

## Original Article

# Hypocalcaemic Tetany After Total Thyroidectomy

NN Biswas<sup>1</sup>, WA Chaudhury<sup>2</sup>, JA Khan<sup>3</sup>, AC Biswas<sup>4</sup>, KM Arif<sup>5</sup>, S Ghosh<sup>6</sup>, S Akter<sup>7</sup>

### Abstract:

Hypocalcaemic tetany is one the commonest complication after total thyroidectomy. It may cause significant morbidity. Early detection and treatment have better out come. The main objective of the study is to find the incidence of hypocalcaemic tetany in post operative period after total thyroidectomy and average interval period of hypocalcaemia following surgery. This was an observational study conducted in the department of Otolaryngology & head-Neck Surgery Sylhet M.A.G. Osmani Medical College Hospital during 1<sup>st</sup> January 2006 to 31<sup>st</sup> December 2007. Pre-operative routine investigation, Thyroid Function test, Ultrasonography thyroid gland and cytological evaluation by FNAC were done in all patients. Ten patient developed hypocalcaemia after surgery. Among them only one suffered from permanent hypocalcaemia. Most of the patient developed symptoms about 48 hours after surgery. The Incidence and time interval of development of hypocalcaemic tetany after total thyroidectomy found in the series fully coincides with the results of other researchers globally.

**Key words:** Tetany, Total Thyroidectomy, Hypocalcaemic.

### Introduction:

Total thyroidectomy is a logical treatment for patients with thyroid disease in whom the pathologic process involves both lobes of the thyroid or difficult is a significant consideration as in benign multinodular goitre, Grave's disease and cancer. Meticulous and clean cut identification of parathyroid with its preservation completely is a tough task during thyroid surgery. Inadvertent removal or jeopardization of its blood supply is to some extent inevitable. As a result hypoparathyroidism specially after total thyroidectomy is more or less a common picture.

Calcium is the sedater of nerve. It is the free, ionized calcium in the body fluids that is necessary for nerve conduction, muscle contraction and blood coagulation. A decrease in extracellular  $Ca^{++}$  exerts a net excitatory effect on nerve and muscle cells. The result is hypocalcaemic tetany, which is characterized by extensive spasm of skeletal muscle, involving especially the muscles of the extremity and larynx. In tetany laryngospasm becomes so severe that the airway is obstructed and fatal asphyxia is produced. This spasm is due to increased excitability of peripheral nerves.

The extent of  $Ca^{++}$  binding by plasma proteins is proportionate to the plasma protein level. So it is important to know the plasma protein level when evaluating the total calcium. Hypocalcaemic states can be categorized as following<sup>1,2</sup>. Overt/clinical tetany, Latent or subclinical tetany; Transient tetany; Permanent tetany. Overt or clinical tetany is characterized by triad of carpopedal spasm stridor and convulsion. Stridor is caused by spasm of glottis. Adults complain of tingling in the hands feet and around the mouth<sup>1</sup>. Latent or subclinical tetany can be present when signs of overt tetany are lacking<sup>1</sup>. It is best recognized by eliciting Trousseau's sign. A less specific sign of hypocalcaemia is that described by Chvostek in which tapping over the branches of the facial nerve as they emerge from the parotid gland produces twitching of the facial muscles.

1. Dr. Nripendra Nath Biswas, MBBS, DLO, FCPS (ENT), Assistant Professor, Department of ENT, Faridpur Medical College, Faridpur.
2. Prof. Wazir Ahmed Chaudhury, MBBS, DLO, Ex. Professor, Department of ENT, Sylhet M.A.G. Osmani Medical College, Sylhet.
3. Dr. Jahangir Alam Khan, MBBS, FCPS, (ENT) Assistant Professor, Department of ENT, Mymensingh Medical College, Mymensingh.
4. Dr. Akhil Chandra Biswas, MBBS, MS, (ENT), Associate Professor, Department of ENT Bangladesh Medical College, Dhaka.
5. Dr. Khan Mohammad Arif, MBBS, FCPS, (Medicine) Asst. Professor, Department of Medicine, Faridpur Medical College, Faridpur
6. Dr. Subrata Ghosh, MBBS, FCPS, (ENT) Asst. Professor, Department of ENT, Rajshahi Medical College, Rajshahi.
7. Dr. Selina Akter, MD (Transfusion Medicine), Associate Professor, & Head of Dept. of Transfusion Medicine, Shaheed Suhrawardy Medical College, Dhaka.

### Address of correspondence :

Dr. Nripendra Nath Biswas, MBBS, DLO, FCPS (ENT), Asst. Professor, Department of ENT, Faridpur Medical College, Faridpur.  
Mobile: +880-1712003407,  
E-mail: nripendranathbiswas96@gmail.com

Postoperative hypocalcaemia which is common sequelae of total thyroidectomy may be transient or permanent. The reported incidence of transient hypocalcaemia ranges from 6.9%-42% after total thyroidectomy caused usually due to pre-operative haemodilution, calcitonin release and hungry bone syndrome due to hyperthyroidism and secondary to surgical trauma<sup>3</sup>. In transient hypocalcaemia serum calcium levels normalizes within few months<sup>4</sup>.

In contrast permanent hypocalcaemia has been reported in 0.4-29% of patients after total thyroidectomy<sup>3</sup>. In permanent hypocalcaemia there is requirement for 1,25 (OH)<sub>2</sub> cholecalciferol with calcium supplementation for more than six months after thyroidectomy to maintain adequate calcium level<sup>4</sup>.

Besides carpopedal spasm, stridor, convulsion and tingling numbness sensation prolonged hypocalcaemia in hypoparathyroidism may cause grandmal epilepsy, psychosis, cataracts, calcification of basal ganglia and papilloedema. Prolongation of QT interval in ECG which may cause ventricular arrhythmia

In human symptoms of tetany usually develop 2-3 days postoperatively but may not appear for several weeks or more<sup>5</sup>. Injection of PTH corrects the chemical abnormality and the symptoms disappear. Injection of Ca<sup>++</sup> salts gives temporary relief.

#### Materials and Methods:

This observational study was done in patient who undergone total thyroidectomy admitted in ENT ward in the Department of Otolaryngology & Head-Neck Surgery of Sylhet M.A.G. Osmani Medical College Hospital during 1<sup>st</sup> January 2007 to 31<sup>st</sup> December 2008. A total of 35 patients were included in this study. All the patients of total thyroidectomy were included in this study irrespective of underlying cause of thyroidectomy. Preliminary work up included complete clinical examination, biochemical assay of hormone profile, and Technetium 99 thyroid scintigraphy. Ultrasound imaging of the thyroid gland and neck in general was done routinely. Aspiration cytology was performed from all causes except Grave's disease. Hyperthyroidism was controlled before operation. Vocal cords were assessed by indirect laryngoscopy prior to operation.

The Patient admitted in the ward for total thyroidectomy was considered as sample of the study and was investigated and prepared for surgery as per protocol of this study. Data were collected in a predesigned data sheet form and were analyzed accordingly. Surgery was conducted by senior surgeon, who ensures the quality and skill.

Serum corrected calcium was estimated before commencing operation and 7 AM on postoperative days till discharge. Hypocalcaemia was diagnosed when serum corrected calcium level dropped below 8 mg/dl. Patients with hypocalcaemia received oral calcium supplementation. Patients who developed neuromuscular symptoms received intravenous infusion of calcium gluconate. Patients who developed complications were reviewed monthly for 6 months or more.

#### Results:

A total of 35 patients included of them most were female. Male & female ratio is 1:7.5. Minimum age was 15 years and maximum aged patient was 63 years old. Maximum Sample were in 26-35 age group (Table-1).

**Table-I:** Age and sex distribution are shown are as below:

Age Group	Male	Female	Total
15-25 years	1	6	7
26-35 years	1	12	13
36-45 years	0	9	9
46-65 years	2	4	6
<b>Total</b>	<b>4</b>	<b>31</b>	<b>35</b>

Multinodular goitre is the top most cause 25 (71.45%) for total thyroidectomy. Next common indication was papillary carcinoma thyroid 5 (14.28%) (Table-11).

**Table-II:** The table shows different causes of total thyroidectomy

Diagnosis	Number of Patients	Percentage (%)
Multinodular goitre	25	71.42
Papillary carcinoma	05	14.28
Follicular carcinoma	02	5.72
Medullary carcinoma	01	2.86
Grave's disease	02	5.72
<b>Total</b>	<b>35</b>	<b>100</b>

In this study 3 patient developed hypocalcaemic tetany in the Group-A where parathyroid was identified and 7 patients developed tetany in Group-B where parathyroid is not identified (Table-111).

**Table-III:** Shows Hypocalcaemic present and absent tetany.

Groups	Hypocalcaemic tetany present	Hypocalcaemic tetany absent	Total
Group-A	3	10	13
Group-B	7	15	22
<b>Total</b>	<b>10</b>	<b>25</b>	<b>35</b>

Note: (Group-A: Parathyroid identified  
 □□□□□□□□□□Group-B: Parathyroid not identified.

In this study 10 patients developed hypocalcaemic tetany among which 4 patients developed over or clinical and 6 patients developed sub-clinical or latent tetany (n=35), (Table-1V).

**Table-IV:** Shows clinical and sub-clinical hypocalcaemic tetany.

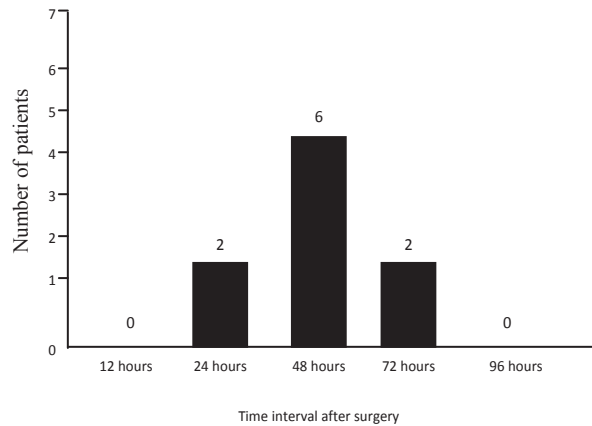
Types	Number of patients	Percentage (%)
Clinical or overt	4	11.43
Sub clinical or latent	6	17.17
<b>Total</b>	<b>10</b>	<b>28.50</b>

Long term follow up shown only one patient development permanent tetany rests 9 were transient,(Table-1V)

**Table-V:** Clinical types of hypocalcaemia with occurrence according to duration (n=35)

Types	Number of patients	Percentage (%)
Permanent	1	2.86
Transient	9	25.71
<b>Total</b>	<b>10</b>	<b>28.57</b>

Patients developed tetany at different time interval after thyroidectomy. Maximum after 48 hours of surgery.



**Discussion:**

Total thyroidectomy is the treatment of preference for many patients with thyroid disease in whom the pathologic process requiring surgery involves both lobes of thyroid or the risk of recurrence is high as in benign multinodular goitre, Grave's disease or cancer. Inadvertent removal or disturbance of blood supply to parathyroid is very common during total thyroidectomy. So hypocalcaemic tetany due to hypoparathyroidism is a common consequence. The incidence of hypocalcaemic tetany in various study ranges from 1.6% - 50%<sup>6</sup>. Such type of study is lacking in our country to compare our outcome with international standard.

For this reason this observational study was conducted in the department of Otolaryngology and Head-neck Surgery in Sylhet MAG Osmani Medical College Hospital from 1st January 2006 to 31st December 2007. In this series 35 patients had undergone total thyroidectomy. Here it is evident that maximum samples were in 26-35 years age group, followed by 36-45 year age group and both age group show female predominance. This figure corresponds to others<sup>7,8</sup>.

The indications for performing total thyroidectomy in 35 patients were benign multinodular goitre (71.42%), thyroid malignancy (22.86%) and other (5.72%). This picture is consistent with other acceptable publications<sup>9</sup>. In one study 'parathyroid auto-transplantation during thyroid surgery' Department of Surgery, SUNY Health Science Centre at Brooklyn, New York showed the incidence of permanent hypocalcaemia with hypoparathyroidism following total thyroidectomy varied from 3-25%<sup>10</sup>.

Another study performed in the Department of Endocrine Surgery, University Hospital of Wales Cardiff and Department of Surgery, Frenchay Hospital Baristal, UK identified 40% symptomatic transient hypocalcaemia<sup>11</sup>. A study conducted at King Abdul

Aziz University Hospital Jeddah, Saudi Arabia in 2005 revealed 15% patients of hypocalcaemia after total thyroidectomy<sup>3</sup>. The result in this observational study showed that transient hypocalcaemia occurred in 25% patients which is within the range of other studies with a reported incidence of 1.6% to 50%<sup>6,12</sup>.

In our series symptomatic permanent hypocalcaemia occurred in one patient (2.86%) that coincides with the study reported by Wingert<sup>3</sup>. that patient developed carpopedal spasm, circumoral paresthesia, tingling and numbness sensation in the limbs and convulsion. Patient was observed closely and followed up routinely for 6 months. Her serum calcium level revealed hypocalcaemia (below 8mg/dl) and improved with intravenous calcium and oral hydroxycholecalciferol therapy.

In this study it is found that maximum patients developed hypocalcaemic tetany 48 hours post operatively, minimum earliest occurrence was 24 hours and maximum late occurrence was 72 hours. This findings coincides with the study done by Sanjay Marwah in Postgraduate Institute of Medical Sciences, Rohtak Haryana, Institute of Medical Science, Rohtak Haryana, India in 2009<sup>13</sup>.

Symptoms of hypocalcaemia usually appear 48 to 72 hours after surgery. It may extend upto several weeks<sup>15</sup>. In another study done by Antonio toniato et al. in Milan study in 2008 showed that hypocalcaemia appear 24 to 48 hour after surgery<sup>14</sup>. This finding correlates favourably with our study. In this study a lady aged of 55 years developed stridor on 4th post operative day. The patient was managed by tracheostomy along with I/V calcium infusion followed by successful decannulation. This correlates with the study done by Oari (2005), King Abdul Aziz University Hospital (Jeddah), Kuwait. In this study it is found that occurrence of hypocalcaemic tetany is more in the group where parathyroid gland was not identified per operatively. So it can be concluded that relationship between identification of parathyroid and development of hypocalcaemia is inversely proportional, which is also supported by other study<sup>15</sup>.

From the result and discussion of this series it is evident that incidence of development of hypocalcaemic tetany and the time of its occurrence fully coincides with the studies found else where which shows the relevance of the outcome of this series.

### Conclusion:

The incidence and time interval of development of hypocalcaemic tetany after total thyroidectomy found in this series fully coincides with the results of other researches globally. So it reflects the standards of total thyroidectomy and its postoperative management in this tertiary level hospital and may be considered as a reflection of local standard in this region of our country.

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