



A Study on Post Thyroidectomy Hypocalcemia

KEYWORDS

hypocalcemia, tetany, thyroidectomy

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ABSTRACT *Post thyroidectomy hypocalcemia is a major problem for surgeons. Hypocalcemic tetany is assumed to be caused by inadvertent injury to parathyroid glands. This study was conducted to assess the incidence of post thyroidectomy hypocalcaemic tetany in near total thyroidectomy, sub total thyroidectomy and hemithyroidectomy. A total of 202 patients were studied. In our study out of the three groups those who underwent hemithyroidectomy did not develop clinical hypocalcaemia but a transient fall in serum calcium which returned to normal was noticed. The incidence of hypocalcaemia in those who underwent sub total thyroidectomy was very low compared to other studies and was 1.01%. No patient developed permanent hypoparathyroidism and the incidence of hypocalcaemia in those who underwent near total thyroidectomy is 18.5%. No patient had permanent hypocalcaemia. The overall incidence in our study is 2.31 % which is very low. This probably reflects the effectiveness of careful preservation of parathyroid glands and its vascularity.*

Introduction

Calcium is the most abundant cation and fifth most abundant organic element of body. It has important functions including bone formation, coagulation, transmission of nerve impulses and structural integrity of tissues.

Thyroidectomy is associated with hypocalcemia due to injury to blood supply to parathyroid glands. There are 4 parathyroid glands and their vulnerable location put them into risk of damage during surgery. The superior glands are usually located on the posteromedial surface of the upper part of gland and the inferior glands are located just below the gland and anterior to recurrent laryngeal nerve.

Parathyroid hormone acts on bone, kidney and intestines. In bone it stimulates resorption of calcium and phosphate. In kidney it stimulates resorption of calcium and inhibits resorption of phosphate and bicarbonate and stimulates hydroxylation of vitamin D. In intestine it has no direct effects but vitamin D stimulates absorption of calcium and phosphate.

Hypocalcemia is caused by a number of clinical entities and often presents with signs of generalized neuromuscular irritability including paresthesia, muscle cramps, laryngospasm, tetany, and seizures. This neuromuscular irritability can also be displayed through the elicitation of Chvostek's sign and Trousseau's sign.

Magnesium is necessary for the normal secretion of parathormone in response to hypocalcaemia and also for the activity of parthormone as a hormone at the site of its target organs.

Around 30% of patients after total thyroidectomy will develop transient hypocalcemia. The sooner after the operation the drop in calcium occurs the longer it persists.

Aim of the study

To assess the incidence of post thyroidectomy hypocalcaemic tetany in near total thyroidectomy, sub total thyroidectomy and hemithyroidectomy.

Methodology

This study was carried out in 202 patients undergoing Near Total thyroidectomy, subtotal thyroidectomy and Hemithyroidectomy for

conditions like carcinoma thyroid, multinodular goiter, diffuse colloid goitre and adenoma thyroid. The cases were operated in Medical College Hospital Trivandrum between July 2001 and June 2002.

The normal calcium level ranges from 9 - 11 mg/dL and values less than 9 mg/dL were considered as hypocalcaemia.

During the postoperative period patients were carefully watched for clinical symptoms and signs of hypocalcaemia. Fatigue, weakness and positive Chvostek's sign and Trousseau's sign were considered as mild hypocalcaemia. Tetany and those with carpopedal spasm, convulsions and laryngeal spasm were considered as advanced hypocalcaemia.

The patients were grouped into 3 according to the type of surgery they have undergone.

Group I Near total thyroidectomy
Group II Subtotal thyroidectomy
Group III Hemi thyroidectomy

In all patients the preoperative calcium level was estimated. The venous blood was drawn without compressing the vessel and before food intake.

The patients were carefully followed for development of features of hypocalcaemia and in those with clinical features suggestive of hypocalcaemia serial serum calcium estimation was done on 1st, 2nd and 5th postoperative day.

Results

Group I comprised of 27, Group 2 98 and Group 3 77 patients [chart 1].

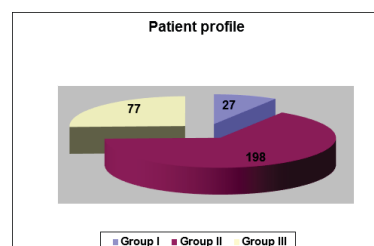


Chart 1- Showing categories of patients

All patients in our study had serum calcium level within normal limits in the preoperative period. The mean preoperative serum calcium level in each group was 9.51 mg% in Group I, 9.37 mg% in Group II and 9.42 mg% in Group III.

A decrease in serum calcium was noted within the first 48 hours of surgery. Most of the clinically overt hypocalcaemia developed within the first postoperative day and all patients were promptly relieved of their symptoms on administration of intravenous calcium gluconate. The calcium level reached within normal range on the third postoperative day.

In Group I there were 27 patients who underwent Near total thyroidectomy. They constituted 8.94% of the study population. They underwent near total thyroidectomy for malignancy of the thyroid gland. Five patients in this group developed clinical features of hypocalcaemia. The incidence is 18.5%. The usual time of presentation was within 24-48 hours. Three patients had mild form of hypocalcaemia and presented as numbness around lips and extremities and it became clinically evident on testing Chvostek's sign and Trousseau's sign. Two of the patients presented with carpopedal spasm. Symptoms were relieved an intravenous administration of calcium gluconate. On serial assay of calcium it was seen to return to normal. None of the patients in our study population developed permanent hypoparathyroidism.

In Group II 198 patients underwent subtotal thyroidectomy and only two patients developed clinical features of hypocalcaemia. The incidence is 1.01%. Both these patients presented clinically on first postoperative day. Both were of mild form of tetany manifested as numbness around the mouth and extremities. One of these patients had toxic goitre, which was controlled preoperatively with neomercazole and propranolol. The effect of intravenous calcium gluconate was prompt and they were relieved of their symptoms. Their serum calcium level was within normal limits thereafter.

None of the patients who underwent hemithyroidectomy developed clinical features of hypocalcaemia but they showed transient fall in serum calcium level and it returned to normal within few days.

The overall incidence of hypocalcaemia in thyroid surgeries is 2.31% in this study.

Study group	Number of patients	Patients developing tetany	
		Number	Percentage
Group I	27	5	18.5
Group II	198	2	1.01
Group III	77	0	0
Total	302	7	2.31

Table 1- Showing Incidence of hypocalcemic tetany.

Discussion

Hypocalcaemia is a well known complication of thyroid surgeries. It is because of the close approximation of the parathyroid gland to the thyroid and common blood supply from the inferior thyroid artery. The incidence reported by various investigators range from 5 - 20%. The reported frequency of permanent hypocalcaemia has varied from 0% - 3.8% and of transient hypocalcaemia from 0.9% - 25.9%.

This study was aimed at finding the incidence in our institution According to Falk.S.A et al despite the careful preservation of the glands and their blood supply, bilateral thyroid lobectomy is frequently associated with temporary hypoparathyroidism^{1,2}. According to Smith M.A et al the attempts to preserve the blood supply to the parathyroid may compromise the completeness of the thyroidectomy or the dissection of cervical nodes in the tracheoesophageal groove³.

As per the study conducted by Watson C.G et al permanent hypocalcaemia complicating thyroidectomy is a rare complication whereas transient post thyroidectomy hypocalcaemia occurs frequently⁴. Ten patients were studied in an attempt to elucidate the underlying mechanism. An early and transient postoperative rise in calcitonin levels appears to play a significant role in the commonly observed early transient post thyroidectomy hypocalcaemia following subtotal or total thyroidectomy.

In our study out of the three groups those who underwent hemithyroidectomy did not develop clinical hypocalcaemia but a transient fall in serum calcium which returned to normal was noticed. The incidence of hypocalcaemia in those who underwent sub total thyroidectomy was very low compared to other studies and was 1.01%. No patient developed permanent hypoparathyroidism and the incidence of hypocalcaemia in those who underwent near total thyroidectomy is 18.5%. No patient had permanent hypocalcaemia. The overall incidence in our study is 2.31 % which is very low compared to other studies that it ranges from 5 - 20%.

This is due to the operative technique that we practice in our institution that carefully preserve the vascularity of the parathyroid gland. After dissection of middle thyroid veins, medial rotation of the thyroid gland is done, inferior thyroid artery is identified as it emerges behind the common carotid artery gently isolated, dissected in atraumatic fashion and looped. Using the loop gently retracted and artery is dissected forwards, as the dissection proceeds, most often parathyroid artery is seen as it emerges commonly from the postero inferior aspect of main stem. Occasionally the branches arises from more distal branches of the inferior thyroid artery, dissection proceeds, encounters the recurrent laryngeal nerve at some point which is safe guarded. Inferior thyroid artery is traced in to the thyroid gland and divided and controlled with bipolar cautery at the most distal point. In this way the arterial supply to the parathyroid is safe guarded. Often the parathyroid artery serves as a guide to parathyroid.

Superior parathyroid is preserved as usual. But however, the consistent and definite preservation of inferior para thyroid gland probably accounts for reduction in the incidence of hypocalcaemia in post operative period.

In this study the overall incidence appears very low compared to other studies and the incidence of permanent hypoparathyroidism is zero. The relief of symptoms with intravenous calcium gluconate is prompt. In all patients the serum calcium returned to normal value and it suggests that parathyroid regained its functions and the reversible factors such as spasm of the vessels, thrombosis, release of calcitonin and increased avidity of bone may be responsible for the hypocalcaemia rather than total loss of vascularity which leads to permanent hypoparathyroidism.

Conclusion

Incidence of clinical hypocalcaemia is maximum in near total thyroidectomy and nil in hemithyroidectomy. Most common time of occurrence is within first 48 hours postoperatively.

The effect of intravenous calcium gluconate is prompt in relieving clinical hypocalcemia. In all clinically overt cases the serum calcium returned to normal after third postoperative day and suggests that the reversible factors play important role in the development of transient hypocalcaemia

The incidence of clinical hypocalcaemia in our situation is very low (2.31%) against other studies which range from 5 - 20% and there is no case of permanent hypoparathyroidism. This reflects the effectiveness of careful preservation of parathyroid glands and its vascularity.

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