Introduction

The origin of the name of the thymus gland is shrouded in mystery. The name thymus comes from the Latin derivation of the Greek thymos, meaning “warty excrescence,” due to its resemblance to the flowers of the thyme plant. The homonym thymos translates as soul or spirit, and it is for this reason that the thymus was misrepresented as the seat of the soul by the ancient Greek anatomists presumably in reference to the intimate anatomic relation between the thymus and the heart (1-3).

Early history (Figures 1-7)

The earliest known reference to the thymus is attributed to Rufus of Ephesus circa 100 AD (3). A Greek anatomist renowned for his investigations of the heart and eye, Rufus attributed the discovery of the thymus to the Egyptians. Rufus quote “There are many glands, some of which are in the neck, others in the groins, others in the mesenteric ganglion, try are a sort of friable flesh. Amongst these glands there is on call the thymus situated under the head of the heart, oriented towards the seventh vertebra of the neck and towards the end of the trachea’s that touches the lung.

The most famous physician of antiquity, Galen of Pergamum (130–200 AD), stated that the thymus played a role in the purification of the nervous system, was also the first to note that the thymus was proportionally largest during infancy (4). He was the initiator of the experimental, methods applied to the study of anatomy and pathology and stated that “the inferior wall of the vena cava rests on a quite soft and bulky gland called thymus, and is far from being small, instead large, most especially in young animals, and gradually dwindles with growth”.

Thymus was re-described by Italian anatomist Giacomo Di Capri 1470–1550. He was a lecturer of anatomy and surgery at the University of Bologna (3).

William Hewson published the first scientific dissertation on the thymus. On the basis of findings of his investigations in dogs and calves, Hewson described the evolution of thymic size during fetal and infant life, thus verifying Galen’s observation. He concluded that the thymus itself was some sort of modified lymph gland (5). He stated “The thymus gland we consider an appendage to the lymphatic glands… expeditiously forming the central particles of the blood of the fetus”, and found that the thymus was larger in the
Figure 1 The centaurs Floor Mosaic, 120–130AD, Tivoli, Italy.

This Centaurs Floor Mosaic captures a centaur attacking its prey at Hadrian’s Villa in Tivoli, Italy. The mosaic dates back to 120–130AD.

Figure 2 Portrait of the Boy Eutyches A.D. 100–150.


Figure 3 Mona Lisa, Leonardo da Vinci, 1504.

Giovanni Bellini (c. 1430–26 November 1516): was an Italian Renaissance painter. He is considered to have revolutionized Venetian painting, moving it towards a more sensuous and colouristic style. His sumptuous coloring and fluent, atmospheric landscapes had a great effect on the Venetian painting school, especially on his pupils Giorgione and Titian.

Figure 4 Naked Young Woman in Front of the Mirror, Giovanni Bellini, 1515.
Jean-Honoré Fragonard 4 April 1732 (22 August 1806): was a French painter and printmaker whose late Rococo manner was distinguished by remarkable facility, exuberance, and hedonism. One of the most prolific artists active in the last decades of the Ancien Régime, Fragonard produced more than 550 paintings (not counting drawings and etchings), of which only five are dated.

**Figure 5** Inspiration (self-portrait), Jean-Honoré Fragonard, 1769.

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**Figure 6** Marie Antoinette, Joseph Ducreux, 1769.

The painting in 1849, illustrates an episode from Giovanni Boccaccio’s Decameron novel Lisabetta e il testo di basilico, reprised by John Keats’s poem, Isabella, or the Pot of Basil, which describes the relationship between Isabella, the sister of wealthy medieval merchants, and Lorenzo, an employee of Isabella’s brothers.

**Figure 7** Isabella, John Everett Millais, 1849.

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**Figure 8** L’Atelier Rouge, Henri Matisse, 1911.

old than the young. Hewson was father of hematology gave initial clues of the function, but for some time theories of the thymus led by famous greats including Virchow as a source of pediatric death due to thymic asthma or status thymolymphaticus.

First surgery [1896] Ludwig Rehn [1849–1930] Transcervical Thymopexy Partial Thymectomy for respiratory distress. Followed by Henry Pancoast who used fluoroscopy and significant exposure to radiation to find enlarged thymus. This was closely followed by followed by Alfred Friedlander in 1907 who formally treated a child with dyspnea with X-ray radiation, thousands of infants and adolescents were then irradiated, that later let to thyroid and breast cancer, until 1945 when this was discredited.
Ernst Ferdinand Sauerbruch (1875–1951) in 1911 performed the first transcervical total thymectomy for thyrotoxicosis in a 19-year-old adult female with myasthenia gravis (MG).

The treatment of thymic Asthma, from “1910–1924 was reported by Vea Veau. “C'était l'âge d'or de la chirurgie thymique” (I) thymopexy, (II) manubrectomy, (III) thymectomy. For the treatment of asthma it was the golden age of thymic surgery, debunked in 1931 by Turnbull Commission. The British investigators Greenwood and Woods characterize status lymphaticus as “this heap of rubbish,” stating furthermore that “the present use in certification and in evidence in coroners’ courts of the phrase Status Lymphaticus and Status Thymic Lymphaticus is... a good example of the growth of medical mythology (6). A nucleus of truth is buried beneath a pile of intellectual rubbish, conjecture, bad observations, rash generalization.” The British commission headed by Young and Turnbull was unable to locate in status lymphaticus even a “nucleus...
The early independent efforts of Carlos Chagas, Eduardo de Robertis, and David Nachmansohn to identify the receptor for acetylcholine (ACh) in the electric organ of the fish Electrophorus electricus with radioactive ligands were abandoned because their tissue extracts lacked specificity. However, in the course of these studies, Nachmansohn recognized the extraordinarily rich content of nicotinic synapses in the electric organ.

Figure 13 Electron Microscopy of acetylcholine receptor in 1934.

The true golden age of the study and understanding of MG began with the understanding of a central cause, the acetylcholine antibody, and as well with the discovery of Pyridostigmine to obviate the effects of the antibody.

The first case of MG was described in 1672. Treatment of MG was negligible until Mary Walker’s seminal observation in 1934 of improvement with physostigmine and neostigmine injections. Blalock reported the initial success with thymectomy around 1940. Edrophonium was introduced around 1950 and pyridostigmine in the mid-1950s. John Simpson’s hypothesis of an autoimmune etiology for MG in 1960 was later proven correct, and subsequent use of immunosuppressive therapy including corticosteroids led to the modern era in management of MG.

Figure 14 Structure of the drug pyridostigmine used to treat myasthenia gravis.

of truth” and concluded that no such condition exists (7). A lesson in history we should all heed.

Figure 15 eWoman (Opera Singer), Joan Miro, 1934.

Figure 16 Soft Construction with Boiled Beans (Premonition of Civil War), Salvador Dalí, 1936.

Alfred Blalock (1899–1964) performs first thymectomy by partial sternotomy for tumor (with MG) in 1936 (8) and in 1941 published his landmark series of planned thymectomy for non-thymomatous MG in Journal of American Medical Academy (JAMA) (9).

In 1946 Keynes in the British Journal of Surgery reported...
on a large series of thymectomies for MG. He noted the invariable presence of large thymic vein draining into left innominate, close union of thymus and pleura and the Extension of thymus over pericardium. And writes, that it “demonstrates the folly and danger of attempting to remove the thymus from the suprasternal incision” (10). He goes on to describe and illustrate a partial sternotomy for thymectomy.

Subsequently, in 1969 Kirshner/Osserman reported 21 patients undergoing trans-cervical resection for MG (11). He cites a brief, bland, postoperative course and simplified management of myasthenia by avoiding a large, painful, chest-splinting sternotomy incision. Contraindications include large, inaccessible thymomas and low-lying preexisting tracheostomy. At the end of one year, 3 patients had borderline remission, 6 showed improvement and
eight patients were operated on too recently to evaluate. There was 1 postoperative death. He reports “Trans-cervical total thymectomy is now our surgical procedure of choice in myasthenia gravis” (11).

In 1975 Professor Akira Masaoka documents extra-thymic rests of thymic tissue in the mediastinum, which led to the establishment of the trans-sternal extended thymectomy approach as a treatment option for MG (12). Of course, another significant accomplishment was in 1981 the proposal of a clinicopathologic staging system for thymic tumors that depends on local tumor invasion and distant spread to the pleura, lymph nodes and distant organs. This staging system was globally adopted and remained the standard for over 30 years (13).

**Surgical innovations**

Puglioni et al. in 1978 describe a case of malignant neoplasm of the mediastinum affecting the S.V.C. and the right lung. Radical removal of the neoplasm involved a right pneumonectomy and resection of the S.V.C. Replacement of the latter with a prosthesis in Dacron double velour was successful—which has lasted 5 months to date (14). And in 1987 Dartevelle et al. published their case series: Replacement of the superior vena cava with polytetrafluoroethylene grafts combined with resection of mediastinal-pulmonary malignant tumors. Report of thirteen cases that helps usher in the ability to completely resect stage 4 thymic neoplasms (15).

Cooper et al. used the transcervical method of thymectomy in patients with MG, with important technical innovations, and believed that complete thymectomy be accomplished with minimum morbidity. They used an improved technique for the trans-cervical approach, employing a specially designed sternal retractor that permits improved visualization of the anterior mediastinum. Results from 65 patients operated on between 1977 and 1986 were reviewed. Comparing these results with those reported following thymectomy through a sternotomy reveals that the trans-cervical approach can yield equivalent results (16). In what would prove to be great academic rivalry, Jaretzki reported his maximal thymectomy surgical treatment of MG. In this report he describes an operation that predictably achieves that goal in most patients. “The results of surgical-anatomic studies in 50 consecutive

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**Figure 21** Red Lenin, Andy Warhol, 1987.

**Figure 22** The Death of Luis Chalet, Fernando Botero, 1984.
specimens obtained by this technique indicate that an en bloc transcervical-transsternal “maximal” thymectomy is required to ensure removal of all available thymus in all patients. This procedure is recommended for all patients undergoing thymectomy in the treatment of MG with or without thymoma and in the treatment of thymoma with or without MG (17). Although both presented radically different approaches, both surgeons did in fact passionately support the need for and importance of a complete resection of thymic and perithymic tissue containing remnants of thymic tissue.

Presently the debate in regards to the effectiveness of thymectomy for MG in non-thymomatous MG was settled with the results of the MGTX trial (18). Many minimally invasive techniques have now been described to reliably remove as much thymic tissue as possible, and to effectively and safely remove thymic neoplasms, the tenets of our surgical heritage remain important guides to our continued evolution.

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Footnote
Conflicts of Interest: This study has been presented at 8th International Thymic Malignancy Interest Group Annual Meeting (ITMIG 2017). All the figures are from public access like WikiArt, Wikipedia, etc.; they are of fair use or in the public domain.

References

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