

Utility of Frozen Section in the Diagnosis of Thyroid Nodules with Indeterminate FNA

The advent of Fine Needle Aspiration (FNA) for Thyroid masses has enabled to define the diagnosis and treatment for most of the patients with thyroid nodules. Bethesda system has classified these results in 6 categories according to the risk of malignancy in each category, being the (B1) as not satisfactory and (B6) as malignant. There are intermediate categories denominated as follicular lesions with indeterminate significance (B3), follicular neoplasia (B4) and malignancy suspicious (B5). The risk of malignancy of these categories range from 5% to 75% being too wide to confirm or exclude carcinoma. Strategies of treatment for indeterminate diagnosis are: repeat the FNA, perform hemithyroidectomy (reoperation according to the pathologist report), total thyroidectomy, use a set of biomarkers and finally carry out frozen section (FZ), the least recommended.

The group of Head and Neck Surgery at Instituto de Cancerología - Clínica Las Américas of Medellín, performed frozen sections (FZ) as a diagnostic tool for the best decision making in the treatment of these patients during surgery.

We present the results obtained and the statistics validations tests performed.

RESULTS

From 2005 to 2015, we have operated 1,460 thyroidectomies; of these, 348 patients had FNA Indeterminate diagnosis and 186 Frozen Sections (FZ) were performed. Table 1.

CHARACTERISTICS	OVERALL
n	186
Mean Age (sd)	51.30 (14.37)
Size (mean sd)	2.52 (1.83)
Performed surgery(%)	
Hemithyroidectomy	132 (71.0)
Total Thyroidectomy	52 (28.0)
Subtotal thyroidectomy	2 (1.1)
Frozen Section (%)	
Not conclusive	32 (17.2)
Benign	106 (57.0)
Malignant	48 (25.8)
Reoperation	4 (2.2)
Complications	1(0.5)
No conclusive if benign	80 (43.0)
No conclusive if malignant	48 (25.8)

Table 1 General data of patients with Indeterminate FNA.

There were 40 patients whom the FZ changed the programmed surgery intraoperatively 40/186 (21.5%).

We had 3 pathology results for FZ: Benign, malignant and indeterminate.

For statistics validation tests, we created 2 scenarios: If indeterminate results were benign: table 2, and if they were malignant (table 3).

Table 2 shows the results of validation test if no conclusive FZ were benign.

	Estimate	0.95 Confidence limits
Sample size:	186.6	NA
Prevalence(%):	38.05	NA
Sensitivity(%):	67.61	[56.06 - 77.34]
Specificity(%):	99.48	[95.84 - 99.94]
Postive predictive value(%):	98.77	[90.54 - 99.85]
Negative predictive value(%):	83.33	[76.23 - 88.63]
Positive likelihood ratio:	130.25	[10.40 - 1630.59]
Negative likelihood ratio:	0.33	[0.23 - 0.46]
Diagnostic Odds Ratio:	203.41	[41.50 - 4899.49]
Error trade off (FN : FP):	38.33:1	NA
Error rate(%):	12.65	[8.62 - 18.18]
Accuracy(%):	87.35	[81.82 - 91.38]
Youden index:	0.6709	[0.6744 - 0.6674]
Area under ROC curve:	0.8354	NA

Table 2: Results assuming 30 patients with no conclusive FZ were benign.

Table 3 shows the results of test validation if no conclusive FZ were malignant

	Estimate	0.95 Confidence limits
Sample size	186	NA
Prevalence (%)	38,17	NA
Sensitivity (%)	81,69	[71.15 – 88.98]
Specificity (%)	80,87	[72.73 – 87.01]
Postive predictive value (%)	72,5	[61.86 – 81.08]
Negative predictive value (%)	87,74	[80.14 – 92.69]
Positive likelihood ratio	4,27	[2.89 – 6.32]
Negative likelihood ratio	0,23	[0.14 – 0.37]
Diagnostic Odds Ratio	18,3	[8.79 – 40.75]
Error trade off (FN : FP)	0.59:1	NA
Error rate (%)	18,82	[13.85 – 25.04]
Accuracy (%)	81,18	[74.96 – 86.15]
Youden index	0,6256	[0.6293 – 0.6219]
Area under ROC curve	0,8128	NA

Table 3 results assuming in 30 patients with no conclusive FZ were malignant.

CONCLUSIONS

- 1 Frozen section test is reliable and useful in the studied population.

- 2- FZ allows an accurate decision making intraoperatively.
- 3- Avoids reoperation and morbidity in our population.