Research Article

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Daycare thyroid surgery: can it be a reality?

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ABSTRACT

Background: Day care surgery is the current trend in surgical practice. With increasing population and thereby increasing patient load, reduction in availability of beds, low financial resources and long surgical waiting lists, the concept of "short hospital stay" came into the limelight. Improvement in anesthesia and pain control, minimally invasive surgery and changing attitude of patients to recovery after surgery have all contributed towards the success of this concept. The aim was to assess the post-operative complication of hypocalcaemia while monitoring the pre closure PTH values, postoperative hypocalcaemia, and other post-operative complications, and thus arriving at feasibility of doing thyroid surgery as a day case surgery.

Methods: A retrospective case control study over a period of one year conducted at medical college of Trivandrum including 40 patients and 100 controls selected with strict inclusion and exclusion criteria. The pre-closure Para Thyroid Hormone (PTH) levels were obtained just before wound closure using the electrochemilumescence immunoassay. Ionized calcium (Ca²⁺) levels were assessed postoperatively on postoperative day 1, day 2 and day 3.the post-operative hypocalcaemia was monitored both clinically and with lab parameters The results obtained were tabulated. Statistical analysis was done with SPSS software package version 17.0 for windows.

Results: By applying ROC curve for analysis of pre-closure PTH assay there is 96% sensitivity and 100% specificity in predicting acute hypocalcaemia.

Conclusions: By doing a pre-closure PTH assay is feasible to predict post- operative hypocalcaemia and so thyroid surgeries can be done as a planned day case surgery.

Keywords: Parathyroid hormones, Post-operative hypocalcaemia, Day care surgery, Recurrent laryngeal nerve palsy

INTRODUCTION

Day care surgery is the current trend in surgical practice. Continued hospitalization for postoperative management until suture removal used to be the trend for a long time. With increasing population and thereby increasing patient load, reduction in availability of beds, low financial resources and long surgical waiting lists, the concept of "short hospital stay" came into the limelight which is well accepted with almost the same or even better results.

New trends and improvements in the health care system allow the choice of short hospital stay even for major surgical operations. Improvement in anesthesia and pain control, minimally invasive surgery and changing attitude of patients to recovery after surgery have all contributed towards the success of this concept.

Daycare surgery benefits patients and surgeons alike, as it is convenient, safe and cost-effective. Hypocalcaemia is the feared complication after total thyroidectomy for which patient is kept under observation for few more days. By assessing PTH values we can predict hypocalcemia. If an early normal PTH value is obtained patient may be discharged on the same day after watching for complications like hematoma, vocal cord palsy, stridor, which manifests within 24 hours. If the study proves pre-closure PTH to be a very sensitive and specific test to predict post-operative hypocalcemia, patients with normal PTH levels could be discharged within 24 hrs. Those who have low PTH values will only need hospital stay more than 24 hrs.

As the thyroid gland is anatomically accessible, its removal is not physiologically disabling, making surgery safer and so the concept of outpatient surgery could apply to thyroidectomy. There are few studies in western literature which suggest that by using specific selection criteria, thyroid lobectomies and subtotal thyroidectomies can be performed safely in an ambulatory surgery setting without increase in morbidity and mortality.

Aim

assess the post-operative complications of To hypocalcaemia while monitoring the pre-closure PTH values, postoperative hypocalcaemia, and other postoperative complications, and thus arrive at feasibility and safety of day care thyroid surgery.

METHODS

Study design: Retrospective case control study

Study setting: Department of surgery medical college Thiruvananthapuram

Study period: 1 year

Study population 40 patients who underwent total thyroidectomy, near total thyroidectomy and completion thyroidectomy during one year study period with postoperative hypocalcaemia and who had pre closure PTH value assayed and who satisfied definite inclusion and exclusion criteria were selected. 100 patients without post-operative hypocalcemia were selected randomly with definite inclusion and exclusion criteria.

Inclusion criteria

Patients who had total or near total or completion thyroidectomy

Patients who had pre-closure parathormone assay

Patients who had calcium monitoring for 3 post-operative days

Patients with no previous history of parathyroid disease

Surgeries done by the same surgeon

Exclusion criteria

Patients not monitored with PTH and Calcium assays

Previous history of any parathyroid disease

Patients with medical renal disease

Patients taking any oral calcium

Intervention

The pre-closure PTH levels were obtained just before wound closure using the electrochemilumescence immunoassay. Ionized calcium (Ca²⁺) levels were assessed postoperatively on postoperative day 1, day 2 and day 3. All patients were clinically evaluated for signs and symptoms of hypocalcemia. Patients who developed tetany were treated with intravenous calcium in addition to oral supplementation. Early complications like tension hematoma, stridor, and recurrent laryngeal nerve palsy were also monitored

Ethical committee clearance was obtained from the institutional ethical committee

The observations were analyzed using statistical methods. Statistical analysis was done with SPSS software package version 17.0 for windows.

RESULTS

The majority of patients belonged to 30-39 years of age. There was female preponderance and the major indication presenting symptom was swelling in front of the neck The indication for which majority of cases were done was multi nodular goiter (60%) there were 17.9% males and 82.1% females in our study.

Table 1: Distribution of age in the study population.

Age	N (%)
<30 years	9 (6.4)
30-39	57(40.7)
≥40 years	74(52.9)

Table 2: Presenting complaints.

Presenting complaints	N (%)
Neck swelling	102 (72.1)
Dysphagia	29 (20.7)
Dyspnoea	10 (7.1)

Multi nodular goiter (60%) was the major indication for surgery followed by malignancy (22.1%). Thyroiditis was also a major indication for surgery accounting for 17.9% of cases.

Total thyroidectomy was done in 53.6% (n=75), Near total thyroidectomy in 32.1% (n=45) and completion thyroidectomy in 14.3% (n=25) cases.

There were 28.6% patients with low PTH levels when the PTH level of 9 pg/ml was taken and 71.4% of patients had high PTH values when PTH value was taken as 9 pg/ml. When the value was raised to 10pg/ml then patients with low PTH values were30.7% and high value were 69.3%

Table 3: Post-operative calcium levels.

Post-operative calcium levels	First day N (%)	Second day N (%)	Third day N (%)
Low (<8.5)	34 (24.3)	29 (20.7)	4 (2.8)
Normal (8.5-10.5)	106 (75.7)	111 (79.3)	136 (97.1)

Post-operative calcium values were measured on post op day 1, 2 and 3 with less than 8.5 mg% taken as low value. In patients presenting with hypocalcaemia symptoms 40% of patients the symptoms developed on day 1, for 50% it was on day 2 and 10% the symptom occurred on day 3.

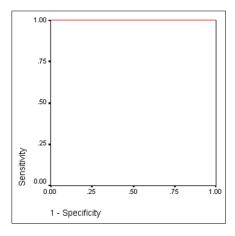


Figure 1: ROC curve.

Table 4: ROC curve.

Positive if greater than or equal to	Sensitivity	1 - Specificity	Specificity
8.25	1	0.15	0.85
8.55	1	0.13	0.88
8.75	1	0.10	0.90
8.85	1	0.05	0.95
9.05	1	0.00	1.00
9.25	0.99	0.00	1.00
9.40	0.98	0.00	1.00
9.85	0.97	0.00	1.00
10.50	0.96	0.00	1.00
10.95	0.94	0.00	1.00
11.15	0.93	0.00	1.00
11.55	0.92	0.00	1.00

The sensitivity and specificity was calculated using the ROC curve PTH values were found to be 96% sensitive and 100% specific in predicting hypocalcemia

Table 5: Pre-closure calcium levels and post-operative calcium levels day 1.

Duo alaguna	Post-operative Ca levels - first day		T-4-1
Pre-closure PTH levels	Low (<8.5) N (%)	Normal (8.5-10.5) N (%)	Total N (%)
Low (<10)	34 (100)	9 (8.5)	43 (30.7)
Normal (10-54)		97 (91.5)	97 (69.3)

Pre-closure PTH levels when compared to calcium levels it was found that 34 patients had developed hypocalcaemia and 9 patients with normal calcium levels had low PTH values when CHI SQUARE test was applied it was found to be significant.

Table 6: Pre-closure calcium levels and post-operative calcium levels day 2.

Duo ologuno	Post-operati second day	Total	
Pre-closure PTH levels	Low (<8.5) N (%)	Normal (8.5-10.5) N (%)	N (%)
Low (<10)	28 (96.6)	15 (13.5)	43 (30.7)
Normal (10-54)	1 (3.4)	96 (86.5)	97 (69.3)
Total	29	111	140
Chi square-82.826; P < 0.001			

Table 7: Pre-closure calcium levels and post-operative calcium levels day 3.

Pre-closure	Post-operati	Total	
PTH levels	Low (<8.5) N (%)	Normal (8.5-10.5) N (%)	N (%)
Low (<10)	4 (57.14)	32 (24.06)	36 (30.7)
Normal (10-54)	3 (42.85)	101 (75.93)	104 (69.3)
Total	7	133	140
Chi square-65.039; P <0.001			

Similarly Chi square test applied showed that the PTH value assay in predicting hypocalcaemia is statistically significant on Posy operative day 2 and day 3 also

Other complications

3 patients developed hoarseness due to unilateral recurrent laryngeal nerve palsy, developed within 2 hour.

One patient developed stridor due to bilateral recurrent laryngeal palsy, developed within one hour.

2 patients developed tension hematoma within 8 hours. Hematoma was evacuated as an emergency. All these complaints other than hypocalcemia developed within the early part of 24 hours.

DISCUSSION

Thyroid disorders, both benign and malignant are found more commonly in females in this study. I included 140 patients for my study, only 25 patients (17.9%) were males. 115 patients (82.1%) were females. In a study published by Troitter et al. there were 84% females undergoing thyroid surgeries which is comparable to our study also. This shows that thyroid disorders are common in females. In our study it shows that most of the patients were between the age group of 40 and above. This shows most of people who comes for thyroid surgery belongs to the middle and older aged group. Among the 140 patients 9 patients (6.4%) were less than 30 years, 57 patients (40.7%) were between 30-39 years, 74 patients (52.9%) were greater than or equal to 40 years. In a study conducted by Nair et al the mean age was found to be 45 years.²

Among the patients we have studied the common presenting symptom is the presence of neck swelling. Next common presenting symptom was difficulty in swallowing .Some patients had difficulty in breathing. Most of the patients who presented with dysphagia or dyspnoea had large goiters or features of thyroiditis. Among the 140 patients 101 patients (72.1%) presented with neck swelling, 29 patients (20.7%) also had symptoms of dysphagia, 10 patients (7.1%) had features of dyspnoea. Most common indication for thyroidectomy was multinodular goiter. Next common indication we found was thyroiditis. 25 patients (17.9%) had history of thyroiditis which was found to be increasing in incidence in people of Kerala according to the current literature. 31 patients (22.1%) had history of malignant goiter.

Most common type of thyroidectomy done was total thyroidectomy. The reason for this may be most of the current literature supports doing total thyroidectomy for multinodular goiter patients as it decreases recurrence. 75 patients (53.6%) underwent total thyroidectomy, 45 patients (32.1%) underwent near total thyroidectomy. 20 patients (14.3%) underwent completion thyroidectomy. Near total thyroidectomy is also practiced as it can the incidence of hypothyroidism decrease thyroidectomy patients. Completion thyroidectomy is done mainly for patients who found to have occult malignancy in the resected lobe or histopathology report coming as follicular adenoma and in patients who had recurrence of MNG in the contralateral lobe.

Pre-closure PTH levels

Pre-closure PTH levels were being assessed by taking a peripheral blood sample just before closure of thyroidectomy wound. As PTH half-life is around 4

minutes if the parathyroids are destroyed the levels will surely fall before wound closure. We took two cut off value 10 and 9 pg/ml as the lower limit of PTH. The study showed that pre-closure PTH levels <10 pg/ml in 43 patients (30.7%) normal PTH in 97 patients (69.3%). Pre-closure PTH levels <9 pg/dl in 40 patients (26.6%). 100 patients have pre closure PTH levels \geq 9 mg/dl. In the study by Richards et al. the pre closure PTH value of cut off 12 pg/dl was taken and then the sensitivity was 71% and specificity was 81%.

Post op calcium levels were assessed in patients on day 1 day 2 and day 3 of post thyroidectomy patients. We found out that most off the patients had low calcium levels during the 1st 48 hours and less common on day 3. Post-op calcium levels day 1 - low (<8.5 mg/dl) in 34 patients (24.3%). Normal (8.5-10.5 mg/dl) in 106 patients (75.7%). Post-op calcium levels day 2 low in 29 patients (20.7%) normal in 111 patients (79.3%). 4 hypocalcemic patients had decreased calcium levels on post-operative day 3.

Other complications

3 patients developed hoarseness due to unilateral recurrent laryngeal nerve palsy, developed within two hours. One patient developed stridor due to bilateral recurrent laryngeal palsy, developed within one hour. Two patients developed tension hematoma developed within 8 hours. Hematoma was evacuated as an emergency. All these complaints other than hypocalcemia developed within the early part of 24 hours. As the study proves pre-closure PTH to be a very sensitive and specific test to predict post-operative hypocalcemia, patients with normal PTH levels could be discharged within 24 hours. Those who have low PTH values will only need hospital stay more than 24 hours. Perioperative parathyroid assay is an independent predictor of postoperative hypocalcaemia. This was shown in a systemic review and meta-analysis of predictors of post-operative hypocalcaemia by Edafe et al.⁴ some authors validate post-operative serial OTH assay for prediction of hypocalcemia.⁵ But the cost effectiveness in serial assessment will negate the benefit obtained by doing the procedure as day care surgery. More over the single intra operative assessment also give high sensitivity and specificity.

If pre-closure PTH assay is done in thyroidectomy patients we will be able to predict accurately which patients will develop hypocalcemia in the post op period with 100% specificity. With 96% sensitivity we will be able to predict who will not develop hypocalcemia. And if the lower limit of pre-closure PTH levels is taken as 9.05 pg/ml we will be able to predict hypocalcemia with 100% sensitivity and specificity. A study by Bozec et al. estimated post-operative PTH values after one hour of surgery. The sensitivity and specificity of the test was 100% and 71.7% respectively with cut off taken as 16 pg/dl.⁶ A study by Pieter et al also estimated post-

operative PTH values in predicting hypocalcaemia.⁷ A study by Rchards et al. estimated intra operative PTH assay for prediction of hypocalcaemia and the cut off taken was 10 pg/dl. The test was found to be 80% sensitive and 100% specific.³ So we can accurately predict hypocalcemia in patients in post thyroidectomy patients, we will be able to discharge the patients within 24 hours after watching for other complications which develops with in the early post-operative period. Patients with normal PTH levels can be safely discharged towards the end of 24 hours. This helps both the surgeon and patient in predicting post-operative hypocalcemia and decreasing the unnecessary prolonged hospital stay and unnecessary expenditure. A study by Daniel et al from university of Ottawa also mentions the feasibility of outpatient thyroid surgery. Pradeep et al. studied various factors put together and developed a scoring system to facilitate early discharge within 24 hours.8

CONCLUSION

With pre-closure PTH assay which has 96% sensitivity and 100% specificity in predicting acute hypocalcaemia which is a dreaded complication of thyroidectomy, and monitoring of complications like hoarseness of voice stridor and tension hematoma which occurs within 24 hours of thyroidectomy it is possible to convert thyroidectomy to day care surgery and discharging uncomplicated patients after 24 hours of surgery.

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Ethical approval: The study was approved by the

institutional ethics committee

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