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Original article

Impact of incidental parathyroidectomy and mediastinal-recurrent cellular and lymph-node dissection on parathyroid function after total thyroidectomy.

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Abstract

Objectives: To determine the impact of incidental parathyroidectomy and mediastinal-recurrent cellular and lymph-node dissection on parathyroid function after total thyroidectomy.

Material and Methods: A single-center retrospective study was conducted for a 5-year period in a university hospital center, including 605 patients undergoing total thyroidectomy, 52 of whom had mediastinal-recurrent cellular and lymph-node dissection.

Endpoints: The main endpoint was intraoperative number of parathyroid glands as predictor of parathyroid hormone (PTH) level and postoperative hypocalcemia. The secondary endpoint was the correlation between associated mediastinal-recurrent cellular and lymph-node dissection and incidental parathyroidectomy and its impact on PTH level and calcemia in the immediate postoperative period and at 1 month.

Results: 161 patients (26.61 %) showed hypocalcemia in the immediate postoperative period and 12 (1.98 %) at 1 month. Mediastinal-recurrent cellular and lymph-node dissection increased incidental parathyroidectomy risk 4.6-fold. Mediastinal-recurrent cellular and lymph-node dissection was associated with a statistically “suggestive” decrease in day-1 calcemia ($p=0.03$), and no significant decrease at 1 month ($p=0.52$). Incidental parathyroidectomy (6.7% of cases with parathyroidectomy versus 1.3% without) did not significantly increase the rate of early hypocalcemia ($p=0.28$), but was associated with a “suggestive” worsening at 1 month ($p=0.02$).

Conclusion: Hypocalcemia after total thyroidectomy is a complex, probably multifactorial issue. Systematic parathyroid gland identification is not recommended due to the increased risk of gland lesion, mainly by devascularization. Incidental parathyroidectomy may induce hypocalcemia at 1 month postoperatively (statistically “suggestive” association).

Key-words: total thyroidectomy, parathyroid gland, parathyroid hormone, hypocalcemia, hypoparathyroidism

Introduction

Calcemia is largely regulated by parathyroid hormone (PTH) secreted by the parathyroid glands. There are in principle 4 of these, behind or under each lobe of the thyroid gland, and they pose surgical problems of identification and conservation. Total thyroidectomy incurs a risk of incidental parathyroidectomy, potentially inducing PTH deficiency and hence transient or permanent hypocalcemia [1].

More than postoperative recurrent nerve palsy, it is hypocalcemia that prolongs hospital stay after total thyroidectomy.

Reducing hypocalcemia risk is important for the patient, as definitive hypoparathyroidism is a real health problem, and for overall management costs in thyroid pathology requiring total thyroidectomy [1].

The trend in France is to reduce indications for thyroid gland surgery, but some 50,000 thyroidectomies are still performed each year [2].

The present study had 2 main endpoints: 1) intraoperative number of parathyroid glands as predictor of PTH level and postoperative hypocalcemia; and 2) the correlation between associated mediastinal-recurrent cellular and lymph-node dissection and incidental parathyroidectomy, and its impact on postoperative PTH level and calcemia.

Material and method

A single-center retrospective study was conducted in a university hospital center. A database under DxCare® (Medasys, France) inventoried patients between January 1, 2013 and December 31, 2017, undergoing total thyroidectomy with or without mediastinal-recurrent cellular and lymph-node dissection, by selecting for the appropriate codes under the French

CCAM medical acts classification: i.e., KCFA005 and KCFA007, for total thyroidectomy by cervicotomy or cervicothoracotomy, respectively.

Patients were included only if their records contained:

- surgical report:
 - number of parathyroid glands identified, spared or reimplanted;
 - any associated lymph-node surgery;
- definitive pathology report:
 - number and location of identified intra- or extra-thyroid parathyroid glands;
- postoperative biology report:
 - PTH assay at 6 hours;
 - postoperative calcemia as available for days 1, 2, 3 and/or 4 and at about 1 month (postoperative check-up).

Calcemia was calculated according to proteinemia as follows:

corrected calcemia (mmol/l) = measured calcemia (mmol/l) / (0.55 + proteinemia (g/l) / 160).

Day-1 calcemia was assayed in case of PTH <15 pg/ml at 6 hours. Day-, -3 and/or -4 calcemia were assayed according to the day-1 level and symptomatology: limb paresthesia, muscle cramp, etc.

In case of symptomatic hypocalcemia ≥ 1.85 mmol/l, calcium supplementation (calcidose® 3 g/d) was initiated. In case of hypocalcemia <1.85 mmol/l or “unassayable” PTH at H6, calcium (calcidose® 3 g/d) plus vitamin D supplementation (alfacalcidol 0.25 μ g 3 times daily) was initiated.

Exclusion criteria comprised; preoperative hyperparathyroidism, lobectomy or thyroid totalization, and/or secondary malignant thyroid tumor.

Age, gender and hospital stay were also collated.

Thyroid surgery was performed by 3 senior surgeons on the same protocol. Surgery reports were drawn up following the guidelines of the French Endocrine Surgery Association (AFCE) (http://www.chirurgie-endocrinienne.net/download/afce/CRO_Thyroidectomie.pdf).

Lobectomies were capsular, with ligature flush with the gland using either bipolar coagulation forceps, Harmonic™ forceps (Ethicon, Johnson & Johnson, Somerville, New Jersey, USA), the LigaSure™ small jaw instrument (Covidien, Medtronic, Minneapolis, Minnesota, USA) or Vicryl™ 2.0 or 3.0 suture (Ethicon, Johnson & Johnson, Somerville, New Jersey, USA). Lobectomy was performed down-up or up-down, but only once the inferior laryngeal nerve had been located, as nerve dissection guided lobectomy.

Mediastinal-recurrent dissection consisted in monobloc resection of cellular and lymph-node tissue between the trachea and the inferior laryngeal nerves posteriorly, the common carotid arteries laterally, a horizontal through the inferior edge of the thyroid cartilage superiorly, the brachiocephalic artery toward the lower right and, ideally, the brachiocephalic vein toward the lower left, although the lower limit of dissection could be affected by local anatomy, especially toward the left.

All surgery was conducted under laryngeal neuromonitoring (C2NerveMonitoring®; Inomed GmbH, Fenigen, Germany). At end of procedure, a Redon drain was fitted to the thyroid cavity.

In-hospital biology measurements were made in the hospital's laboratory. Day-1, -2 and -3 calcemia was assayed on an Advia 2400 analyzer (Siemens®, with CA_c (concentrated calcium) reagent kit, ref: 06502128), and PTH on an Advia Centaur XP (Siemens®, ADVIA Centaur PTH kit, ref 10699155). Subsequent calcium assays were performed in other laboratories, using other methods. To have analyzable data for M1 calcemia, the variable was treated qualitatively, as the actual level was very often reported only as normal/abnormal; normal calcemia was defined as ≥ 2 mmol/l. "Seen and spared" parathyroid glands were

counted from the surgical report data, discounting reimplanted glands, as short-term efficacy of autotransplantation is poor [1,3,4,5]. In the light of the recent literature [6,7], the count was dichotomized as >2 or ≤ 2 glands seen and spared.

Statistical analysis used the Student test (or Fisher test for small samples) for quantitative variables with comparison between 2 groups) and chi² test for quantitative variables (i.e., M1 calcemia and gland count) with comparison between 2 groups).

The significance threshold was set at $p < 0.005$, with p-values 0.05-0.005 considered suggestive [8].

Results

605 patients from the database were included: 472 female, 133 male; mean age, 54 years (median, 56 years; range, 11-90 years). 90 patients were excluded, mainly for missing data or coding issues.

161 patients (26.61%) showed early hypocalcemia and 12 (1.98%) persistent hypocalcemia at 1 month.

Mean age and sex-ratio did not significantly differ between groups (total thyroidectomy and total thyroidectomy with mediastinal-recurrent dissection). Dissection, however, increased the risk of incidental parathyroidectomy 4.6-fold. Mean postoperative PTH levels were significantly lower in case of lymph-node dissection ($p=2.7 \cdot 10^{-5}$), and D1 calcemia was suggestively lower ($p=0.03$). Risk of hypocalcemia at M1 did not significantly differ between groups (Table 1). Dissection suggestively increased hospital stay (3.71 versus 3.24 days; $p=0.014$; 95% CI, -0.85 to 0.10). 22.4% of specimens (26 out of 116) showed intrathyroid parathyroid glands.

Parathyroid gland count in the specimen showed that patients free of incidental parathyroidectomy had significantly higher postoperative PTH levels ($p=5.4 \cdot 10^{-11}$). Mean D1 calcemia did not significantly differ according to incidental parathyroidectomy (2.02 mmol/l

with versus 1.99 mmol/l without; $p=0.28$), but there was a suggestively higher rate of M1 hypocalcemia in case of incidental parathyroidectomy (6.7% with versus 1.3% without; $p=0.02$). (Table 2).

Higher “seen and spared” gland count was suggestively associated with hospital stay: (3.38 days for ≤ 2 glands versus 3.17 days for > 2 glands ($p=0.03$; 95% CI, 0.02-0.39). It did not, however, impact postoperative PTH level or early or late calcemia (Table 3) or hospital stay (3.25 days with incidental parathyroidectomy and 3.42 days without; $p=0.17$; 95% CI, -0.08 to 0.42).

PTH >15 ng/ml was associated with shorter hospital stay: 2.97 days versus 3.81 days; $p=1.5 \times 10^{-5}$; 95% CI, 0.64-1.03).

Discussion

In case of H6 PTH ≥ 15 pg/ml, 24 of the 384 patients (6.25%) showed D1 hypocalcemia and 2 (0.52%) showed M1 hypocalcemia. In case of H6 PTH <15 pg/ml, 137 of the 221 patients (62%) showed D1 hypocalcemia and 7 (3.17%) showed M1 hypocalcemia. Therefore, in line with the recent literature [9], we recommend not assaying calcium in case of H6 PTH ≥ 15 pg/ml if no clinical or functional signs suggest hypocalcemia. The few cases of postoperative PTH >15 pg/ml accompanied by D1 hypocalcemia were all asymptomatic. This reinforces our therapeutic attitude following total thyroidectomy.

The macroscopic resemblance of parathyroid glands to lymph nodes, the wide variations in parathyroid gland location and especially parathyroid glands inside the cellular and lymph-node resection tissue in monobloc mediastinal-recurrent dissection, and parathyroid glands in fatty involution may all cause confusion in surgery and a risk of unintentional parathyroidectomy. It seems intuitively obvious that associating mediastinal-recurrent cellular and nodal dissection to total thyroidectomy is going to increase the risk of incidental

parathyroidectomy [10-17]. The same is true for definitive pathology examination of the surgical specimen [12,18,19], as thyroid cancer discovered before or during surgery leads to mediastinal-recurrent dissection, increasing the risk of incidental parathyroidectomy. This is why we did not include these data in the Results section (0.15 glands per patient when “benign”, versus 0.47 when “malignant”), as they seem to us to be a mere repetition.

The rate of intrathyroid parathyroid glands discovered on definitive pathology examination of the specimen was within previously reported ranges of 11% to 33% [20-22] but higher than the 2.2% reported by Lin [10]. Such discovery may be dependent on the pathology technique, and notably on slice thickness and number. A standard slice thickness of around 5 mm may overlook some intrathyroid parathyroid glands, as parathyroid tissue is not specifically screened for in preparing the specimen.

The 26.6% rate of early hypocalcemia was also within previously reported ranges, confirming that the present surgical results were in line with those of the literature [23,24]. We were not able to determine the long-term risk of hypocalcemia, at 6 or 12 months, when it can be considered definitive, although recovery up to 2 years can still not be ruled out [1].

In the light of these findings, it may be wondered whether a decrease in PTH level always entails hypocalcemia, since no correlation emerged between parathyroid gland count on pathology, significantly lowered postoperative PTH level and non-significant decrease in early calcemia; likewise, mediastinal-recurrent cellular and nodal dissection was associated with significantly lower postoperative PTH but only “suggestively” lower early calcemia.

This may have been due to D1 calcemia not being systematically assayed in case of H6 PTH ≥ 15 pg/ml, so that many cases of normal or supposedly normal calcemia were not assayed, as mean calcemia in case of PTH ≥ 15 pg/ml was 2.18 mmol/l compared to 1.94 mmol/l in case of PTH < 15 pg/ml, artefactually lowering the mean calcemia value in case of “high” PTH.

Results for hospital stay were rather paradoxical. In line with our usual attitude, patients with $\text{PTH} \geq 15 \text{ ng/ml}$ had shorter stay. Associated hypocalcemia prolonged stay, to allow for oral calcium and vitamin D supplementation and day-to-day monitoring of calcemia. Patients with ≥ 1 incidental parathyroidectomy, on the other hand, did not stay significantly longer in hospital, reinforcing the absence of significant difference in early calcemia according to incidental parathyroidectomy. Moreover, hospital stay was inversely proportional to the number of parathyroid glands seen and spared during surgery.

Male-to-female sex ratio did not significantly differ according to mediastinal-recurrent lymph-node dissection, but seemed lower in case of incidental parathyroidectomy, as also reported elsewhere [17] but in disagreement with most reports [11,13,23]. Anatomically and physiologically, there is no reason for incidental parathyroidectomy to be more frequent in females, and the present finding was only “suggestive” ($p=0.03$); the association can therefore no doubt be discounted.

The overall impression created by the present data is that PTH level differs significantly according to mediastinal-recurrent lymph-node dissection, while things are less clear for D1 and M1 calcemia. On preliminary analysis of just over half the data-set (i.e., the first 375 patients), PTH level showed no significant association with incidental parathyroidectomy, and the difference in D1 calcemia according to mediastinal-recurrent lymph-node dissection was non-significant. Sample size thus seems to be a determining factor, as in the literature. Lin [10] and Applewhite [12] reported large series (3,186 and 1,767 patients respectively) and found a causal relation between incidental parathyroidectomy and postoperative hypocalcemia, in contrast to other studies [19-21] with sample sizes comparable to the present.

Reimplanted glands should perhaps have been counted in analyzing M1 calcemia, as they recover normal endocrine function in the long term [1,3]. But there is also the question of parathyroid glands that are spared but devascularized.

This raises the issue of the number of parathyroid glands “seen and spared” as predictive of postoperative hypocalcemia. Should as many glands as possible be “seen (and spared)” during surgery?

This has been increasingly studied in recent years, and the conclusion would seem to be that it is best not to seek out parathyroid glands, as there is a risk of devascularization during dissection. Not only has no correlation been shown between the number of glands detected and the risk of postoperative hypocalcemia [6,7], but it was on the contrary shown that hypocalcemia and hypoparathyroidism risk increases with the number of glands visualized [25-28].

One idea for avoiding parathyroid injury during total thyroidectomy is to use intraoperative indocyanine green fluorescence. This technique is feasible in parathyroid and thyroid surgery, and ensures good parathyroid vascularization as the indocyanine green is injected peripherally. Recent studies seem to demonstrate safety and a certain efficacy, with prognostic value for postoperative hypoparathyroidism [29-31]. We ourselves, however, have no experience with it.

Conclusion

Hypocalcemia after total thyroidectomy is a complex, probably multifactorial problem, usually unrelated to any incidental parathyroidectomy, even in case of mediastinal-recurrent cellular and lymph-node dissection, which increases incidental parathyroidectomy risk 4- to 5-fold.

H6 PTH level >15 pg/ml simply ensures against onset of severe hypocalcemia, allowing discharge as of postoperative day 1 in the absence of other complications.

Systematic intraoperative screening of parathyroid glands is not to be recommended, due to the increased risk of gland devascularization.

Further studies are needed, to shed light on the pathophysiological mechanisms of hypocalcemia after total thyroidectomy, and to look for solutions to prevent definitive hypoparathyroidism.

References

1. Page C, Strunski V. Parathyroid risk in total thyroidectomy for bilateral, benign, multinodular goitre: report of 351 surgical cases. *J Laryngol Otol* 2007;121:237-41
2. Peix JL, Duclos A, Lifante JC. Qualité en chirurgie thyroïdienne : critères d'évaluation et applications pratiques. *Bull Acad Natle Med* 2015;199:629-38
3. El-Sharaky MI, Kahalil MR, Sharaky O, Sakr MF, FadaLy GA, El-Hammadi HA et al. Assessment of parathyroid autotransplantation for preservation of parathyroid function after total thyroidectomy. *Head Neck* 2003;25:799-807
4. Lorente-Poch L, Sancho J, Muñoz JL, Gallego-Otaegui L, Martínez-Ruiz C, Sitges-Serra A. Failure of fragmented parathyroid gland autotransplantation to prevent permanent hypoparathyroidism after total thyroidectomy. *Langenbecks Arch Surg* 2017; 402:281-7
5. Kihara M, Miyauchi A, Kontani K, Yamauchi A, Yokomise H. Recovery of parathyroid function after total thyroidectomy: long-term follow-up study. *ANZ J Surg* 2005;75:532-6
6. Glinoe D, Andry G, Chantrain G, Samil N. Clinical aspects of early and late hypocalcaemia after thyroid surgery. *Eur J Surg Oncol* 2000;26:571-7
7. Sheahan P, Mehanna R, Basheeth N, Murphy MS. Is systematic identification of all four parathyroid glands necessary during total thyroidectomy? a prospective study. *Laryngoscope* 2013;123:2324-8
8. Laccourreye O, Lisan Q, Bonfils P et al. Use of P-values and the terms "significant", "non-significant" and "suggestive" in Abstracts in the European Annals of Otorhinolaryngology, Head & Neck Diseases. *Eur Ann Otorhinolaryngol Head Neck Dis* 2019;136:469-73

9. Galy-Bernadoy C, Lallemand B, Chambon G, Guedj AM, Lumbroso S, De Brauwere DP. et al. Parathyroid Hormone Assays following Total Thyroidectomy: Is There a Predictive Value? *Eur Thyroid J* 2018;7:34-8
10. Lin YS, Hsueh C, Wu HY, Yu MC, Chao TC. Incidental parathyroidectomy during thyroidectomy increases the risk of postoperative hypocalcemia. *Laryngoscope* 2017;127:2194-2200
11. Hone RW, Tikka T, Kaleva AI, Hoey A, Alexander V, Balfour A et al. Analysis of the incidence and factors predictive of inadvertent parathyroidectomy during thyroid surgery. *J Laryngol Otol* 2016;130:669-73
12. Applewhite MK, White MG, Xiong M, Angelos P, Shen WT, Grogan RH et al. Incidence, Risk Factors, and Clinical Outcomes of Incidental Parathyroidectomy During Thyroid Surgery. *Ann Surg Oncol* 2016;23:4310-15
13. Du W, Fang Q, Zhang X, Cui M, Zhao M, Fang Q et al. Unintentional parathyroidectomy during total thyroidectomy surgery: A single surgeon's experience. *Medicine (Baltimore)* 2017;96:e6411
14. Youssef T, Gaballah G, Abd-Elaal E, El-Dosoky E. Assessment of risk factors of incidental parathyroidectomy during thyroid surgery: a prospective study. *E.Int J Surg* 2010;8:207-11
15. Zheng J, Song H, Cai S, Wang Y, Han X, Wu H et al. Evaluation of clinical significance and risk factors of incidental parathyroidectomy due to thyroidectomy: A single-center retrospective clinical study. *Medicine Baltimore* 2017;96:e8175
16. Zhou HY, He JC, McHenry CR. Inadvertent parathyroidectomy: incidence, risk factors, and outcomes. *J Surg Res* 2016;205:70-5
17. Christakis I, Zacharopoulou P, Galanopoulos G, Kafetzis ID, Dimas S, Roukounakis N. Inadvertent parathyroidectomy risk factors in 1373 thyroidectomies-male gender

- and presence of lymphadenopathy, but not size of gland, independently increase the risk. *Gland Surg* 2017;6:666-74
18. Spiliotis J, Vaxevanidou A, Sergouniotis F, Tsiveriotis K, Datsis A, Rogdakakis A et al. Risk factors and consequences of incidental parathyroidectomy during thyroidectomy. *Am Surg* 2010;76:436-41
 19. Campos NS, Cardoso LP, Tanios RT, Guimarães AV, Dedivitis RA, Marcopito L et al. Risk factors for incidental parathyroidectomy during thyroidectomy. *Braz J Otorhinolaryngol* 2012;78:57-61
 20. Lee NJ, Blakey JD, Bhuta S, Calcaterra TC. Unintentional parathyroidectomy during thyroidectomy. *Laryngoscope* 1999;109:1238-40
 21. Sakorafas GH, Stafyla V, Bramis C, Kotsifopoulos N, Kolettis T, Kassaras G. et al. Incidental parathyroidectomy during thyroid surgery: an underappreciated complication of thyroidectomy. *World J Surg* 2005;29:1539-43
 22. Gourgiotis S, Moustafellos P, Dimopoulos N, Papaxoinis G, Baratsis S, Hadjiyannakis E et al. Inadvertent parathyroidectomy during thyroid surgery: the incidence of a complication of thyroidectomy. *Langenbecks Arch Surg* 2006;391:557-60
 23. Manatakis DK, Balalis D, Soulou VN, Korkolis DP, Plataniotis G, Gontikakis E. Incidental Parathyroidectomy during Total Thyroidectomy: Risk Factors and Consequences. *Int J Endocrinol* 2016;2016:7825305
 24. Dedivitis RA, Aires FT, Cernea CR. Hypoparathyroidism after thyroidectomy: prevention, assessment and management. *Curr Opin Otolaryngol Head Neck Surg* 2017;25:142-6
 25. Praženica P, O'Keeffe L, Holý R. Dissection and identification of parathyroid glands during thyroidectomy: association with hypocalcemia. *Head Neck* 2015; 37:393-9

26. Lang BH, Chan DT, Chow FC. Visualizing fewer parathyroid glands may be associated with lower hypoparathyroidism following total thyroidectomy. *Langenbecks Arch Surg* 2016;401:231-8
27. Gschwandtner E, Seemann R, Bures C, Peldzic L, Szucsik E, Hermann M. How many parathyroid glands can be identified during thyroidectomy? : Evidence-based data for medical experts. *Eur Surg* 2018;50:14-21
28. Lorente-Poch L, Sancho JJ, Ruiz S, Sitges-Serra A. Importance of in situ preservation of parathyroid glands during total thyroidectomy. *Br J Surg* 2015;102:359-67
29. DeLong JC, Ward EP, Lwin TM, Brumund KT, Kelly KJ, Horgan S, Bouvet M. Indocyanine green fluorescence-guided parathyroidectomy for primary hyperparathyroidism. *Surgery* 2018;163:388-92
30. Yu HW, Chung JW, Yi JW, Song RY, Lee JH, Kwon H et al. Intraoperative localization of the parathyroid glands with indocyanine green and Firefly(R) technology during BABA robotic thyroidectomy. *Surg Endosc* 2017;31:3020-7
31. Chang YK, Lang BHH. To identify or not to identify parathyroid glands during total thyroidectomy. *Gland Surg* 2017;6:S20-S29

	Without mediastinal- recurrent cellular and lymph-node dissection (n=553)	With mediastinal- recurrent cellular and lymph-node dissection (n=52)	p	95% confidence interval
Mean age	54.8	50.0	0.0514	[-9.64 ; 0.03]
M/F sex ratio	0.29	0.18	0.29	[0.25 ; 1.39]
Parathyroidectomies (glands per patient)	0.15	0.67	2.3 10⁻⁵	[0.30 ; 0.75]
Mean PTH (pg/mL)	29.5	16.5	2.7 10⁻⁵	[-18.7 ; -7.21]
Early calcemia (mmol/L)	2.03	1.94	0.03	[-0.15 ; -0.03]
Hypocalcemia at 1 month	1.9 %	2.9 %	0.52	[0.09 ; 30.8]

Table 1: Impact of mediastinal-recurrent cellular and lymph-node dissection on H6 PTH and D1 and M1 calcemia.

	No incidental parathyroidectomy (n=508)	Incidental parathyroidectomy (n=97)	p	95% confidence interval
Mean age	54.4	54.8	0.77	[-2.88 ; 3.86]
<i>M/F sex ratio</i>	0.31	0.15	0.03	[0.25 ; 0.94]
Mean PTH (pg/mL)	30.7	16.1	5.4 10⁻¹¹	[-18.8 ; -10.5]
Early calcemia (mmol/L)	2.02	1.99	0.28	[-0.03; 0.10]
Hypocalcemia at 1 month	1.3%	6.7%	0.02	[1.04 ; 26.0]

Table 2: Impact of incidental parathyroidectomy on H6 PTH and D1 and M1 calcemia.

Number of spared parathyroid glands	2≤ (n=320)	>2 (n=285)	p	95% CI
Mean age	55.5	53.3	0.07	[-0.17 ; 4.53]
<i>M/F sex ratio</i>	0.36	0.20	0.004	na
Mean PTH (ng/mL)	27.5	29.3	0.41	[-5.94 ; 2.44]
Early calcemia (mmol/L)	2.02	2.01	0.72	[-0.03 ; 0.05]
Hypocalcemia at 1 month	3.0%	0.9%	0.18	[0.67 ; 35.6]

Table 3: Impact of number of intraoperatively “seen and spared” parathyroid glands on H6 PTH and D1 and M1 calcemia.