Completeness of thyroidectomy based on postoperative thyroglobulin level and its predictive value

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Introduction

- Previous studies have shown that postoperative thyroglobulin levels may predict recurrence[1,2]
- Tg is a valid marker of recurrence in the long term follow up of differentiated thyroid cancer, specially stimulated post I^{131} treatment levels
- Completeness of thyroidectomy may be assessed by Tg levels
- However, some patients with negative Tg levels may have metastasic disease [3]

1. Kim TY. J Clin Endocrinol Metab. 2005;90(3):1440-1445 2. Toubeau M. J Nucl Med. 2004;45:988-994
3. Park E-K. Eur J Nucl Med Mol Imaging. 2009;36:172-179.

Objectives

- To determine whether postoperative thyroglobulin <2 ng/dl predicts recurrence

Methods

- Data was prospectively collected from the Differentiated Thyroid Cancer Registry at San Juan de Dios Hospital in San José, Costa Rica.
- Thyroglobulin levels were measured at the time of remnant ablation using LT4 withdrawal protocol
- Inclusion criteria
  - All patients included in the Differentiated Thyroid Cancer Registry at San Juan de Dios Hospital
  - At least one thyroglobulin measurement previous to whole body scan using thyroid hormone withdrawal
  - At least one year follow up with WBS and stimulated thyroglobulin

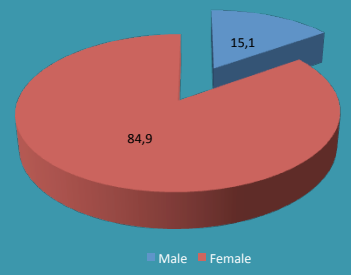
Methods

- Exclusion criteria
  - Patients with microcarcinoma
  - Patients with neck dissection
  - Patients with less than total thyroidectomy
  - Positivity for anti-Tg antibodies
- Group 1 were those who had < 2 ng/ml and Group 2 had > 2 ng/ml.
- Data analysis was performed using SPSS 15.0

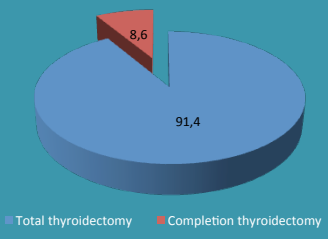
Results

- 246 patients are included in our database
- From these, 139 patients matched the inclusion/exclusion criteria and were included in this analysis
- Age was 44.14 ± 12.33 years.
- Median follow up was 2.83 years (range 1-3.66 years).

Gender distribution



Type of surgery



11 patients had completion thyroidectomy, 10 of these were in Group 2 (p=0.007).

Table 1

Characteristics	Group 1 (n=63, 45.3%)	Group 2 (n=76, 54.7%)	p
Gender (M/F)	11.1/88.9%	18.4/81.6%	.231
Age (mean ± SD)	46,9 ±10,45	41,83±13,35	.015
Papillary/Follicular	88.9/11.1%	89.5/10.5%	.231
Tumor size	2,10±2,02	2,14±1,33	.886
Median Thyroglobulin (ng/dl)	0.39 (0.43-0.74)	13 (24.78-4050)	.339
1 year F/U thyroglobulin	0.20 (0-2,35)	1,87 (10.05-1073)	.006

Median thyroglobulin levels

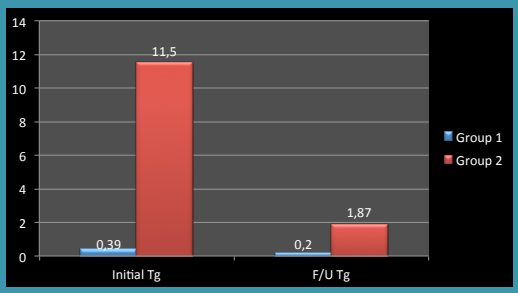
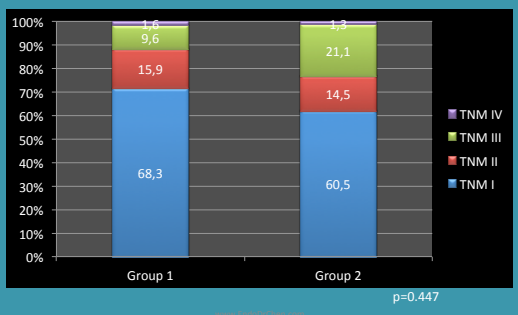


Table 2 (continued)

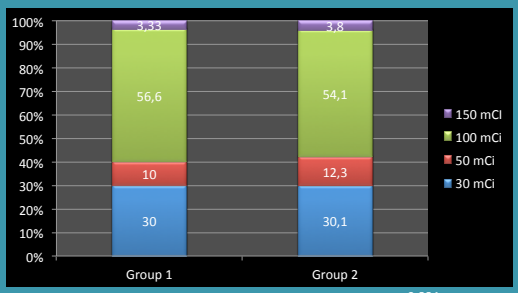
Characteristics	Group 1 (n=63, 45.3%)	Group 2 (n=76, 54.7%)	p
% with microscopic linfatic invasion	23,8%	13,2%	,263
Capsule invasion	50,8%	47,4%	,857
Microscopic vascular invasion	28,6%	22,4%	,523
Lymph node metastasis	7.9%	26.3%	.019
Multifocality	31.7%	28.9%	,722
Extrathyroidal invasion	23,8%	35,5%	,391
Distant metastasis	0%	2.6%	,351

TNM distribution (%)



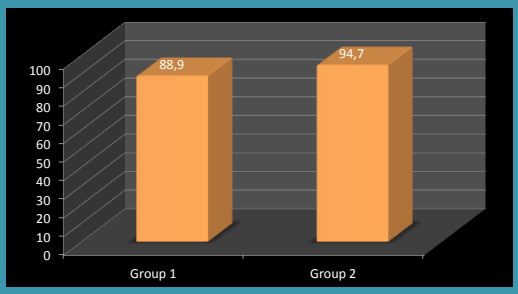
p=0.447

Radioidine dose distribuition (%)



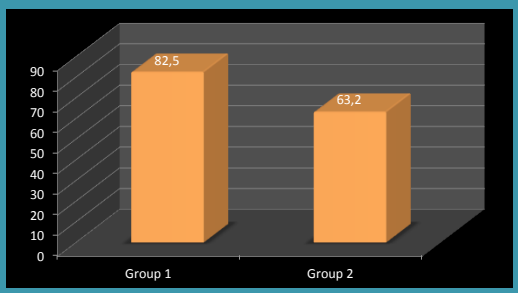
p=0.884

Percentage of patients with positive WBS post thyroidectomy



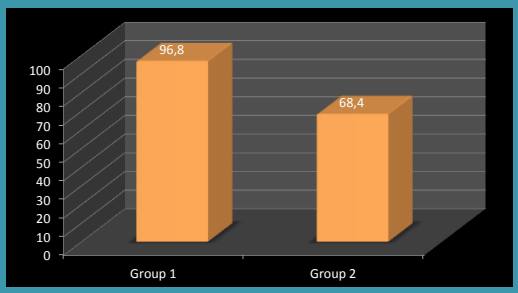
p=0.518

Percentage of patients with negative WBS and Tg <2 ng/ml at 1 year



p=0.002

Percentage of patients with Tg <2 ng/dl at 1 year



p<0.001

Table 3

	No recurrence (n=126)	Recurrence (n=13)	P
Age	44.8±12.3	37.7±10.92	0.047
Size	2.07±1.65	2.55±2.07	.329
Median Post op Tg (95% CI)	1.59 (4.81-18.32)	61.0 (0.0-16032)	.001
I^{131} dose (mCi)	74.5±35.04	80±37.63	.594
F/U Tg	0.26 (0-18.8)	42.7 (0.0-4209)	.007
Follicular carcinoma (%)	9.5%	23.1%	.681
Distant metastasis	0%	15.4%	<0.001
TNM	68.3/13.5/16.7/1.6	61.5/30.8/7.7/0	.453

F/U Tg >2 ng/ml by TNM staging

TNM	Group 1	Group 2
I	2.3% (1/43)	32.6% (15/46)
II	0% (0/10)	45.4% (5/11)
III	16.7% (1/6)	18.8% (3/16)
IV	0% (0/1)	100% (1/1)
overall	3.2% (2/63)	31.5% (24/76)

Predictive value

- A postoperative preablation thyroglobulin level with a cutoff of 2 ng/ml will render:
  - Sensitivity 0.92 (0.72-0.98)
  - Specificity 0.53 (0.44-0.63)
  - Positive predictive value: 0.31 (0.21-0.43)
  - Negative predictive value: 0.97 (0.88-0.99)

Study limitations

- Small number of patients
- Short follow up

Discussion

- Compared with other series, Kim et al showed that in those patients with Tg <2 at ablation, 1.6% had recurrence and another 16.8% had Tg greater than 2 with no clinical recurrence.
- In our series, only 4.4% of patients had a follow up Tg >2 ng/dl, but 22.2% had a positive WBS
- Possible explanations are the I131 dose (5.55 GBq) and the surgical differences

Kim TY. J Clin Endocrinol Metab. 2005;90(3):1440-1445

Different cutoff points

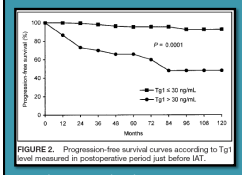
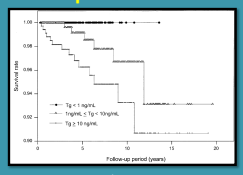
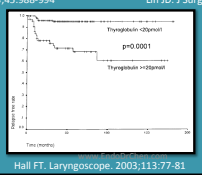


FIGURE 2. Progression-free survival curves according to Tg1 level measured in postoperative period just before IAT.

Toubeau M. J Nucl Med. 2004;45:988-994



Lin JD. J Surg Oncol. 2002;80:45-51



Hall FT. Laryngoscope. 2003;113:77-81

	Our series	Corea, cutoff Tg 2 ng/ml [1]	Corea, cutoff Tg 10 ng/ml [1]
Sensitivity (95% CI)	92% (72-98%)	-	-
Especificity (95% CI)	53% (44-63%)	-	-
Positive predictive value (95% CI)	31% (21-43%)	23.1 % (16.4-30.8%)	42.2% (31-56.7%)
Negative predictive value (95% CI)	97% (88-99%)	98.4 % (94.4-99.8%)	96.1% (92.4-98.3%)

1. Kim TY. J Clin Endocrinol Metab. 2005;90(3):1440-1445

Conclusions

- TNM stage I patients with total thyroidectomy patients and a stimulated thyroglobulin of <2 ng/ml might not require low dose radioiodine ablation since most of these patients will be disease free at 2.8 years.
- Postoperative thyroglobulin may help to discern who could benefit from radioiodine treatment

Thank you. Questions?

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