost 30% of the patients had no staging reported. Now, regarding the first variable it is intuitive to understand that in earlier stages it is easier to achieve R0 resection and it is also clear that MIT is more often preferred at stage I and II. At more advanced stages the R0 rate is lower as well as the use of MIT. This is the main reason that does not allow to compare “safely” MIT with OT; it should be more correct to compare these two approaches only in the early stages.

Regarding the second variable we must decide how to consider R0 resection in thymomas; in fact, the “nouveau vague” in thymic surgery has introduced the concept of “partial” thymectomy (PT) that risks to be confusing. Is it sufficient that in the surgical specimen there is no invasion of thymoma cells in the portion of removed thymus? Or we have to treat thymic tumors following the surgical paradigms used in Myasthenia Gravis patients (removal of all the thymic gland)? Actually, there are no proved evidence that PT is comparable to total thymectomy (TT); furthermore, in this study the percentage of PT is three-fold higher in MIT! Probably, before comparing the surgical approaches it should be necessary to define the correct oncological strategy and to present incontrovertible data.

Since at least 15 years, thoracic surgeons have been involved in a continuous (and sometimes sickly) discussion comparing between open and minimally invasive thymectomy. The reports often showed different bias regarding follow-up, indications and in general have been retrospectively performed. Another critical point has been the paucity of numbers because of the relative small number of cases at each center. Finally, the study population has often been erroneously selected because patients were not correctly matched.

This paper has tried to overcome these limitations; we can conclude that the take home message should be that both approaches allow R0 resections only in early stages,

strictly following all oncological criteria.

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