

Early Calcium Supplementation v/s Late Calcium Supplementation in Patients of Total Thyroidectomy

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Abstract: *Since surgical procedures are associated with complications and total thyroidectomy is no exception to it, the early diagnosis and treatment of hypocalcemia (tetany) arising as the complication of total thyroidectomy is of great importance and solace for the patients as well as their care takers. The aim of this manuscript was to demonstrate the well accepted notion about the use of early supplementary calcium after thyroid surgery in preventing and reducing the severity of hypocalcemia (tetany) in the post-operative period.*

Keywords: Thyroid surgery, hypocalcemia (tetany), calcium supplementation

1. Introduction

The thyroid gland is one of the most important endocrine gland of the body and has been mentioned in the literature throughout the 12th and 13th century, but in 1170 Robert Frugaadi described the extirpation of a goiter. Thyroid surgery was known before its physiology was well studied. The procedures were often associated with complications including massive haemorrhage, infection and injury to surrounding structures; and thereby associated with morbidity and mortality rates of nearly 40% as technology improved and with the advent of aseptic techniques, mortality associated with these surgeries decreased¹.

Various indications for thyroidectomy exist, apart from malignancy; thyroidectomy is an option for patients with symptomatic thyroid masses or goitres. By developing a thorough understanding of thyroid anatomy, the surgeon can minimise each patient's risk. Potential major complication of thyroid surgery include bleeding, infection, injury to recurrent laryngeal nerve, hypoparathyroidism, hypothyroidism, thyrotoxic storm and injury to the superior laryngeal nerve.

Reported rates of transient hypocalcemia (tetany) vary in the literature from 5% to 50%^{2,3} but the rate of permanent hypocalcemia (tetany) secondary to hypoparathyroidism (i.e. lasting more than 6 months) is between 0.5 to 2%^{2,3}. The pathophysiology behind transient hypoparathyroidism and hypocalcemia (tetany) is not well understood but is thought to be related to a transient ischemia to the parathyroid glands or perhaps an increased release of the acute phase reactant endothelin-1². Maitland & Miell in 2010³ emphasised that there are various causes of post-operative hypocalcemia (tetany) which have been suggested including hemodilution or increased urinary calcium excretion, secondary to thyroid gland manipulation, hunger bone syndrome (reversal of toxic thyroid osteodystrophy) and interference with the

function of parathyroid glands either through direct injury, removal or devascularisation.

The biochemical predictors of post thyroidectomy hypocalcemia (tetany) include perioperative PTH levels, pre-operative vitamin D and post-operative changes in calcium level⁴. High risk patient for these complications includes patient with Graves' disease or malignancy or those undergoing total thyroidectomy or total thyroidectomy with central compartment neck dissection.

Routine oral calcium and vitamin D supplements have been proposed to prevent the development of symptomatic hypocalcemia (tetany) and its manifestations, and to increase the likelihood of early hospital discharge after total thyroidectomy⁵. Our aim was to validate this hypothesis.

2. Aim

To find out the incidence of hypocalcemia (tetany) manifestations in patients undergoing total thyroidectomy when treated with early calcium supplementation v/s late calcium supplementation after monitoring serial serum calcium levels post-operatively or when hypocalcemia (tetany) signs develop or both.

3. Material and Methods

This study was conducted in Department of ENT and HNS Govt. Medical College (SMHS), Srinagar. All patients with thyroid pathology whether benign or malignant who gave consent for surgery after explaining them nature of disease, various treatment modalities available including surgical treatment were included in this study. This study was conducted from March 2017 to January 2018. A total of 60 patients were included in this study. All the 60 patients underwent total thyroidectomy done by single surgeon after proper consent. Prior all necessary investigations were done

including thyroid profile, serum calcium levels pre operatively, USG neck and FNAC of lesion. Total thyroidectomy was conducted in all 60 patients included in this study. Total of 22 males and 38 females were included and operated. These patients were divided in two groups comprising 30 of each. Group A was given calcium orally soon after surgery without waiting for hypocalcemic signs or serial serum calcium levels. However group B was not given any calcium supplementation and were monitored by serial serum calcium levels in post-operative ward or signs of hypocalcemia (tetany). Calcium supplementation was given intravenously or orally depending on signs of hypocalcemia (tetany) and serial serum calcium levels.

4. Results and Observations

During this study, 60 patients underwent total thyroidectomy. The ratio of male to female in group A and group B is shown in table 1. The mean duration of hospital stay in control group was 3 days (range 1 to 6 days) and in the treatment group stayed with a mean of 2.2 days (range 1 to 4 days). (Table 1 & 2)

Table 1

| Variables | Control group (Group A, n=30) | Treatment group (Group B, n=30) |
|--------------|-------------------------------|---------------------------------|
| Patient no. | 30 | 30 |
| Male/ Female | 13/18 | 17/12 |
| Age | | |
| Mean | 38.2 years | 41.2 years |
| Range | 20-50 years | 20-64 years |

Table 2: Hospital stay of two groups

| Length of hospital stay (Days) | Control Group | Treatment Group |
|--------------------------------|---------------|-----------------|
| Mean: | 3 days | 2.2 days |
| Range: | 1-6 days | 1-4 days |

| Variable | Control group (Group A, n=30) | | Treatment group (Group B, n=30) | |
|--------------------|-------------------------------|--------|---------------------------------|--------|
| | Number | %age | Number | %age |
| Perioral tingling | 2 | 6.70% | 2 | 6.70% |
| Fingertip numbness | 3 | 10% | 2 | 6.70% |
| Carpopedal spasm | 5 | 16.60% | 0 | 0% |
| Tetany | 2 | 6.70% | 0 | 0% |
| Total | 12 | 40% | 4 | 13.33% |

5. Discussion

Every procedure is associated with complications and thyroid surgeries are no exception to it but prompt recognition in early diagnosis and treatment is key to attain low morbidity and mortality. Patients with post thyroidectomy hypocalcemia (tetany) may initially be asymptomatic while hypocalcemic classic presenting symptoms include numbness and tingling of the digits or perioral area, carpopedal spasm, or the presence of Chvostek sign or a Trousseau sign. In severe cases patient may also experience tetany, ECG changes (QT prolongation), seizures, mental status changes or cardiac arrest secondary to hypocalcemia (tetany). Patients with post-operative hypocalcemia (tetany) can be treated with calcium supplementation. By monitoring the calcium levels, oral calcium supplementation can be titrated accordingly.

Symptomatic Laboratory documented hypocalcemia (tetany) developed in total 10 patients including 7 patients (7/30) in the control group not receiving supplement (23.3%) and in 3 patients (3/30) in the treatment group receiving supplements (10%). (Table 3)

Asymptomatic laboratory documented hypocalcemia (tetany) in 6 patients; including 5 in the control group (5/30) not receiving supplements (16.7%) and one (1/30) in the treatment group (3.3%) (Table 3)

Table 3: Incidence of hypocalcaemic manifestations in two groups

| Variable | Control group (Group A, n=30) | | Treatment group (Group B, n=30) | |
|--|-------------------------------|--------|---------------------------------|--------|
| | No of patients | %age | No of patients | % age |
| Symptomatic and laboratory documented | 7 | 23.30% | 3 | 10% |
| Asymptomatic but laboratory documented | 5 | 16.70% | 1 | 3.30% |
| Total | 12 | 40% | 4 | 13.33% |

We observed that the incidence of hypocalcemia (tetany) was lower in the treatment group than in the control group i.e. 12/30 (40%) in control group and 4/30 (13.3%) in treatment group.

The hypocalcemic symptoms were recorded for both groups and observed that the symptoms were mild (perioral tingling and finger tips numbness) in the treatment group but more severe in the control group (carpopedal spasms and tetany i.e. 7 patients in the control group and none in the treatment group) (Table 4).

Table 4: Severity of hypocalcemic symptoms in two groups

Intravenous calcium supplementation may be necessary for patients' refractory to oral management or those severe symptomatic hypocalcemia (tetany). Serum hypoalbuminemia and any hypomagnesemia should be corrected. After a few months, weaning from the calcium supplementation can be considered. Dependence on calcium for longer than 6 months usually indicates permanent hypoparathyroidism.

Jong-Lyel-Roh & Colleagues⁶, evaluated the clinical usefulness routine oral calcium and vitamin D supplements in the prevention of hypocalcemia (tetany) after total thyroidectomy and concluded that routine administration of a supplement containing oral calcium and vitamin D is effective in reducing the incidence and severity of hypocalcemia (tetany) after total thyroidectomy. **Alvaro Sanabria et al⁷** studied "Routine post-operative administration of vitamin D and calcium after total thyroidectomy: a meta-analysis"; in 706 patients with 346 in the calcitriol group, 288 in the oral calcium group and 72 in the control group. They noted the rates of hypocalcemic symptoms were 4%, 19% and 31% respectively. They, thus, concluded that the prophylactic treatment with vitamin D or metabolites + calcium is effective to decrease the incidence of symptoms of hypocalcemia (tetany). **Mohamad El-Shinawi et al⁸** studied the use of oral calcium and vitamin D

supplementation after total thyroidectomy in 50 patients and reported the incidence of symptomatic and laboratory hypocalcemia (tetany) was lower in the treatment group receiving supplements than control group not receiving supplement i.e. 24% vs 44% respectively⁸.

As per the published literature and results from our manuscript it is to **conclude** that early post-operative supplementation definitely reduces the development and severity of hypocalcemia (tetany) and we recommend routine post-operative supplementation after total thyroidectomy so as to reduce morbidity, mortality and in hospital stay.

Pitfalls

The study has no age bar which can be one factor which has an independent effect on outcome.

Study also does not take into account sex separately which again can have overwhelming effect on outcome in terms of male and female.

Surgical aspect we did not take into account whether we saved parathyroids during surgery or not, which can altogether, change our outcome.

6. Conclusion

Early calcium supplementation not only reduced dreadful hypocalcemia (tetany) but also mental trauma to the patients and caretakers. Some patients even feel that they are going to die only concerned cause; however we observed during our study that patients can afford calcium medication easily.

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