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Original Research Article

A retrospective study on the incidence of hypocalcemia and number of parathyroid glands identified and preserved during thyroid surgeries

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ABSTRACT

Background: Hypocalcaemia remains a major post-operative complication of total thyroidectomy causing potentially severe symptoms and anxiety in affected patients and increasing hospitalization time. Therefore the present study was designed to evaluate the incidence of hypocalcaemia and the number of parathyroid gland.
Methods: 146 patients who underwent total/near total thyroidectomy were recruited. The incidence of hypocalcaemia was analyzed with serial calcium estimation results with 6 hours, 24 hours, 48 hours and 2weeks post-operative calcium level estimations. The incidence of hypocalcaemia with regards to the number of parathyroid glands was determined and the results between the three groups were compared.
Results: The overall incidence of hypocalcaemia decreases with increase in the number of parathyroid glands per operatively. In Group-3, 16% of patients had hypocalcaemia in first 6 hours and 96% of patients had calcium value more than 8 mg/dl after 2 weeks without the features of hypocalcaemia. It was 84% and 77% in Group-1, 33% and 23% in Group-2.The difference was found to be statistically significant ($p<0.001$).
Conclusions: The incidence of hypocalcaemia decreases with increase in the number of parathyroid glands peroperativly in thyroid surgeries. The post-operative hypocalcaemia is predictable with the number of parathyroid glands and it gives a platform for an early discharge of the thyroidectomy patients without the fear of post-operative hypocalcaemia.

Keywords: Hypocalcaemia, Parathyroid glands, Thyroidectomy

INTRODUCTION

Hypocalcaemia remains a major post-operative complication of total thyroidectomy causing potentially severe symptoms and anxiety in affected patients and increasing hospitalization time. Transient hypocalcaemia, often observed after the operation, generally respond favorably to replacement therapy within a few days or weeks.[1] Hypocalcaemia is considered permanent when it does not return to normal within 6 months.

The primary cause of hypocalcaemia is secondary hypoparathyroidism following damage to or devascularisation of, one or more parathyroid glands during surgery. Hypocalcaemia can be asymptomatic, particularly if calcium levels are only mildly reduced, or symptomatic with typical manifestations such as Chvostek's and Trousseau's signs, muscle spasms and paresthaesia.[2]

Severe neurological manifestations may occur if the condition is not adequately treated. Post-operative hypocalcaemia requires calcium and Vitamin D supplementation, with monitoring until blood calcium returns to normal, thus hospitalization is typically prolonged.[3,4] The aims of the present study included the

identification of patients at high risk of developing hypocalcaemia following total thyroidectomy by means of retrospective analysis of serial post-operative calcium levels in 6 hours, 24 hours, 48 hours and 2weeks of post-operative period and comparing the number of parathyroid glands identified per operatively with the serum calcium levels estimated to predict the risk of post-operative hypocalcaemia.

METHODS

The present study was conducted after the institutional ethical clearance. The study included 146 patients who are subjected to total /near total thyroidectomy after the informed and written consent from all the patients. The preoperative number of parathyroid glands identified in all the patients and the serial calcium levels were estimated. The patients who were admitted for total/near total thyroidectomy belonging to different age group of both genders were included. Patients having abnormal preoperative serum calcium level below the normal range of 8 mg/dl in the retrospective series were excluded. The parameters assessed were post-operative serial calcium levels in 6 hours, 24 hours, 48 hours and 2 weeks. The number of parathyroid glands identified per operatively was recorded. Then the patients were allotted to 3groups namely, Group-1 (with <2 parathyroid glands), Group-2 (with 2 parathyroid glands) and Group-3 (with >2 parathyroid glands).

Meticulous dissection without much use of monopolar or bipolar cautery, identifying the glands by its colour, texture and position is followed. Post-operative serum calcium level was estimated using commercially available kit according to the manufacturer's guidelines.

Statistical analysis

The number of patients belongs to different group on the basis of serum calcium level was represented as percentage. Chi square test was used to find out the statistical significance. P value less than 0.005 was considered significant.

RESULTS

Out of 146 patients, 9% of patients had <2 parathyroid glands identified, 42% of patients had 2 parathyroid glands and 49% of patients had with >2 parathyroid glands identified (Table 1).

Table1: Demographic features.

Group	n (%)
Group-1	13 (9%)
Group-2	61(42%)
Group-3	72 (49%)

Table 2: Group-wise comparison of incidence of hypocalcaemia at different time points.

Group vs Time period	Group-1		Group-2		Group-3		P value
	<8 mg/dl	>8 mg/dl	<8 mg/dl	>8 mg/dl	<8 mg/dl	>8 mg/dl	
6hrs post-operative period	84%	16%	33%	67%	16%	84%	0.001
24hrs post-operative period	69%	31%	30%	70%	14%	86%	0.001
48hrs post-operative period	62%	38%	26%	73%	7%	93%	0.001
2wks post-operative period	77%	23%	23%	77%	4%	96%	0.001

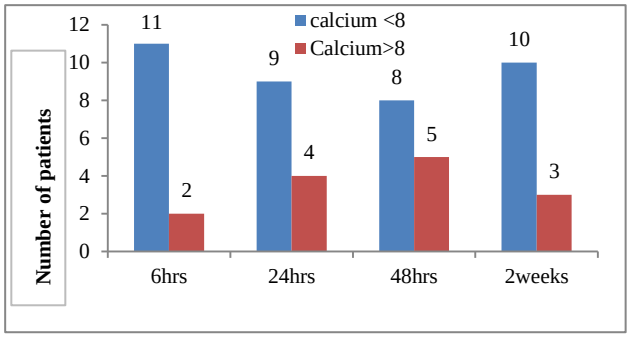

Figure 1: Group-wise comparison of incidence of hypocalcemic symptoms at different postoperative time period in patients with less than 2 parathyroid glands. It was found to be statistically significant (p<0.001).

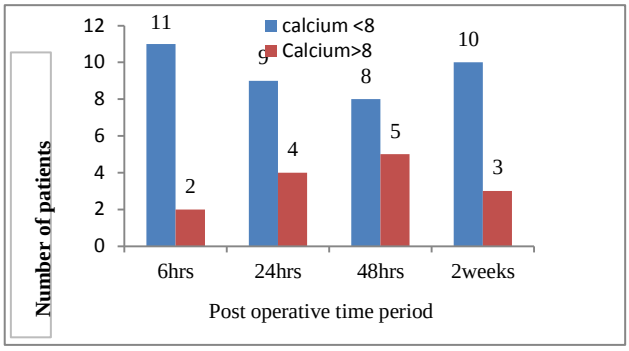

Figure 2: Group-wise comparison of incidence of hypocalcemic symptoms at different postoperative time period in patients with 2 parathyroid glands. It was found to be statistically significant (p<0.001).

When the group-wise comparison of incidence of hypocalcaemia at different time points was performed, it showed 96% of the patients in Group-3 were with calcium level >8 mg/dl comparing to 77%in Group-2 and 23% in Group 1. The difference in the incidence of hypocalcaemia was statistically significant (Table 2, p<0.001). The percentage of patients without hypocalcaemia (>8 mg/dl) increases with increase in the number of parathyroid glands.

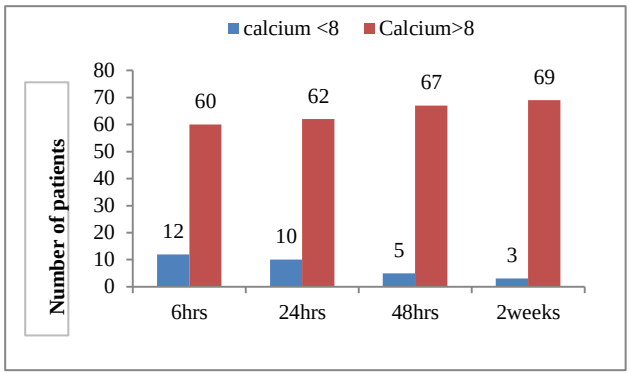

Figure 3: Group-wise comparison of incidence of hypocalcemic symptoms at different postoperative time period in patients with more than 2 parathyroid glands. It was found to be statistically significant (p<0.001).

The percentage of patients with calcium level <8 mg/dl and >8 mg/dl compared in serial calcium estimation and with the three group of patients with the parathyroid glands identified preoperatively. The group-wise comparison of incidence of hypocalcemic symptoms at different postoperative time period in patients with 2 parathyroid glands and more than 2 parathyroid glands was showed statistically significant (Figure 2 and 3, p<0.001) variation.

DISCUSSION

The aims of the present study were to identify patients at high risk of developing hypocalcaemia following total /near total thyroidectomy by means of retrospective analysis of serial post-operative calcium levels in 6 hours, 24 hours, 48 hours and 2 weeks of post-operative period and comparing the number of parathyroid glands identified per operatively with the serum calcium levels estimated to predict the risk of post-operative hypocalcaemia.

In a study published in The American Laryngological, Rhinological and Otological Society, consisting 126 patients the number of parathyroid glands identified intraoperatively was compared with postoperative hypocalcaemia, Patients with 0-2 parathyroid's identified peroperativly had a significantly lower incidence of clinical hypocalcaemia than patients with 3-4 parathyroid's identified peroperativly.[5-10] In present study the group I patients with <2 parathyroid glands identified per operatively had clinical hypocalcaemia, <8 mg/dl in 77% of patients. The 61 patients in Group-2 with 2 parathyroid glands identified had only 23 % of the patients with features of hypocalcaemia and the patients in Group-3 had 96% with calcium level >8 mg/dl without features of hypocalcaemia as reported in the earlier studies.[11-14] The risk of hypocalcaemia (<8 mg/dl) decreases from Group 1 to Group 3, as the number of parathyroid glands identified meticulously during surgery increases from less than to more than two.

CONCLUSION

In conclusion, we propose herewith the meticulous identification and preservation of 2 or more parathyroid gland per operatively so that we can predict the chance of post-operative temporary and permanent hypocalcaemia and the patients can be early discharged without the use of prophylactic calcium tablet in fear of post-operative hypocalcaemia symptoms.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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