

## Research

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# Post-Thyroidectomy Hypocalcemia: Timing of Discharge Based on Serum Calcium Levels

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### ABSTRACT

**Purpose:** The study concerns about the evaluation of Calcium serum levels in patients who underwent total thyroidectomy. Our previous experience underlined how patients who had levels of serum Calcium more than 9 mg/dl at the first day after surgery, did not show Hypocalcemia in the next days, so that this value could be considered a good cut-off for the decision of an early discharge. With regards to this experience, the aim of our current study was to confirm the effective feasibility of an early discharge based on the levels of serum Calcium at the first post-operative day.

**Patients and Methods:** Our study included 102 consecutive patients (82 F; 20 M, age with a range between 14-78 year sold, average 52.6) that were submitted to total thyroidectomy in the years 2010 to 2014, performed by the same operator and all done with sutureless technique (Ligasure precise<sup>®</sup>) We classify hypocalcemia, according to their normal range (8.6 to 10.4 mg/dl), in mild (not less than 7.6 mg/dL), moderate (between 7.5 mg/dL and 7 mg/dL) and severe (less than 7 mg/dL) We classified the normal range of serum Calcium between 8.6 mg/dl and 10.4 mg/dl. Patients that showed levels of serum Calcium under this limit (<8.6 mg/dl) were treated with 6 fials of Gluconate Calcium 40 mEq in 500 ml of saline solution NaCl 0.9% i.v. (one per day), until the return to the normal range. Patients who had serum Calcium levels more than 9 mg/dl at the first post-operative days, and did not have other complications, were discharged at the same day and reevaluated after 7 days.

**Discussion and Conclusion:** Moreover our study has been useful to confirm what we observed in the previous experience, that levels of serum Calcium more than 9 mg/dl at the first post-operative day can be considered a feasible cut-off to exclude the appearance of hypocalcaemia in future.

Therefore, according to our results, we assume to propose an early discharge for the patients who have serum Calcium levels more than 9 mg/dl, asking them to come back for controls one week after discharge.

**KEYWORDS:** Surgery; Calcium; Thyroid gland.

**ABBREVIATIONS:** iPTH: intact Parathormone; POD: Postoperative day.

### INTRODUCTION

Surgery is a therapeutic strategy for the treatment of different thyroid diseases (multinodular goiter, tumors, lymphomas). The presentation of thyroid gland pathologies can vary from specific symptoms (for the overproduction of thyroid hormones), to an asymptomatic growth of the gland, entirely or as a nodule, so that they are accidentally diagnosed.<sup>1</sup>

Once the pathology is diagnosed, surgical treatment is necessary to remove the gland partially or totally. Patients undergoing total resection need to be hospitalized to evaluate the possible onset of complications that should be treated promptly. Possible complications related to thyroid surgery mainly include:<sup>2,3</sup>

- Bleeding and hematoma
- Recurrent laryngeal nerve injury
- Postoperative hypocalcemia

Regarding to bleeding, it is now clear that the fatal ones may occur 4-6 hours after surgery, and in general, exceptionally a few hours later, rarely after 24 hours.<sup>4</sup>

The unilateral or bilateral recurrent lesions usually appear within 24 hours, in this way early diagnosis and treatment are usually performed; they represent contraindications to early discharge.<sup>5,6</sup> With regards to the post-operative hypocalcaemia, it is an uncommon occurrence although the incidence and the cause are not yet clear.

Its incidence in large case studies is variable: transitional hypocalcemia can vary from 1.6% to 68%, while permanent hypocalcemia varies from 0, 4% to 33%.<sup>7-10</sup> Traditionally, the period of observation in patients who underwent total thyroidectomy is at least 3 days (72 hours).<sup>11</sup>

The trend of some specialized centers was, in selected cases, to reduce the period of observation to 24 h (One Day Surgery).<sup>12,13</sup> Our previous experience underlined how patients who had levels of serum Calcium higher than 9 mg/dl at the first post-operative day, did not show Hypocalcemia in the next days;<sup>14</sup> for this reason this value could be considered a good cut-off for the decision of an early discharge.<sup>1</sup>

With regards to this experience, the aim of our current study was to confirm the effective feasibility of an early discharge based on the levels of serum Calcium at the first post-operative day.

**MATERIALS AND METHODS**

Our research included all patients undergoing total thyroidectomy from January 2010 until December 2014. Surgeries were all performed by the same operator and all with suture less technique (Ligasure precise®). After surgery, all patients were treated with Levothyroxine 100 mg (1 cp per day) and Calcium Carbonate 300 mg (2 cps per day). We measured the serum Calcium at the first post-operative day and in next ones until discharge, and successively 7 days after discharge.

We assumed the normal range of serum Calcium is between 8.6 mg/dl and 10.4 mg/dl. Patients that showed levels of serum Calcium under this limit (<8.6 mg/dl) were treated with

4vials of Gluconate Calcium (40 mEq) in 500 ml of saline solution NaCl 0.9% *intra venus (i.v.)* (one per day), monitoring the Serum Calcium levels daily. The treatment was suspended when the Serum Calcium levels were at the normal range.

Patients who had serum Calcium levels more than 9 mg/dl at the first post-operative days, and did not have other complications, were discharged the same day and reevaluated after 7 days.

**RESULTS**

Our study included 102 consecutive patients (82 F; 20 M, age ranged between 14-78 years old, average 52.6).

Post-operatively pathological examinations are reported in Table 1.

	2010	2011	2012	2013	2014	TOT
<b>MNG</b>	14	16	9	8	9	<b>56</b>
<i>Toxic</i>	2	5	0	2	1	<b>10</b>
<i>Recurrent</i>	1	3	2	2	0	<b>8</b>
<i>Dipped</i>	0	2	2	2	0	<b>6</b>
<b>Follicular CA</b>	0	0	0	3	0	<b>3</b>
<b>Hurtle</b>	0	0	1	0	1	<b>2</b>
<b>Papillary CA</b>	4	2	7	10	9	<b>32</b>
<b>Atypical Adenoma</b>	2	0	0	1	4	<b>7</b>
<b>Medullary CA</b>	0	1	1	0	0	<b>2</b>
<b>Lymphoma</b>	0	0	0	0	0	<b>0</b>
<b>TOTAL</b>	20	19	18	22	23	<b>102</b>

Table 1: Pathological examinations results after surgery (MNG: Multi Nodular Goiter; CA: cancer).

Out of 102 patients who underwent total thyroidectomy, hypocalcemia was observed in 18 cases (16%), out of which 15/102 cases (14.7%) were transitional, while 3/102 cases (2.9%) were permanent.

Regarding to the 18 patients presenting hypocalcemia, in 7 patients it occurred at the first Postoperative day (POD) (38.8%), in 4 patients at the second POD (22.2%), in 6 patients at the third POD (33.3%), in 1 patient at the fourth POD (5.5%).

At the first POD, 71 patients out of 102 had serum Calcium levels higher than 9 mg/dl (Table 2). These patients were discharged the same day, between 24 and 30 hours after surgery (average 26.7 hrs).

Serum Calcium at 1 <sup>st</sup> POD	Patients	%
9-9.5	45/102	44%
9.6-10	23/102	22%
10.1-10.4	3/102	3%
Total	71/102	69%

Table 2: Serum Calcium values at the first post-operative day.

These patients were examined after 7 days from discharge. No one of them reported symptoms of hypocalcemia. Values of serum Calcium after 7 days were all in the normal range (8.6-10.4 mg/dl). Twenty patients (28%) had serum Calcium between 8.6 mg/dl and 9 mg/dl, 31 patients (43.7%) between 9.1 mg/dl and 9.5 mg/dl, 18 patients (25.3%) between 9.6 mg/dl and 10 mg/dl, 2 patients (2.8%) between 10.1 mg/dl and 10.4 mg/dl (Table 3).

Levels of serum Calcium	Number of patients	Percentage
<8.6	0	0%
8.6-9	20	28.2%
9.1-9.5	31	43.7%
9.6-10	18	25.3%
10.1-10.4	2	2.8%

Table 3: Values of serum Calcium after 7 days from discharge.

**DISCUSSION**

The current research was focused on the feasibility of an early discharge in patients who underwent total thyroidectomy, based on the absence of complications and the levels of serum Calcium. Many papers in the International literature describe different features to predict the occurrence of hypocalcemia in patients who have undergone total thyroidectomy.

Al Qahtani, et al.<sup>15</sup> proposes to use as an early predictor of hypocalcemia the intact Parathormone (iPTH) essay 1-hour, 6-hour and 24-hours post-thyroidectomy. Also Seo<sup>16</sup> underlines how iPTH essay can be used for evaluating the possible appearance of hypocalcemia, resulting in a sensitivity and specificity of 83.4% and 100% respectively.

On the other hand, some authors, accepted Serum Calcium assay as an early predictive factor of hypocalcemia,<sup>17,18</sup> measuring iPTH assay to 4-6 weeks and 1-year post-thyroidectomy controls.<sup>18</sup>

Basing on our experiences, we assume Serum Calcium measurement as a good predictive factor of hypocalcemia, considering its reliability, easier feasibility and low costs of this exam. Besides, our study underlines that the first post-operative days are crucial for an early discharge of the patient (24-30 h), confirming what we already experienced in our previous research.<sup>14</sup>

Moreover, we confirmed that levels of serum Calcium more than 9 mg/dl at the first post-operative day, in patients treated with Calcium Carbonate 300 mg (2 cps per day) from the same day after surgery and the following day, can be considered a feasible cut-off to exclude the appearance of hypocalcemia, as we observed in the previous experience.<sup>14</sup>

Therefore, according to our results, we propose serum calcium measurement as a predictive factor of hypocalcemia in

patients who have undergone total thyroidectomy, and to propose an early discharge for the patients who have serum Calcium levels more than 9 mg/dl, prescribing a medical examination one week after discharge.

**CONFLICTS OF INTEREST**

All authors declare that they have no conflicts of interest.

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**AUTHOR CONTRIBUTION**

All authors contributed significantly to the present research and reviewed the entire manuscript.

SP: Participated substantially in conception, design and execution of the study and in the analysis and interpretation of the data; also participated substantially in the drafting and editing of the manuscript.

SR: Participated substantially in conception, design and execution of the study and in the analysis and interpretation of the data.

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GA: Participated substantially in conception, design and execution of the study and in the analysis and interpretation of the data; also participated substantially in the drafting and editing of the manuscript.

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