



ORIGINAL ARTICLE

Thyroid gland topography

Flavio Carneiro Hojaj^{1*}, Ana Docko¹, Leticia Franceschi¹, Tatiana Mina Yendo¹,
Flavia Akamatsu¹, Alfredo Luis Jacomo¹, Claudio Roberto Cernea¹

Abstract

Introduction: Clinical and imaging evaluations of thyroid gland disorders suggest that its topography seems to be more thoracic, especially in older patients. **Objective:** To demonstrate this topography variation. **Materials and Methods:** We performed an anatomical study in 45 cadavers of both genders within 24 hours post-mortem to establish the influence of anthropometric data in this topography variation. **Results:** The thyroid gland is always positioned above the jugular notch, and we observed no stray node gland. **Conclusion:** The thyroid gland was always present in cervical position, without stray node glands. There is no influence on anthropometric features.

Keywords: Thyroid, Anatomy, Surgery.

¹Universidade de São Paulo (USP), Faculdade de Medicina, Disciplina de Topografia Estrutural Humana, São Paulo, SP, Brasil

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Introduction

Thyroid gland disorders are highly prevalent and nowadays the diagnosis of thyroid nodules through imaging studies are reported in up to 60% of the population. Even through physical examination, about 5% of the population present palpable nodules^{1,2}.

However, with aging, respiratory and skeletal changes can cause apparent changes in the thyroid gland position, entering into the thoracic area. This can certainly difficult the clinical examination and imaging studies, such as ultrasound.

Even during the preoperative preparation of goiter or nodular thyroid gland disease, CT scans or MRI show a more thoracic position of the gland. Thus, it becomes necessary to have surgical schedules with better logistics, preparation for sternotomy, and possible blood infusions and intensive unit care afterwards.

Concerned about this fact, we aim to evaluate the thyroid gland position and the prevalence of stray nodules, which have been observed in up to 5% of the thyroid gland procedures. The purpose is to describe the thyroid gland position in human cadavers and determine the percentage positioned below the jugular notch.

Methods

We dissected 45 adult human cadavers, up to 24 hours post-mortem, at the Death Verification Service from the Capital (SVOC - Serviço de Verificação de Óbito da Capital) of the University of São Paulo School of Medicine. The study

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was conducted at the Department of Human Structural Topography and the Medical Laboratory Investigation LIM 02 with approval of the Ethics Committee under protocol number 162/13.

We obtained the following data obtained from the SVOC records: weight, age, height and gender.

The dissection was conducted through the following steps:

- Small cushion placement under the occiput to support the area without extending the neck;
- Biacromial incision, dissection under the platysma muscle until the thyroid cartilage;
- Measurement in centimeters from the cricoid cartilage to the jugular notch;
- Determination of the intercostal angle (Charpy's angle);
- Dissection of the thyroid gland through an incision between the right and left infrahyoid muscles;
- Measurement in centimeters from the jugular notch to the lower edge of the isthmus;
- Total dissection of the thyroid gland to observe if there were stray nodes.

This study did not include cadavers with thyroid macroscopic variations such as nodules with 2 or more centimeters, and thyroid glands with volume exceeding 20 milliliters.

Results

The following Tables 1-4 show the statistical analysis of this study.

Table 1. Population.

Age	68.51± 12.7
Height (cm)	165.10 ± 10.99
Weight (Kg)	66.54 ± 16.01
Gender	Female=46% Male=54%

Table 2. Ethnicity.

Caucasian	70%
Dark-skinned	26%
Brazilian African	2%
Brazilian Asiatic	2%

Table 3. Charpy's angle.

Angle > 90°	18%
Angle < 90°	26%
Angle = 90°	56%

Table 4. Measurements.

Cricoid cartilage-jugular notch	5.19 ± 1.00
Jugular notch-lower edge of the isthmus	3.83 ± 0.96

Discussion

We dissected 45 cadavers in anatomic and supine position. We found the thyroid gland of all cadavers in cervical position and we did not observe any stray node gland. It is important to say that every study that had described the thyroid gland in a different topography, such as entering to the thoracic area, used imaging features to define the gland's position. However, when cadavers were positioned into orthostatic or supine position with their arms elevated, as they are positioned during imaging studies acquisition, their thyroid glands were observed to be more caudal when compared to our previous findings.

The cervical topography of the thyroid gland can be explained by its embryological origin, gravitational effect blockage when the body is in the supine position and absence of posterior and inferior traction by the trachea. The displacement of the studied structure to a more caudal situation is due to the respiratory movements. The posterior segments of the secondary bronchus pull the trachea to a more inferior and posterior position, which tractions the thyroid gland to a caudal location. In cadavers and in individuals under general anesthesia, this traction is null or irrelevant, which is compatible to the thyroid gland cervical position in all corpuses studied³.

Our findings contribute to the clinical and imaging knowledge and analysis, and highlight the importance of determining the thyroid gland position before a surgical approach to the neck, like a thyroidectomy for instance. It also explains the reason why the thyroid gland is in a caudal position when the patient takes a deep breath and the physician tractions the trachea down in order to perform a tracheostomy.

Finally, there observed no stray node glands in the 45 cadavers studied. We believe that although there may be thyroid tissue niches outside the gland during the embryological development, they do not mature and enlarge in a normal condition, unless there is a non-physiological condition with increased stimulation by grow factors that results in stray node glands. As we did not include cadavers with thyroid macroscopic variations, such as nodules with 2 or more centimeters and thyroid glands which volume exceeds 20 milliliters, we believe that there was no favorable environment to the development of the stray node glands.

Conclusion

The thyroid gland was always present in cervical position, without stray node glands. There is no influence on anthropometric features.

Flavio Carneiro Hojaj
Faculdade de Medicina, Universidade
de São Paulo (USP)
Av. Dr. Arnaldo, 455, Cerqueira César
CEP 01246-903 , São Paulo (SP), Brasil
Tel.: +55 (11) 3087-8215
E-mail: fchojaj@uol.com.br

Authors information

FCH -full professor ,Department
of Human Structural Topography;
Universidade de São Paulo
(USP); AD and TMY - students
of medicine, DDepartment of
Human Structural Topography,
Universidade de São Paulo
(USP); LF - Resident, Department
of Head and Neck Surgery,
Universidade de São Paulo (USP);
FA - Professor Phd, Department
of Human Structural Topography,
Universidade de São Paulo (USP);
ALJ - Full Professor Department
of Human Structural Topography,
Universidade de São Paulo (USP);
CRC - Full Professor , Department
of Head and Neck Surgery,
Universidade de São Paulo (USP)..

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*Correspondence