

INFLUENCE OF THYROID ULTRASOUND PERFORMED BY THE SURGEON ON THE CONDUCT OF PATIENTS WITH THYROID DISEASE IN BRAZIL

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Abstract: Objective: to evaluate the impact of cervical ultrasound performed by the surgeon in comparison with the pre-visit examination in the treatment of patients with thyroid disease in a country where such examinations are performed and interpreted only by physicians. **Methods:** we selected patients with thyroid disease referred for surgery from December 2015 to July 2017. We compared their ultrasound examinations with the exam performed by the surgeon, and we expressed the change in surgical planning as a percentage. **Results:** we evaluated 71 patients. In 25 (35.2%), the exam performed by the surgeon did not agree with the pre-consultation examination, and in 17 (23.9%) this difference resulted in a modification of the surgical planning. Only 37 (52.1%) pre-consultation examinations described the characteristics of the lateral lymph nodes, allowing correct staging. Among all patients, about half had undergone the examination more than 6 months prior. Among the 25 patients with non-concordant tests, 48% had an examination carried out more than 6 months before. Among the 46 patients with concordant tests, 50% had an examination done within 6 months. Of the 17 patients who presented a modification in the surgical planning, 10 (58.8%) had undergone the exam more than 6 months before surgery. **Discussion:** This study confirms the benefit of the ultrasound performed by the surgeon, even in Brazil, where such exams are always performed by physicians. The absence of lymph nodes investigation prevents proper staging and planning. The exam date does not appear to be a major factor in the non-agreement of the exams.

Keywords: Thyroid, thyroid gland disease, thyroid gland nodule, thyroid gland neoplasm, thyroidectomy, ultrasonography, excision of lymph node.

INTRODUCTION

Although thyroid nodules are common, most do not require any intervention, and only a few will require resection. The final decision to operate or maintain conservative management will depend greatly on the clinical picture, risk assessment, diagnostic tests and radiological findings (1).

In some areas of medicine, ultrasound has become an extension of physical examination. The American College of Surgeons (ACS) has developed courses in various surgical disciplines and stimulated the use of ultrasound in an increasingly routinely way in the areas of breast, abdomen, vascular, trauma and in the evaluation and programming of thyroid and parathyroid diseases (2).

Detection of thyroid nodules has increased, especially incidental findings, possibly due to the greater availability of equipment with increasing resolution and sharpness. Epidemiological studies have shown a prevalence of palpable thyroid nodules of approximately 5% in women and 1% in men in iodine-sufficient areas (3). With the current ultrasound equipment, which identifies millimetric changes in the thyroid parenchyma, these rates go up precipitously, and can be found in 19-67% of the population, especially in women and the elderly (3).

In the United States, ultrasound examinations are usually performed by a radiology technician and then interpreted by a radiologist or resident. This creates a problem because this exam is dynamic and dependent on the examiner. Once these radiologists receive static images, not following the complete exam, the final evaluation may be compromised. In this sense, and corroborating this hypothesis, an American study involving 286 patients with thyroid disease, comparing ultrasound performed prior to surgical consultation to the one done by the surgeon, identified change in surgical planning in

17.4% of the cases (1). In another study with 136 patients diagnosed with thyroid cancer, planning was modified in 45% of cases (4).

In Brazil, it is traditionally incumbent upon a physician to perform the complete ultrasound examination, as well as its description and characterization of thyroid nodules, parathyroid glands, and adjacent lymph nodes, its interpretation allowing the planning of the best strategy for such patients.

The optimal surgical programming is strongly based on staging and, thus, the description and photos of the ultrasound findings performed and brought in the consultation (pre-consultation ultrasound) are of great importance. In this sense, unobserved or poorly described findings may lead to misinterpretation and, consequently, poor planning, which predispose these patients to important problems, such as residual and recurrent disease, necessitating additional surgeries, as well as unnecessary surgeries.

In our poor health system, the waiting time for the appointment of a consultation and complementary examinations is long, the exam reports are heterogeneous, the quality of the equipment used is unknown, and the photos, when present, have insufficient resolution. All this may cause the conduct drawn by the endocrinologist and surgeon to be flawed, based on old exams, with incomplete and dubious descriptions, and poor-quality or even absent photos.

For many reasons and after due training, thyroid and parathyroid diseases allow rapid learning of the performance and interpretation of thyroid and parathyroid ultrasound. Smith, Fry and associates have developed a graduating scale for difficulty in learning different ultrasound examinations. On a scale of 1 to 5, the thyroid examination was numbered as 2 (5). With this, many endocrinologists and endocrine surgeons have adopted routine ultrasound in their daily

practice (1).

OBJECTIVES

Main objective: To evaluate whether there is a change in the therapeutic approach in patients with thyroid disease when the preoperative cervical ultrasound examination is performed by the surgeon and compared to the pre-consultation examination in Brazil, where these are performed and interpreted only by physicians.

Secondary Objectives: To evaluate the factors possibly related to the difference in the ultrasound evaluation before the first surgical consultation and the examination by the surgeon, such as exam date, presence of other thyroid diseases, and quality of the description of sonographic findings.

METHODS

We conducted a prospective study, with patients with thyroid disease referred to the general surgery service of the third ward of the Gaffrée e Guinle University Hospital (HUGG). Patients were randomly selected from December 2015 to July 2017. After complete anamnesis and physical examination, patients underwent ultrasound examination performed by a surgeon from the HUGG surgery service.

Ultrasound examinations took place at the Radiology Department of the HUGG, with a Medison Accuvix V10 device, with linear transducer of 512 MHz. The evaluation included the investigation of nodular thyroid disease and lymph nodes of the lateral cervical compartments. Nodules and lymph nodes were described according to their sonographic characteristics, size and location.

We considered the date of the pre-consultation exam the one on the exam report, and divided it into greater than or equal to 6 months and less than 6 months. This variable aimed at assessing time as a factor related to

the difference between exams.

The American Thyroid Association (ATA) has stated that an optimal thyroid ultrasound must contain a description of the gland, the nodules and the lymph nodes. These were the parameters considered in the comparison between the pre-consultation examination and the one performed by the surgeon.

We excluded patients referred for surgical evaluation without previous ultrasonographic examination and those who refused to participate in the study.

VARIABLES STUDIED

Conformity of ultrasound results:

We evaluated ultrasonography exams undergone prior to the consultation with the surgeon and confronted the results with the ultrasound that the surgeon performed in the preoperative period. Possible outcomes were Agree or disagree.

We also evaluated which items whose description lacked in the pre-consultation exams, when compared with those performed by the surgeon.

Change in Conduct:

We evaluated conduct changes when comparing the prior ultrasound with the preoperative one. Expected results were Yes or No.

STATISTICAL ANALYSIS

We expressed the results of the ultrasonography exams comparison and conduct evaluation in percentages, and calculated the possible difference by means of the chisquare test, accepting a value of 5% for statistical significance. We expressed epidemiological data by means and standard deviation.

RESULTS

We evaluated 71 patients referred to the general surgery service of the third ward

of the Gaffreé e Guinle University Hospital (HUGG), to undergo thyroid surgery, who had previous thyroid ultrasonography. Of these, 62 were women and nine men, with a mean age of 48.9 years, 46 patients being less than 45.

In 25 patients (35.2%), the examination performed by the surgeon did not agree with the pre-consultation one, and in 17 (23.9%), this difference resulted in a modification of the surgical planning.

The eight (11.2%) patients that had no changes in surgical planning had multinodular goiters, whose ultrasonography described only dominant nodules, not mentioning the presence of others.

Of the 17 patients who had their planning modified, in eight (47%), the change occurred due to the presence of multinodular goiter affecting both lobes, whose pre-consultation report described only the main nodule in a single lobe.

In four patients (23.5%) with surgical indication due to nodules, the change in conduct occurred because they were pseudonodules resulting from thyroiditis. All of them had hormone replacement. However, they had no previous diagnosis of this pathology. In one (5.8%), the pyramidal lobe was misinterpreted as a supra-thyroid nodule and had its procedure contraindicated.

One patient in preparation for Plummer's disease surgery had the nodule described in the wrong lobe, and in another, with multinodular goiter, no nodules were identified in one of the lobes (table 1).

Of the 71 patients, only 37 (52.1%) had pre-consultation exams describing the characteristics of the central and lateral lymph nodes, allowing correct staging. In all these cases, the findings of the examination performed by the surgeon were concordant with the pre-consultation one. Of the 34 patients with no description of lymph node

status, one case referred for Fine needle Aspiration (FNA) of thyroid nodule and another referred to surgery had suspicious lymph nodes according to the criteria of the American Thyroid Association guidelines (12); however, in both the cytological and histopathological results were negative for lymph node metastasis.

Among all the patients, 35 (49.2%) presented with an examination carried out more than 6 months prior to the surgical visit. When segregating by agreement, exams performed at dates more than 6 months before consultation were present in 12 (48%) of the 25 patients with non-concordant tests, and in 23 (50%) of the 46 patients with concordant exams.

Of the 17 patients who had surgical planning altered, 10 (58.8%) presented with an exam carried out more than 6 months before the surgical visit. In the analysis of agreement and planning modification, this time variable was not a factor with statistical significance (tables 2 and 3).

DISCUSSION

Thyroid nodules are extremely common. With the perfection of imaging equipment, this condition has been increasingly diagnosed. Ultrasound remains the most important image method in thyroid evaluation and staging and it is routinely used (6).

After diagnosis, the decision about FNA, operation, and which procedure, suffers direct influence not only by the clinical and laboratory situation, but also by the pre-consultation image examination.

All procedures involve complications, some of which have extremely morbid consequences for the patient. In thyroidectomy, the most important are recurrent and superior laryngeal nerve lesions and hypocalcemia due to parathyroid glands lesion (7). It is estimated that around 10% of patients present with

temporary laryngeal paralysis, with unknown permanent paralysis data (8). Postoperative hypocalcemia occurs within 53%, around 2% lasting more than 6 months, although other authors report even higher rates (9).

The probability of such complications increases with the procedure size. That is, a total thyroidectomy exposes 4 nerves, 2 recurrent laryngeal and 2 superior laryngeal, and 4 parathyroid glands. Whereas in a partial procedure only 2 nerves and 2 parathyroids are exposed.

Thyroid cancer is associated with overall survival exceeding 90%, but it has a very high recurrence risk, reaching 35%. Most recurrences are detected within the first 5 years after diagnosis and therefore may actually represent persistence rather than recurrence (10). Most reoperations in thyroid cancer are preventable and inadequate planning is the main cause of incomplete surgery, preoperative imaging playing an important role in this issue. About 50% of patients treated in the United States each year undergo an inadequate initial operation (7).

In this study, there was no agreement between the pre-consultation ultrasound and the one performed by the surgeon in 35.2% of patients, and in 23.9% of the cases there was a direct modification of the surgical planning. Our results were different from those of Mazzaglia's (1) survey in 2010, in which disagreement was 19.2%, with planning change in 17.4 %.

The majority (47%) that had a change in planning occurred due to the presence of multinodular goiter involving both lobes, whose pre-consultation report described only the main nodule in a single lobe, altering the planning from a partial thyroidectomy to a total one.

Failure to identify contralateral or bilateral nodules has been described as a deficiency of radiologists performing thyroid ultrasound

(11). In the study of Carneiro-Pla et al, the description of contralateral nodules was absent in 16 of the 74 patients (22%) with bilateral nodules (4).

Ultrasonographic examination of thyroiditis may pose a challenge, since the gland is small in size, irregular, with diminished echogenicity, and presents fibrous traces, with pseudonodules. In our statistics, this was the cause of disagreement in 23.5% of the cases. This result was similar to that found in other source (1), with 20.6% of cases.

In one of the patients, the difference was quite significant, since it was a single, voluminous toxic nodule, erroneously described on the contralateral side.

The evaluation of the lymph node chains of compartments 1 through 6 should be performed routinely in the preoperative period, aiming not only at correct staging, but mainly to guide surgical planning, thus being of utmost importance (6).

In our research, this information was absent in 47.9%. Although the correct investigation was incomplete, it was responsible for modifying surgical planning in only two cases (11.6 %). In one, cytology was performed preoperatively by ultrasonography-guided aspiration; and the other underwent intraoperative lymph node biopsy and frozen section histopathology. In both cases, the investigation was negative for metastases.

The time factor did not influence the disagreement between exams or the change in surgical approach, whose difference was not statistically significant (tables 2,3).

CONCLUSION

In our sample, the ultrasound performed by the surgeon differed significantly from that previously performed by the radiologist, even in Brazil, where the examination is performed and interpreted only by physicians.

The change in surgical management

occurred in the majority of patients whose sonographic examinations disagreed.

The time elapsed between the two exams did not influence agreement, nor the change in surgical planning.

Ultrasonography is highly dependent on the operator and on his/her experience with thyroid disease, which suggests that endocrine surgeons should be able to learn and develop these diagnostic skills.

CONFLICT OF INTEREST

The authors declare no conflict of interest in this manuscript.

Number of patients	%	Differences found	New planning
8	47.0	No description of nodules in contralateral lobe	Total thyroidectomy
4	23.5	Pseudonodules due to thyroiditis	Procedure contraindicated
1	5.8	Misinterpreted Pyramidal lobe	Procedure contraindicated
1	5.8	Side description error	Altered procedure side
1	5.8	Benign nodule in only one lobe	Partial thyroidectomy
2	11.6	Suspected lymph nodes not described	Biopsy

Table 1. Description of the differences that resulted in surgical planning change.

Time	Disagreement	Agreement	Total
≥ 6 months	12	23	35
< 6 months	13	23	36
Total	25	46	71

Odds ratio: 0.92; *p-value:* 0.872.

Table 2. Evaluation of disagreement according to the time of the pre-consultation exam.

Time	Changed planning	Same planning	Total
≥ 6 months	10	25	35
< 6 months	7	29	36
Total	17	54	71

Odds ratio: 1.667; *p-value:* 0.368.

Table 3. Evaluation of surgical planning change according to the time of pre-consultation exam.