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Surgical complications in prophylactic central neck dissection: preliminary findings from a retrospective cohort study

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Aim. **Papillary thyroid carcinoma (PTC) is the most frequent thyroid malignancy with an overall ten-year survival more than 90%. Total thyroidectomy (TT) is considered the gold standard for PTC, but not all the endocrine surgeons agree on central neck dissection except in case of known metastases.**
Methods. **We enrolled 158 patients, that underwent, between January 1990 and September 2012 total thyroidectomy±prophylactic CND for PTC. 59 Patients (group A) had a preoperative diagnosis of PTC; 99 (group B) had a diagnosis of benign disease. We focused on possible complications.**
Results. **In group A we had 4 patients who blamed a definitive RLN palsy, only 1 patient in group B, with an OR=7.12. Definitive hypoparathyroidism was found respectively in 3 patients of group A and in 5 patients in group B, even in this case not statistically significant with an OR=1.007.**
Conclusion. **We can affirm that the complications of thyroid surgery seem not to be strongly associated to the extent of surgery.**

KEY WORDS: Thyroid cancer, papillary - Thyroidectomy - Hypoparathyroidism - Vocal cord paralysis.

Papillary thyroid carcinoma (PTC) is the most frequent thyroid malignancy.[1, 2] It is a very indolent neoplasia, with an overall ten-year survival more than 90%.[3, 4] In spite of that, lymph node metastases in central and lateral neck compartments are frequent,[4, 5] but the impact on survival is very limited.[6]

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To date, total thyroidectomy (TT) is considered the gold standard for PTC, but not all the endocrine surgeons agree on central neck dissection excepted in case of already known lynph node metastases. It is assumed that central neck dissection (CND) that is a longer and more complicated surgical procedure, could be associated with a higher rate of complications than total thyroidectomy alone. The evidence supporting the effectiveness of prophylactic CND (pCND) in reducing recurrence and mortality in PTC is limited.[7]

The aim of the present study was to evaluate the surgical complications after a systematic use of this technique, in the viewpoint to extend the indications of pCND.

Materials and methods

This is part of a retrospective cohort study evaluating the overall outcome of a series of patients that underwent pCND. We collected 158 consenting patients, that underwent, between January 1990 and September 2012 total thyroidectomy±prophylactic CND for PTC.

We excluded patients that previously underwent neck radiation, <18 years, suffering from a different variant thyroid carcinoma (included poorly differentiated and anaplastic carcinoma), patients with microcarcinoma, multifocal thyroid carcinoma, patients with preoperative diagnosis of lymph node metastases and patients with distant metastases known at the first postoperative scan.

Ethical board approval was obtained.

The data were collected by telephone interview or direct talks. the patients was enrolled at least 1 year after thyroidectomy and followed up until the interview (1-22 years; average: 6.6 years).

This preoperative diagnostic protocol included clinical examination, laboratory tests (TSH, FT3, FT4, Thyroid antibodies if a thyroid autoimmune disease was suspected), scintigraphy and/or ultrasounds. Suspicious nodules had undergone fine-needle aspiration biopsy, to confirm or refuse the diagnosis of PTC. With the aim to obtain a complete evaluation of vocal folds motility, a fiber optic laryngoscopy had been always performed. The patients suffering from a preoperative vocal cord motility impairment were excluded from the study.

The patients with preoperative diagnosis of cN0 PTC had undergone TT + CND; in the patients with unexpected postoperative diagnosis of malignancy only a TT had been performed.

Total thyroidectomy was performed with knoth-tie technique, or, more recently, by means of energy-based surgical instruments, such as ultrasound dissector or thermal device. Parathyroid glands and inferior laryngeal nerves were always identified. In case of removal or devascularisation of a parathyroid, this one was autotransplanted in a sterno-cleido-mastoid separate pocket and the site marked with nonresorbable suture.

The extent of level VI dissection satisfied the principles included in the classification proposed by Dralle *et al.*:[8] in this particular case, we enrolled in the study the patients in which a bilateral central lymph node dissection had been performed.

When the central compartment specimen contained less than 6 lymph nodes, the patients were excluded from the study.

The complications were stated as definitive with effect from 1 year after thyroidectomy. The transient complications were defined as any vocal folds motility impairment concerning the RLN palsy; as any calcium level <8.1 mg% found at the 24 hours or later after thyroidectomy concerning the hypocalcemia. In this case a calcium-vitamin D treatment was administered if calcemia levels were ≤8 mg% (normal range: 8.6-10.2 mg%), after 24, 48 and 72 hours after surgery and pursued until calcemia settled into normal range.

Statistical analysis

This analysis was performed by use of a test useful for retrospective studies, Odds Ratio (OR) for categoric variables (complications in group A and B), because of the largeness of the cohort, in wich Fisher's exact text was not applicable. If OR <1, the risk of complications was lower in the group A (TT+CND). The association was of moderate power if OR <0.33 or >3, and strong if OR <0.12 or >8.

Results

A total amount of 158 patients (127 women, 31 men) were enrolled in the study. The demographic data are reported in Table I.

TABLE I.—*Demographic data.*

	Total	Group A	Group B
Patients	158	59	99
Age (mean)	47.29	49.35 (±12.21)	47.84(±12.32)
Sex			
Women	127 (80.38%)	46	81
Men	31 (19.62%)	13	18

TABLE II.—*Complications.*

	Group A TT+CND (59 patients)	Group B TT (99 patients)	OR
Definitive RLN palsy	4	1	7.12
Definitive Hypoparathyroidism	3	5	1.007
Transient RLN palsy	2	3	1.12
Transient Hypoparathyroidism	21	12	4.006
Hematoma	0	1	

Fifty-nine patients (group A) had a preoperative diagnosis of PTC; in 99 (group B) a diagnosis of benign disease had been assumed. The two groups were similar in terms of age, sex and tumor size.

In group A we had 4 patients who blamed a definitive RLN palsy, while only one patient blamed it in group B, with an OR=7.12 (moderate association). Definitive hypoparathyroidism was found respectively in 3 patients of group A and in 5 patients in group B, even in this case this was not statistically significant with an OR=1.007 (Table II). Concerning the transient complications, 2 more patients of the group A complained a vocal cord palsy and 3 in the group B (OR=1.12, no association); 21 patients in the group A and 12 in the group B complained a transient hypocalcemia due to hypoparathyroidism. Both complications in general recovered in a few months, although we considered 1 year of observation the standard to consider definitive each complication.

Discussion

It is a widespread thinking that CND is a technique that could increase the time and the cost of surgery.[9-11] Moreover, it could rise the complication rate in patients undergoing surgery for PTC. Infact if it is globally accepted when there are already known lymphnodes metastases or in the advanced stage of the desease,[12] there are many controversies about the prophylactic CND in T1 or T2 stage, with some moderate advantages of pCND, generally not statistically significant.[13]

Injury to the parathyroid glands, especially the inferior ones (P III), could be likely enough. The lower parathyroid glands are usually located anteriorly to the recurrent laryngeal nerve and they could be mistaken for the central neck lymph nodes. Furthermore, central neck dissection requires a longer operating time, which also has a negative effect on the preservation of normal parathyroid function because of hypothermal injury to the parathyroid gland during surgery.[14-16]

A study by Ahn *et al.*[17] demonstrates that even in central neck dissection procedures requiring increased handling of recurrent laryngeal nerve, permanent loss of its function is not likely unless the surgeon transects the nerve itself.

In our experience, the rate of complications showed a not significant association between transient RLN palsy and type of surgical procedure, while the definitive RLN palsy reached a moderate power in this association, but non a strong significance. On the contrary, the association between type of surgical procedure and the postoperative hypocalcemia showed a moderate power if the transient complication was considered, but the difference was not significant considering definitive hypoparathyroidism. The compressive hematoma seems to be a sporadic complication and it seems very difficult to advocate a possible association with the type of operation performed.

Conclusions

On the light of these findings, the complications of thyroid surgery such as hypoparathyroidism (transient or definitive) and RLN palsy (transient or definitive) seem not to be strongly associated to the extent of surgery (TT alone, TT+ CND). The com-

pressive hematoma remains a challenge, fortunately rare, the causes of which are not well known, anyway it do not seems associated to a more aggressive surgical approach. This is why we can affirm that more studies are needed to carry on, even better if they could be prospective. In any case, the complications are not a strong matter capable of direct to the one or the other technique. On this subject, more arguments should be taken into consideration.

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Conflicts of interest.—The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.