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Morbidity of prophylactic lymph node dissection in the central neck area in patients with papillary thyroid carcinoma

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Abstract The benefits of prophylactic central neck dissection (PCND) in patients with papillary thyroid carcinoma (PTC) have not been clearly demonstrated so far and should be weighed against the potential risks of the procedure. The aim of the study was to assess the recurrent laryngeal nerve and parathyroid risks of PCND after total thyroidectomy in patients with PTC and to compare the results with those obtained in patients who underwent total thyroidectomy only. *Methods:* We selected 100 patients who underwent a total thyroidectomy: 50 for nontoxic benign multinodular goiter (Group 1) and 50 for PTC (Group 2). Patients with PTC had no evidence of macroscopic lymph node invasion during surgery and underwent, in addition to the total thyroidectomy, a PCND. All of the 100 patients were operated on by two experienced endocrine surgeons. All patients had pre- and postoperative investigations of vocal cord movements. Calcemia and phosphoremia were systematically evaluated preoperatively and on day 1 and day 2 after surgery. All patients presenting a postoperative calcemia below 1.90 mmol/l were considered to present an early postoperative hypoparathyroidism and received calcium-vitamin D therapy. The hypoparathyroidism was considered permanent when calcium-vitamin D therapy was still necessary 1 year after surgery. *Results:* None of the patients presented permanent nerve palsy. There were three cases of transient nerve palsy (6%) in Group 1 and two (4%) in Group 2. In Group 1 there was no permanent hypoparathyroidism and four cases of transient hypoparathyroidism (8%). In Group 2, seven patients presented transient hypoparathyroidism (14%) and two patients (4%) remained with definitive hypoparathyroidism. *Conclusion:* After total thyroidectomy for PTC, PCND does not increase recurrent laryngeal nerve morbidity but it is responsible for a high rate of hypoparathyroidism, especially in the early postoperative course. Even taking into account the possible benefits, the results make it difficult to advocate PCND as a routine procedure in all patients presenting a PTC.

Key words Papillary thyroid carcinoma · Lymph node surgery

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Introduction

The indications for and the extent of lymph node surgery in patients with papillary thyroid carcinoma (PTC) have always been controversial. Nevertheless there is a consensus on performing a lymph node dissection in patients with clinical or macroscopic lymph node metastases. However, the indications of prophylactic lymph node dissection in patients with potential microscopic lymph node metastases is still questionable.

In any case the possible benefits of systematic lymph node dissection should be weighed against its potential risks. Thus the aim of this study was to assess the recurrent laryngeal nerve and parathyroid risks of prophylactic central neck dissection (PCND) in patients with PTC.

Materials and methods

We selected 100 patients who underwent a total thyroidectomy: 50 for nontoxic benign multinodular goiter (Group 1) and 50 for PTC (Group 2). Patients with PTC underwent in addition to the total thyroidectomy a PCND. There was no evidence of macroscopic lymph node invasion during surgery. Microscopic lymph node invasion was observed in 20 out of the 50 patients. The mean size of the PTC was 19 mm (6–60 mm). There was no sign of extrathyroid tumor invasion.

All of the 100 patients were operated on by two experienced endocrine surgeons, during the same period. All patients had pre- and postoperative investigations of vocal cord movements. Calcemia and phosphoremia were systematically evaluated preoperatively and on day 1 and day 2 after surgery. Before surgery, none of the patients presented recurrent laryngeal nerve palsy and serum calcium and phosphorus values were normal in all patients (Table 1).

Table 1 Preoperative data in Group 1 (total thyroidectomy) and Group 2 (total thyroidectomy with prophylactic central neck dissection)

	No. of patients M/F	Mean age (years)	Mean serum [a] calcemia) (mmol/l)	Mean serum [b] phosphoremia (mmol/l)	Vocal cord palsy (*n*)
Group 1	11/39	57.6 (36–77)	2.37 (2.23–2.58)	1.00 (0.71–1.43)	0
Group 2	10/40	44.4 (22–73)	2.36 (2.15–2.53)	1.02 (0.71–1.36)	0

[a] Normal range: 2.15–2.60
[b] Normal range: 0.90–1.45

Table 2 Recurrent laryngeal nerve and parathyroid morbidity of total thyroidectomy without (Group 1) or associated with prophylactic central neck dissection (Group 2)

	Recurrent laryngeal nerve palsy		Hypoparathyroidism	
	Transient	Permanent	Transient	Permanent
Group 1	3 (6%)	0	4 (8%)	0
Group 2	2 (4%)	0	7 (14%)	2 (4%)

During surgery, the superior parathyroid glands were systematically identified in both groups of patients. The inferior parathyroid glands were not systematically checked in patients in Group 1 but their preservation was ensured by the technique of ultraligation advised by Halsted and Evans [3]. However, in patients in Group 2 the inferior parathyroid glands were carefully searched for and dissected during the lymph node clearance.

In patients in Group 1, 156 parathyroid glands were identified and preserved: 150 in situ and 6 transplanted into the sternocleidomastoid muscle. In patients in Group 2, 167 parathyroid glands were dissected and preserved: 149 in situ and 18 transplanted into the muscle. In all of the 100 patients both recurrent laryngeal nerves were identified below the trunk of the inferior thyroid artery and dissected in an upward direction until their entry into the larynx. On day 1 or day 2 after surgery, all patients presenting a calcemia below 1.90 mmol/l (normal range: 2.15–2.60) were considered to present an early postoperative hypoparathyroidism and received calcium-vitamin D therapy. The hypoparathyroidism was considered permanent when calcium-vitamin D therapy was still necessary one year after surgery.

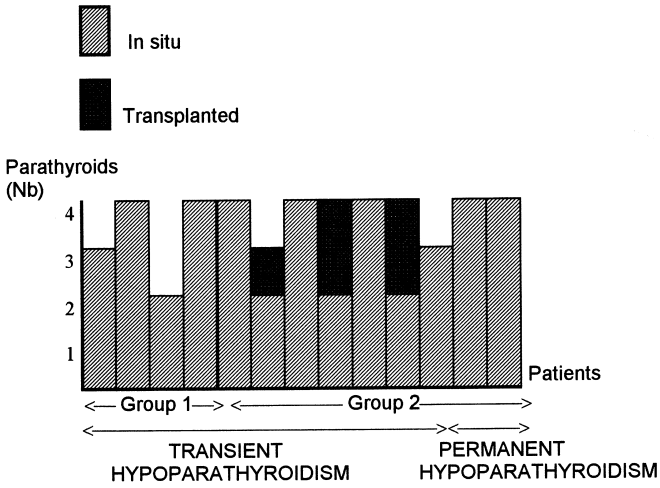

Fig. 1 Number of parathyroid glands preserved in each patient presenting postoperative hypoparathyroidism

Results

After surgery none of the patients presented permanent nerve palsy. There were three cases of transient nerve palsy in Group 1 and two in Group 2 (Table 2). In Group 1 there was no permanent hypoparathyroidism and four cases of transient hypocalcemia which required treatment during 15 to 150 days (Table 2). In Group 2, seven patients presented early hypoparathyroidism which required treatment during 15 to 90 days and two patients (4%) remained with definitive hypoparathyroidism (Table 2). The number of parathyroids preserved in each patient presenting postoperative hypoparathyroidism is detailed in Fig. 1. In the 13 patients with postoperative transient or permanent hypoparathyroidism, 47 out of the 52 parathyroid glands, i.e. more than three glands in each patient (3.6 glands), were preserved. Four parathyroid glands were preserved in situ in each of the two patients who presented permanent hypoparathyroidism.

Discussion

It has been demonstrated that 70–90% of patients with PTC have microscopic metastases in the regional nodes [4, 11, 12]. Conversely, the subsequent clinical appearance of lymph node metastases does not exceed 7–15% [1, 6, 10, 12] in patients who have had no prophylactic lymph node dissection.

In addition, the prognostic value of lymph node involvement has been debated. Some authors have reported that metastases to the lymph nodes did not have any influence on the survival and recurrence rates [8, 10, 13]. However, recent papers [9, 14, 15, 17] suggest that lymph node metastases exercise a significant influence on survival and are associated with a higher risk of recurrence.

Most surgeons agree that prophylactic modified neck dissection in the lateral neck areas is not indicated. It is a demanding and time-consuming procedure that should be carried out only if there is macroscopic involvement. More-

over, recurrences can be diagnosed easily and early by clinical examination or imaging techniques. Finally, reoperations can be performed safely.

The problem is different in the central cervical compartment and there is still no consensus concerning PCND in patients with PTC. The central cervical compartment is the primary zone of lymphatic involvement for all thyroid cancers except those located in the upper pole of the glands from which lymphatic drainage may flow directly into the lateral neck nodes [7]. It is generally accepted that lymph node metastases in the visceral compartment of the neck have greater clinical importance than metastases in the lateral neck areas [16]. Recurrences are sometimes difficult to demonstrate, especially in males with a short and thick neck. But, above all, central neck re-explorations are hazardous. These secondary procedures may be technically difficult and the recurrent laryngeal nerve and the parathyroid glands are at increased risk. For the above reasons some surgeons recommend routine removal of cervical lymph nodes from the central neck compartment concomitant with total thyroidectomy [12, 14, 15, 17], or at least when lymph nodes are positive at routine node sampling.

The two main complications after total thyroidectomy are recurrent laryngeal nerve palsies and hypoparathyroidism. Complications concerning the recurrent laryngeal nerve occur in 0–5% of the patients [2, 5]. The incidence of hypoparathyroidism is variously reported in the literature: 3–83% for temporary hypoparathyroidism and 0–29% for permanent hypoparathyroidism. In this study we tried to evaluate the exact rate of recurrent laryngeal nerve and parathyroid morbidity caused by PCND in itself during initial surgery. Concerning recurrent laryngeal nerve palsies there was no difference between the two groups of patients. This has been reported in other series and it confirms that the dissection of the nerve is no more dangerous during a total thyroidectomy associated with PCND than during a total thyroidectomy alone. However, PCND is obviously responsible for the high rate of hypoparathyroidism in Group 2 and particularly for the two cases of definitive hypoparathyroidism. In this series, if we calculate the number of parathyroid glands preserved in both groups of patients there is no significant difference: 156/200 glands in Group 1 and 167/200 glands in Group 2. Thus, hypoparathyroidism in Group 2 was certainly related to an insufficiency of blood supply due to PCND. This complication should be particularly feared during the dissection of the inferior parathyroid glands.

Conclusions

Prophylactic central neck dissection associated with total thyroidectomy in patients with papillary thyroid carcinoma does not increase recurrent laryngeal nerve morbidity. However, it is responsible for a high rate of hypoparathyroidism, especially in the early postoperative course. In our opinion, taking into account its morbidity, PCND should not be proposed as a routine procedure in all patients with papillary thyroid carcinoma and particularly not in patients with well-encapsulated microcarcinoma in whom the rate of microscopic lymph node invasion is low.

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