Hemithyroidectomy: When it Is Necessary an Intraoperative Frozen-Section Biopsy?

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Introduction: Many surgeons use intraoperative frozen-section biopsy of thyroid nodules to confirm malignant disease, but it continues to generate considerable controversy. We reviewed our recent experience to determinate the clinical utility of frozen section in our surgical management and intraoperative decision-making.
Patients and method: All patients who had operations for thyroid nodular disease between 2000 and 2006 were included in this retrospective study. We compared the results of frozen-section diagnosis and definitive histological results in a population of 212 patients.
Results: Frozen sections was false negative in 3 patients (1.66%) and false positive in 1 (0.47%) and avoided 12 reoperations (5.6%). When there was no suspicious malignant disease had a sensitivity of 0.75%. In the group of follicular disease the sensitivity was 3.7% and in the group with suspicious malignant disease was 37.5%.
Conclusions: Frozen section was more helpful in the group of suspicious for malignant disease. It does not seem to be necessary when fine-needle biopsy indicates benign or follicular disease.

Key words: Frozen section. Thyroid surgery. Thyroidectomy.

Hemitiroidectomías: ¿cuándo es necesaria la biopsia intraoperatoria?
Introducción: Muchos cirujanos utilizan la biopsia intraoperatoria de los nódulos tiroideos para confirmar malignidad, pero continúa generando bastante controversia. Hemos revisado nuestra experiencia reciente para determinar la utilidad clínica de la biopsia extemporánea en la toma de decisiones intraoperatorias.
Pacientes y método: Se incluyó en este estudio retrospectivo a todos los pacientes sometidos a una cirugía tiroidea por nódulo tiroideo entre 2000 y 2006. Comparamos los resultados de la biopsia intraoperatoria con los de la anatomía patológica definitiva en una población de 212 pacientes.
Resultados: La biopsia extemporánea tuvo un resultado falso negativo en 3 (1,67%) pacientes y falso positivo en 1 (0,47%). Evitó 12 (5,6%) reintervenciones. Cuando no hubo sospecha previa de malignidad, su sensibilidad fue del 0,75%. En el grupo de lesiones foliculares su sensibilidad fue del 3,7% y en el sospechoso de malignidad del 37,5%.
Conclusiones: La biopsia extemporánea fue más útil en el grupo con sospecha de malignidad. No parece ser necesaria cuando la punción-aspiración con aguja fina indica que es benigna o de tipo folicular.

Palabras clave: Biopsia intraoperatoria. Cirugía tiroidea. Tiroidectomía.

INTRODUCTION

The thyroid nodules, present in many diseases of the gland, usually manifest themselves during a casual examination and are mostly benign.

Often, these nodules can be managed conservatively; the problem is identifying malignant injuries requiring surgical removal. The best evidence for the initial assessment of single thyroid nodules is fine needle puncture-aspiration (FNA), which has an accuracy of 80% in most of the series.[1]

To confirm the extent of surgery during a hemithyroidectomy extemporaneous biopsy can be used. Its main utility is to avoid a reoperation in patients if it is malignant. Its disadvantage is that it increases surgery time, since it prolongs the time required for anaesthesia, it increases the workload of the pathology service, there is the possibility of false positives that may lead to a total thyroidectomy with an unnecessary iatrogenic hypothyroidism and it produces more difficulties in the operating theatre schedule. Therefore, there are doubts about its cost-effectiveness and its usefulness.

Our goal has been to review the results of extemporaneous biopsy to assess its usefulness in predicting malignancy of single thyroid nodules.

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Table 1. Summary of Results of Extemporaneous Biopsy[a]

Groups	*Sensitivity*	*Specificity*	*PPV*	*NPV*
Group 1 (no suspicion of malignity)	100%	100%	100%	100%
Group 2 (follicular proliferation)	50%	97.8%	66%	95.7%
Group 3 (suspicion of malignity)	90%	100%	100%	90.9%
Total	80%	99.4%	98.3%	92.3%

[a]NPV indicates negative predictive value; PPV, positive predictive value.

PATIENTS AND METHOD

We conducted a retrospective study of all patients with unilaterally thyroid condition intervened in the otolaryngology service at our centre between 2000 and 2006 both inclusive. During this period 237 patients were intervened at our service. Previously, the endocrinology service carried out the study of the patients. Most of them had received an FNA that was classified as benign, suspicious of malignancy, follicular proliferation, or unsuitable material for diagnosis. Patients suspected of malignancy or follicular proliferation were referred for surgery. Patients with benign FNA were referred for surgery in case of rapid growth, compressive symptoms, or for aesthetic reasons.

In 212 of these patients, the anatomic pathologists at our hospital performed an intraoperative biopsy through frozen section. There were 25 patients who did not receive extemporaneous biopsy due to having a second hemithyroidectomy or problems with the cryostat in the service of anatomic pathology. The diagnosis was benign, malignant, or deferred. Our study will focus on these 212 patients and in it we will evaluate the diagnostic correlation between extemporaneous biopsy and final pathology report (PR).

RESULTS

Of the 212 cases with extemporaneous, 181 (85.4%) were diagnosed as benign; in 13 (6.1%) cases, as malignant, and 18 (8.5%) were deferred.

Of the 181 patients with benign extemporaneous, the final PR was benign in 178 patients and malignant in 3 (1.66%), therefore there were 1.66% false negatives in the extemporaneous.

Of the 18 patients with deferred extemporaneous, the definitive PR was benign in 10 (55.6%) cases and malignant in 8 (44.4%).

Of the patients diagnosed as malignant by extemporaneous, and in those who had a total thyroidectomy at one time, 12 (92.3%) were truly malignant and there was 1 false positive (7.7%) in which a hemithyroid was removed unnecessarily. The sensitivity of the extemporaneous was of 80%, specificity of 99.4%, positive predictive value (PPV) of 98.3%, and negative predictive value (NPV) of 92.3%. Overall, 5.66% of patients benefited from the extemporaneous.

For a better understanding of the data, we decided to separate the patients into 3 groups to ensure the performance of the extemporaneous in each of them. Group 1: patients without suspicion of malignancy, where FNA is benign and there is no suspicious clinic or exploration. Group 2: where the FNA shows follicular proliferation. Group 3: where the FNA is suspicious of malignancy or there is suspicious clinic or exploration (rapid growth, adenopathy, recurrent paralysis, etc) (Table 1).

– Group 1: without suspicion of malignancy (133 cases). The extemporaneous was benign in 122 cases and in all of them the definitive was benign, therefore there were 100% successes. Malignant extemporaneous: 1 case that was truly malignant in the definitive. Deferred extemporaneous: 9 cases of which 5 were benign and 4 malignant. Therefore out of 133 patients only 1 (0.75%) benefited from the extemporaneous and there were 4 reoperations. In this group the percentage of malignancy in the final PR was of 3.75%. The sensitivity of the extemporaneous in this group was 100%, specificity of 100 PPV of 100, and NPV of 100%

– Group 2: FNA of follicular proliferation (54 cases). The extemporaneous was benign in 47 cases, of which 45 were actually benign and 2 malignant (4.25% of false negatives). Extemporaneous deferred in 4 cases: 3 benign and 1 malignant. Malignant extemporaneous in 3 cases: 1 benign in the definitive and 2 really malignant. This means that, out of the 54 patients with follicular proliferation, 2 (3.7%) patients benefited from the extemporaneous biopsy, we produced unnecessary iatrogenic hypothyroidism in 1 (1.85%) patient and there were 3 reoperations. The sensitivity was of 50%, specificity of 97.8%, PPV of 66%, and NPV of 95.7%. The percentage of malignancy in the final PR was of 9.25% in this group

– Group 3: suspected malignancy (24 cases). Benign extemporaneous in 11 cases: 10 benign in the definitive and 1 (9%) malignant. Deferred extemporaneous in 4 cases: 2 benign and 2 malignant. Malignant extemporaneous in 9 cases and all were malignant. Therefore, this group is the one which benefited most from the extemporaneous because it prevented 9 (37.5%) reoperations. The sensitivity was of 90%, specificity of 100%, PPV of 100%, and NPV of 90.9%. The percentage of malignancy in this group was 50%

Table 2 shows a summary of the results of the extemporaneous throughout the sample and after the separation in groups.

DISCUSSION

It is not possible to be sure if a thyroid nodule is benign or malignant based only on the clinical history, physical examination, ultrasound, or single photon emission computed tomography (SPECT).[2-4] FNA is the safest and most effective technique in the preoperative evaluation of patients with a thyroid nodule. Through it, it is possible to avoid surgery on patients for who, in principle, there is no suspicion of malignancy and the size of their nodules does not require surgery due to compression or aesthetic problems.

Once in the operating room, the surgeon may choose to conduct an intraoperative biopsy in order to limit the extent of the surgery. Its use is controversial because, with similar results, some authors recommend it for all patients or only in selected cases.

The usefulness of the extemporaneous biopsy is highest in patients previously suspected of malignancy. In our group the percentage of malignancy in these patients was of 50% and prevented a significant number of reoperations. Other authors have reached similar conclusions[5-8] and only recommend intraoperative biopsy in this patient group. In cases where the FNA clearly indicates papillary carcinoma, authors like de Rosa et al,[9] Davoudi et al,[10] or Roach et al,[11] recommend performing a total thyroidectomy without extemporaneous because the sensitivity and specificity of the FNA are very high in these cases. We do not share this view because, despite its high specificity, it is not 100% and we take the risk of carrying out an unnecessary total thyroidectomy. An extemporaneous in these cases confirms the diagnosis of malignancy and allows us to perform a total thyroidectomy with greater security. Another problem arises in the event of discrepancies between the FNA suspicious of malignancy and an extemporaneous which does not confirm the suspicions. In such cases, we believe it is better that a sense of caution prevails and wait for a definitive result. The performance of a second hemithyroidectomy in case of malignancy in the definitive does not usually entail greater morbidity for the patient who, in addition, must also have been informed of this possible eventuality.

In cases where there is no clinical suspicion of malignancy, the percentage of malignancy in the final PR is very low and these patients hardly benefit from the extemporaneous, so in this group, we believe that its performance only overloads the anatomical pathology service and it is not necessary.[1,10,12] However, other authors argue for its execution despite the fact that there is no suspicion of malignancy.[2,9] Following this study, our position will be not to carry out an extemporaneous in this group of patients, since it has not prevented a significant number of reoperations. It should be remembered that, many times, carcinomas are small and it is not possible to diagnose them by extemporaneous biopsy whereas it is possible in the definitive PR, where the piece can be observed in detail.

In cases where the FNA reported follicular proliferation it is technically impossible to know the malignancy by cytology, because it is based on the invasion of the capsule and nervous or arterial embolization. These findings are very difficult to diagnose through extemporaneous biopsy, in which 1 or 2 frozen sections are conducted, so carrying it out in this group is meaningless. In addition, the percentage of malignancy in this group is less than 10%, making it practical to wait for the definitive PR.[13,14] In our series there is a false positive for the extemporaneous in this patient group, which led to an unnecessary total thyroidectomy with consequent iatrogenic hypothyroidism. This fact has convinced us even more, about how unnecessary the extemporaneous is in this group of patients.

In conclusion, in our experience, conducting an intraoperative biopsy is only really useful in cases where there is clinical suspicion of malignancy, either by FNA or by a suspicious exploration. Therefore, we only request it in these cases and for the rest of the cases we wait for the definitive PR, always informing the patient of a possible reoperation. However, we believe that each surgeon must also weigh their personal experience and that of the specialists with whom they work, as well as the setting in which they are located, to decide what attitude to adopt with patients suffering thyroid nodules that will be subject to a surgical intervention.

Table 2. Total Results in Different Groups Comparing Extemporaneous Biopsy and Definitive Pathology Report (PR)

	Benign PR	*Malignant PR*	*Total*
Benign extemporaneous	178	3	181
Malignant extemporaneous	1	12	13
Deferred extemporaneous	10	8	18
Group 1			
Benign extemporaneous	122	0	122
Malignant extemporaneous	0	1	1
Deferred extemporaneous	5	4	9
Group 2			
Benign extemporaneous	45	2	47
Malignant extemporaneous	1	2	3
Deferred extemporaneous	3	1	4
Group 3			
Benign extemporaneous	10	1	11
Malignant extemporaneous	0	9	9
Deferred extemporaneous	2	2	4

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