A Study on Post Thyroidectomy Hypocalcemia

KEYWORDS
hypocalcemia, tetany, thyroidectomy

Dr Rishikeshan Nair
Associate Professor, Department of General Surgery, Government Medical College, Trivandrum

Dr Aravind S Ganapath
Junior Resident, Department of General Surgery, Government Medical College, Trivandrum

Dr Anoop S
Junior Resident, Department of General Surgery, Government Medical College, Trivandrum

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 hypocalcemic tetany in near total thyroidectomy, subtotal 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 subtotal 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 in 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, subtotal 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 hypocalcemia.

During the postoperative period patients were carefully watched for clinical symptoms and signs of hypocalcaemia. Fatigue, weakness and positive Chovstek’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].
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Hypocalcaemia is a well known complication of thyroid surgeries. It is 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 noted. The incidence of delayed hypocalcaemia in the group that 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.

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.

<table>
<thead>
<tr>
<th>Study group</th>
<th>Number of patients</th>
<th>Patients developing tetany</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percentage</td>
</tr>
<tr>
<td>Group I</td>
<td>27</td>
<td>5</td>
</tr>
<tr>
<td>Group II</td>
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<td>2</td>
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<td>Group III</td>
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<tr>
<td>Total</td>
<td>302</td>
<td>7</td>
</tr>
</tbody>
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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. 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 groove 1.

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 frequently 1. 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 noted. The incidence of delayed hypocalcaemia in the group that 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.

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 hypocalcaemia. 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.
References

4. Assessment of the Morbidity and Complications of Total Thyroidectomy. Neil Bhattacharya, MD; Marvin P. Fried, MD