Introduction

The term thymus is Latin and is derived from the Greek thymos meaning "warty excrescence", a descriptor similar to the appearance of another namesake, the thyme plant. It is interesting that the thymus gland was called, at that time, the "organ of mystery", a name that continues to have some truth even to this day [1]. Because the thymus migrates from the third and fourth branchial pouches to the anterior mediastinum during its embryologic development, ectopic thymic tissue can occur anywhere along this path [2]. The thymus is a lymphatic organ that plays a vital role in the development and maturation of the immune system during childhood [3,4]. It is bilobal, each lobe having a separate fibrous capsule that is connected to the inferior lobes of the thyroid gland by the thyrothymic ligament. The thymus is located in the anterior mediastinum, overlies the pericardium, aortic arch, left innominate vein and trachea [3]. The thymus can vary greatly in size during infancy and childhood. In infancy, the thymus makes up the greatest proportion of overall bodyweight compared to any other time in life. This relationship changes over time [1]. It is generally assessed that thymic size (in terms of weight) increases until puberty, when the gland achieves its greatest gram weight. After this time, involution occurs and the lymphoid thymus tissue is replaced by adipose tissue [1]. Nevertheless, the thymus maintains its ability to grow back at any time and at any age [4].

Radiologic findings

Radiographically, despite its variations in size and shape thymus can be virtually always recognized because of its location in the upper anterior mediastinum, appearing as homogeneous opacity, difficult to discriminate from the cardiac silhouette on the frontal view and with an increase in the supra-cardiac/retrosternal opacity on the lateral view without compression on the trachea [1,5].

On the frontal view, the normal width of the thymic image must be higher than the double width of the third thoracic vertebra, if shorter it is a sign of thymic involution [5]. The thymus usually shows smooth borders and remains visible on radiographs through the age of 3 years [4]. It presents peculiar features, including the "wave sign", corresponding to a soft undulation on the thymus surface produced by ribs impression, more frequently on the left (Figure 1); the "notch sign", where the inferior border of the normal thymus blends with the border of the cardiac silhouette (Figure 2); and the "sail sign" resulting from a peculiar shape of the thymus appearing triangular; due to a slightly convex right lobe with a sharply demarcated base like sail shaped structure (Figure 3). This latter is a common radiographic finding, imaged in approximately 5% of children [4,5]. These appearances help to exclude mediastinal expansive masses or other pathologic conditions such as pneumo-mediastinum, which may be suggested by the presence of the "spinnaker-sail sign" (Figure 4) [6]. Every changing in the typical aspect of the thymus at plain film may suggest pathologies affecting thymus itself or mediastinum. Despite it is not the purpose of this article, here there is a brief description of the most common thymic affections. A typical cause of thymic enlargement is the so-called rebound hyperplasia that occurs when recovering after important stress or disease or chemotherapy and which is characteristically symmetrical with smooth margins. On the contrary, tumoral disease of the thymus (lymphoma more commonly than thymoma in childhood) causes asymmetric growth with nodular contours. Whereas, the presence of homogeneous mass with or without calcified margins may suggest acquired cystic changing of the thymus, happening after chemotherapy for lymphoma or in presence of thymoma [4].
Conclusion

In summary, it is important to be familiar with the spectrum of chest X-ray appearances of the trophic thymus in infant and child. Given the variability in shape and size of this gland, familiarity with the main X-ray features of thymus will help clinicians to prevent misdiagnoses and to avoid unnecessary imaging or invasive procedures.

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References