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TO STUDY THE INCIDENCE OF HYPOCALCAEMIA IN POST THYROIDECTOMY PATIENTS.

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ABSTRACT

Background: Objective of the present study was to study the incidence of hypocalcaemia in post-thyroidectomy patients. **Methods:** Total 40 patients of thyroid swelling were studied prospectively from a period starting from july 2015 to april 2018 at a rural hospital, A.V.B.R.H. All patients visiting the surgical clinic with thyroid swelling and admitted for total thyroidectomy were included in the study. During the course of study, of the total patient who presented to the OPD,40 patients(male and female) were sorted out and were thoroughly examined clinically, hematologically, biochemically, sonologically and cytologically and were posted for total thyroidectomy. A serum calcium was sent preoperatively and on the first day of total thyroidectomy. Symptomatic hypocalcaemia developing within 24 hours of surgery & which returned to normal with little or no treatment was termed as Transient hypocalacaemia. Those cases who showed decrease in serum calcium i.e ≤ 8 (despite of any obvious symptoms) were started on tablet calcium and were assessed in follow up. **Results:** Of the total 40 patients of total thyroidectomy, 25% had post thyroidectomy hypocalcaemia;40% were symptomatic and 60% were asymptomatic; 30% were diagnosed as medullary carcinoma, 20% as papillary carcinoma, 20% as lymphocytic thyroiditis, 20% as nodular goiter and 10% cases of follicular carcinoma; 80% received oral calcium supplementation and 20% received injectable calcium supplementation. **Conclusion:** Meticulous dissection of thyroid lobes and respecting the anatomy of Recurrent nerves and identification of both pairs of parathyroides, preserving their blood supply are key factors a surgeon should observe during surgery in order to reduce the incidence of post thyroidectomy hypocalcaemia.

KEYWORDS: Thyroidectomy, Hypocalcaemia, Medullary Carcinoma, Papillary Carcinoma, Follicular Carcinoma, Thyroiditis, Parathyroids.

INTRODUCTION

FROM the beginning, fatalities attendant upon injuries to the neck emphasized this region as the most vulnerable in the human body. Lesions here are conspicuous. It is only natural that these, especially enlargements of the thyroid gland, should have attracted early medical attention.

Total Thyroidectomy (TT) is now the procedure of choice for benign multinodular goiter. Total Thyroidectomy reduces the need for re-exploration and postoperative hormonal administration is also easy. Complications of thyroidectomy include bleeding, hematoma formation, hypocalcemia, recurrent laryngeal nerve palsy etc.

Hypocalcemia is observed in up to one third to half of total or completion Thyroidectomy patients and is the most common complication. Though majority are transient, it is a troublesome complication and it continues to challenge even experienced surgeons. Hypocalcemia leads to prolonged hospital stay and increases the need for biochemical tests. The development of hypocalcemia after Total Thyroidectomy are multifactorial and some of these factors include surgical trauma to the parathyroid glands, incidental parathyroidectomy, extent of surgery, experience of the surgeon, hyperthyroidism, stress induced urinary loss of calcium, retrosternal goitre, thyroid carcinoma etc.

Various surgical techniques have evolved to preserve parathyroid function. However, transient hypoparathyroidism still occurs in around 30% of patients owing to parathyroid manipulation, devascularisation etc.

Permanent hypoparathyroidism is less than 5% in majority of surgical units. Following thyroidectomy bleeding or hematoma formation are closely watched for during initial 24 hours. Since then the main discharge-limiting factor is development of hypocalcaemia and patients who are not at risk of hypocalcaemia may be discharged on day 1 following surgery. Symptoms of hypocalcemia are neuromuscular and occasionally psychotic episodes.

Since hypocalcemia is the major discharge limiting factor, need for shorter hospital stay has urged many studies to identify risk factors for post Thyroidectomy hypocalcemia and various measures to reduce its incidence. This study aims at studying the incidence of hypocalcemia in post-thyroidectomy patients.

METHOD

This was a prospective study carried out at AVBRH, Sawangi(Meghe) over a period of about 2 years starting from July 2015 to April 2018. All patients visiting the surgical clinic with thyroid swelling and admitted for total thyroidectomy were included in the study. Detailed history of the patients were recorded including age, sex, chief complaints, duration of complaints, past history and family history, etc.

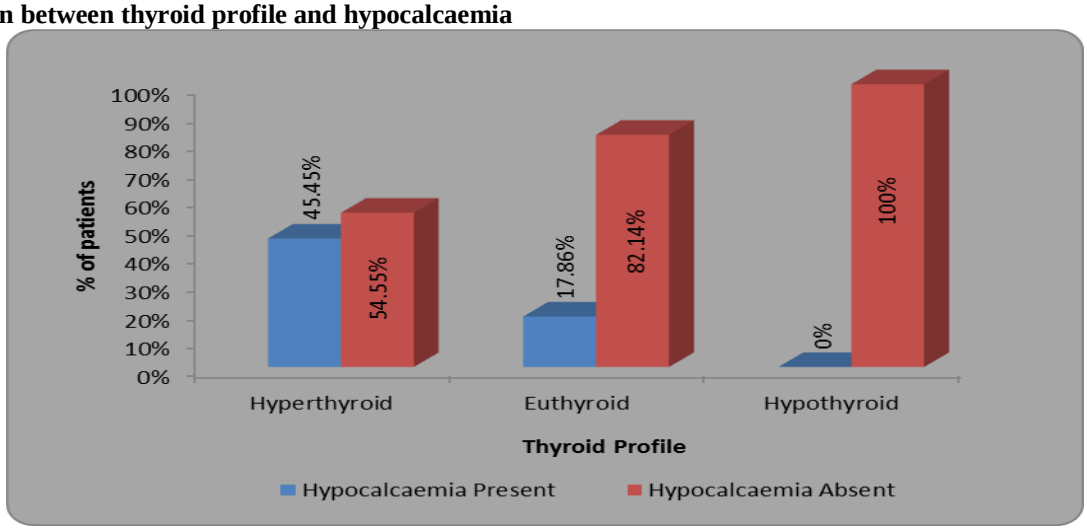
A standardized sequence of thyroid examination was chosen. Thyroid gland was examined with respect to details of the swelling including site, size, surface, nodularity, consistency, movement with deglutition, retrosternal extension, pressure effects, clinical symptoms of clinical thyroid status(hyperthyroid, euthyroid or hypothyroid), gland inspection by Pizzillo's method and palpation by Lahey's method.[2]

During the course of study, of the total patient who presented to the OPD,40 patients(male and female) were sorted out and were thoroughly examined clinically, hematologically, biochemically, sonologically and cytologically and were posted for total thyroidectomy. A serum calcium was sent preoperatively and on the first day of total thyroidectomy. Symptomatic hypocalcaemia developing within 24 hours of surgery & which returned to normal with little or no treatment was termed as Transient hypocalacaemia. Those cases who showed decrease in serum calcium i.e ≤ 8 (despite of any obvious symptoms) were started on tablet calcium and were assessed in follow up. Those cases who showed severe symptoms of hypocalcaemia were started on injectable calcium and assessed on follow up. The response to treatment was assessed clinically and biochemically. The diagnosis was confirmed on histopathological examination.

RESULT

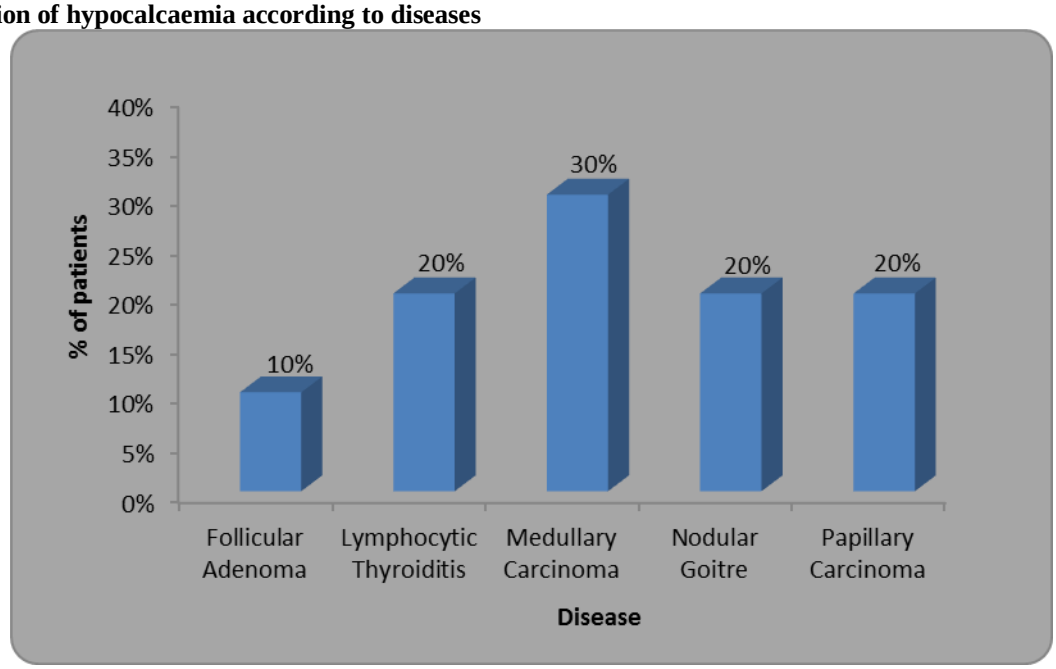
In the present study, it was observed that the youngest patient was 16 years old and the oldest was 77 years old who underwent total thyroidectomy. The maximum number of patients who underwent total thyroidectomy were in the age group of 26-35 years holding 30% of the total population with a mean of 43.57±14.57. It was found,out of 40 cases 6(15%) were male and 34(85%) were female. Females outnumbered males with a male to female ratio of 1:5.66. Majority of the cases i.e. 11(27.5%) cases had swelling for 19-24 months, while there were 8(20%)cases who had swelling for less than or equal to 6 months, followed by 3(7.5%)cases with duration of more than 49 months. Of the 10 patients who developed post thyroidectomy hypocalcemia, 1(10%) patient was male and 9(90%) patients were females; 5(45.45%) cases were hyperthyroid and 5(17.86%) were euthyroid.

Correlation between thyroid profile and hypocalcaemia



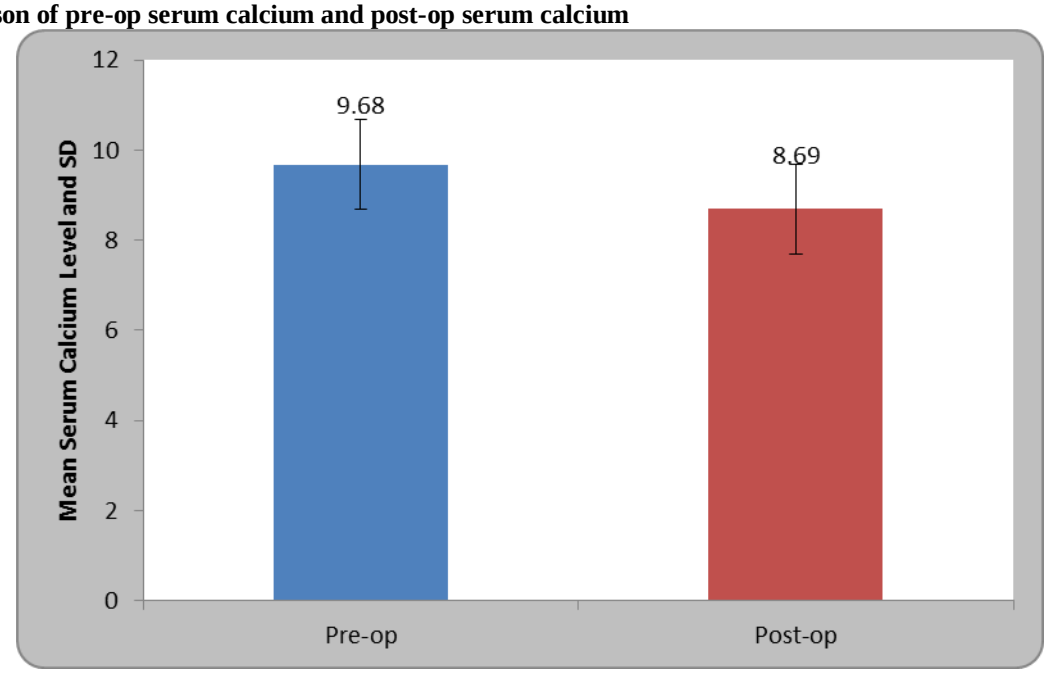
4(40%) cases showed symptoms of hypocalcaemia while 6(60%) showed no symptoms; 5(50%) were benign and 5(50%) were malignant.

Distribution of hypocalcaemia according to diseases



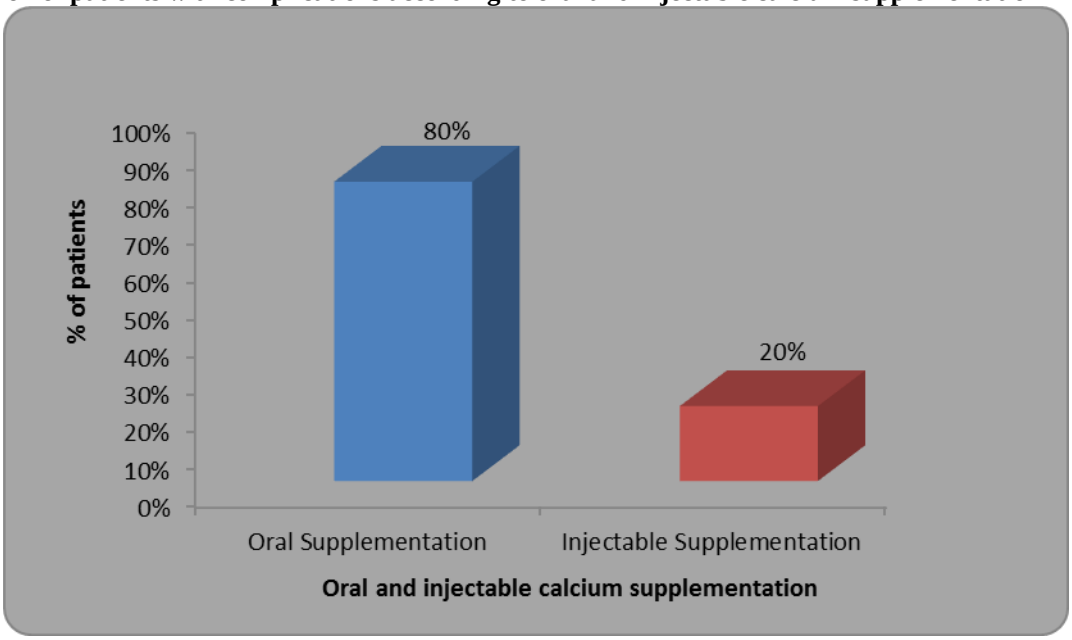
Of all the patients, 3(30%) cases of medullary carcinoma had post thyroidectomy hypocalcaemia, 2(20%) cases of papillary carcinoma had post thyroidectomy hypocalcaemia, 2(20%) cases of lymphocytic thyroiditis had post thyroidectomy hypocalcaemia, 2(20%) cases of nodular goiter had post thyroidectomy hypocalcaemia, 1(10%) of follicular adenoma had post thyroidectomy hypocalcaemia. Mean serum calcium level at pre test was 9.68±0.67 and at post test it was 8.69±1.29. By using student's paired t test statistically significant difference was found in mean serum level at pre and post test(t=5.54,p-value=0.0001).

Comparison of pre-op serum calcium and post-op serum calcium



Of all the patients 4(10%) cases had complication in the form of tingling sensation in hands and feet, numbness, etc and 36(90%) cases had no complication at all. Of all the total hypocalacemic patients 8(80%) received oral calcium supplementation and 2(20%) cases received injectable supplementation.

Distribution of patients with complications according to oral and injectable calcium supplementation



No cases of permanent hypocalcaemia occurred during the course of this study. Those cases who developed transient hypocalcaemia, recovered after a brief treatment of calcium supplementation.

DISCUSSION

There has been a considerable efforts in recent years in identifying simple, reliable and sensitive index that may anticipate the risk for postoperative hypocalcaemia.[1,3-9] Postoperative hypocalcaemia is a common and a major problem following thyroid surgery. It often extends the duration of hospital stay and the need for biochemical tests; when serious can lead to serious complication. To focus our study on the incidence of post thyroidectomy hypocalcaemia, we considered hypocalcaemia patients only with the serum calcium levels of < 8 mg.

Approaches to prediction of incidence of hypocalcaemia are based on pre and post thyroidectomy serum calcium levels. The purpose of this study is to evaluate the ability of consecutive serum calcium level measurements in predicting hypocalcaemia at the earliest time after total thyroidectomy.

Age wise distribution of the patients

In this study, a total of 40 patients were evaluated. The mean age of the patients was 43.57±14.57 ranging from 16 to 77 years with maximum number of patients 12(30%) found in the age group of 12 to 35 years and 1(2.5%) patient found above the age group of >75 years.

In a study by **Erdinc Kamer**[10] et al, the mean±SD age was 46.4±12 years with the range of 20-77 years for 160 patients.

In a study by **Vishwanathan KV**[11] et al, the majority of patients were above the age of 40(52.90%) years in a study conducted on 100 patients.

In a study by **PV Pradeep**[12] et al, the mean ± SD age was 36.58±9.58 and 38.86±9.84 in two groups in 145 patients included in the study.

In a study by **Mark R Burge**[13] et al, the mean ± SD age was 42.8±16.3 years in a study conducted on 142 patients.

In a study by **Nair**[14] et al, the majority of patients were in the mean age of 45 years with the range of 13-82 years in a study conducted on 806 patients.

In a study by **Bhattacharyya**[15] et al, majority of patients were in the mean age of 48.3 years and the younger age was statistically associated with increased incidence of hypocalcaemia with the p value of 0.002 by t-test.

Gender wise distribution of the patients

In this study female cases outnumber the males. Out of 40 cases 6(15%) were males and 34(85%) were female. Females outnumbered males with a male to female ratio of 1:5.66.

According to P V Pradeep[12] et al observed that among 145 patients 22[15.2%] were males and 123[84.8%] were females.

According to **Sumiya Jaan**[16] et al, male to female ratio was 6/24 and 8/22 for two groups.

According to **Sands**[17] et al., 2011, a higher percentage of post operative hypocalcaemia was reported in females.

Prim[18] et al and **Yamashita**[19] et al showed significant higher incidence of post thyroidectomy hypocalcemia in women.

According to **MS Islam**[20] et al., of total 65 patients 15 were male and 50 were female. The male to female ratio was 1:3.3.

Duration of Complaints

In this study, majority of the cases i.e. 11(27.5%) cases had swelling for 19-24 months, while there were 8(20%) cases who had swelling for less than or equal to 6 months, followed by 3(7.5%) cases with duration of more than 49 months. The mean duration of swelling was 27.60±24.35 in a range of 2 to 96 months.

In the study done by **Sengupta**[21] et al 2012,the duration of swelling ranged from 6 months to 36 years.

In the study done by **Panchal**[22] et al., 2014, the maximum number of cases 133(44.33%) had a range of 1-6 months.

Several studies observed patients with thyroid swelling presenting within variable duration. Maximum studies are there where patients came for consultation after 1 year, very few studies are there where the cases have been presented before 6 months or 1 year.[23]

According to **Shubhash Chandra Bhartiya**[24] et al. the variable duration of swelling ranged from 6 months to 3 years.

Similar studies[25] conducted by **Mamun et al**. 2014; **Venkatachlapathy et al**.2012; **Cady et al**. 1979; **Harmo et al**.,1979 shows similar results.

Thyroid profile and hypocalcaemia

In the present study, out of 11 cases of hyperthyroidism, 5[45.5%] developed hypocalcaemia. Of the total 28 patients of euthyroidism, 5[17.86%] developed hypocalcaemia.

According to **Doga kalyonca**[26] et al., of the total 30 patients with hyperthyroidism 14(46.7%) developed post thyroidectomy hypocalcaemia and of total 160 euthyroid patients, 32(20%) developed hypocalcaemia. The rate of hypocalcaemia with hyperthyroidism was 2.3 times higher than non toxic goiter surgery.

According to **Alexandre De Andrade Sousa**[27] et al., of 333 patients of post thyroidectomy hypocalcaemia, 303(91%) were euthyroid, 9(2.7%) were hypothyroid and 21(6.3%) were hyperthyroid.

According to **Michie**[28] and colleagues, hypocalcaemia is more common following thyroidectomy for hyperthyroidism.

Zambudio[29] et al. and **McHenry**[1] et al. conducted a multivariate logistic regression analysis and found hyperthyroidism as an independent predictor of postoperative hypocalcemia.

The were many studies[30-33] which stated of increased incidence of post thyroidectomy hypocalcaemia associated with graves disease but we encountered no such case.

Symptomatic vs Asymptomatic

In the present study, of the 10 hypocalcaemic patients 4(40%) cases showed symptoms of hypocalcaemia while 6(60%) showed no symptoms.

According to **MS Islam**[20], among 25 hypocalcaemic patients asymptomatic hypocalcaemia was found in 22(88%) patients and symptomatic hypocalcaemia in 3(12%) patients.

According to **Gholamali Godazandeh**[34] et al., the incidence of symptomatic hypocalcaemia was 12%(n=15) and asymptomatic hypocalcaemia was 3.2%(n=4).

According to **Alexandre De Andrade Sousa**[27] et al., of 142 incidence of hypocalcaemia, 32(22.5%) cases had symptomatic hypocalcaemia and 85(59.9%) had asymptomatic hypocalcaemia and 11(7.8%) had permanent hypocalcaemia.

In a study[37] with 100 study population, the percentage of symptomatic hypocalcaemia was 9%.

In the study of **Gac EP**[38] et al., with 448 study population, the symptomatic hypocalcaemia was 15%.

Docimo[39] et al found incidence of symptomatic hypocalcaemia to be 6 % and that of asymptomatic hypocalcaemia to be 10 %.

Oral vs injectable calcium

In a study by **Donald S.Gann**[31] et al., two patients in a group were given intravenous calcium for a brief period of time.

According to **Sumiya Jaan**[16] et al., intravenous calcium was given to 4 patients who developed tetany.

According to **Jong-Lyel Roh**[36] et al., 7 patients were administered with intravenous calcium in a group who received calcium suppliments post operatively on occurrence of symptoms.

Postoperative administration of oral calcium and vitamin D3 has found to reduce the incidence of postoperative hypocalcemia.[28,39]

Benign vs malignant

According to **Ottavio Cavicchi**[35]**,** The incidence of TH was 27.6 percent in patients who had a malignant thyroid lesion compared with 20.2 percent in patients who had a benign lesion (Pearson chisquare 0.036).

According to **Alessandro Puzzielo**[40] et al the risk of hypocalcaemia was higher in patients with malignanant thyroid tumor with respect to benign thyroid (43.2% v/s 26.2% with p value < 0.0001).

According to **Randall L Baldassarre**[41] et al., of the total 6605 patients of hypocalcaemia 3050[85.3%] patient were had malignant etiology and 524[14.7%] patients had benign etiology.

Distribution of hypocalcaemia according to diseases

In this study, of the total 10 cases 3(30%) cases of medullary carcinoma had post thyroidectomy hypocalcaemia, 2(20%) cases of papillary carcinoma had post thyroidectomy hypocalcaemia, 2(20%) cases of lymphocytic thyroiditis had post thyroidectomy hypocalcaemia, 2(20%) cases of nodular goiter had post thyroidectomy hypocalcaemia, 1(10%) of follicular adenoma had post thyroidectomy hypocalcaemia

In a study by **MS Islam**[20] hypocalaemia developed in 44% in papillary carcinoma patients, 40% in MNG patients, 8 % in follicular carcinoma patients, 4 % n medullary carcinoma patients and 4 % hashimoto thyroiditis.

In a study by **Bhattacharya**[15] et al, there was a incidence of hypocalcaemia in in 8.46% cases of thyroid carcinoma, 5.17% cases of nontoxic nodular thyroid disease, 3.64% in thyrotoxicosis, and 2.94 % cases of goiter.

Comparison of pre-op serum calcium and post-op serum calcium

In the present study**,** mean serum calcium level at pre test was 9.68±0.67 and at post test it was 8.69±1.29. By using student's paired t test statistically significant difference was found in mean serum level at pre and post test(t=5.54,p-value=0.0001).

According to **C Gopalkrishnan Nair**[14] et al., the mean value of preoperative serum calcium was 8.90mg (8-10.5) and of post operative serum calcium was 8.25mg. The overall incidence of hypocalcaemia ws 23.6%.

According to **Sumiya Jaan**[16] et al., the pre-operative serum calcium was 9.88 ± 0.66 with a p-value of 0.26 and that after 24 hours of surgery was 8.53 ± 0.96 with a p- value of 0.12. Post thyroidectomy hypocalcaemia was developed in 8[26.7%] and 12[40%] cases in two groups within 24 hours of surgery with the p value of 0.21.

According to **Gholamali Godazandeh**[34] et al., the mean serum calcium pre-operatively was 9.36±0.05 and mean serum calcium post operatively was 8.67±0.06.

According to **MS Islam**[20], the mean±SD of pre-operative calcium level was 2.2±0.2 mmol/L with range from 2.0 to 2.6 mmol/L. The mean±SD of post-thyroidectomy calcium level was 2.0±0.3 mmol/L with range from 1.5 to 2.5 mmol/L.

According to **Donald S.Gann**[31] et al., the mean pre operative serum calcium for different diseases was 9.51 ± 0.07, 9.35 ± 0.12, 9.50 ± 0.08, 9.24 ± 0.18 and that of post operative mean serum calcium was 8.20 ± 0.19, 8.44 ± 0.20, 7.65 ± 0.32, 8.19 ± 0.43.

According to **Alexandre de Andrade Sousa**[27] et al., after total thyroidectomy, the incidence of postoperative transient hypocalcemia ranges from 8.9% to 53%.

Accoding to **Ottavio Cavicchi**[28] **et al., t**he rate of hypocalcaemia was 22.8 % (141 of 604 patients) of all surgical procedures and 26.1 % (137 of 527) of total thyroidectomies.

In a study by **Jong-Lyel Roh**[29] et al. the post operative serum calcium in three goups was 8.5±0.5 as compared to pre operative value of 9.1±0.3 ; 8.5±0.4 as copared to pre op value of 9.1±0.4 and 8.2±0.4 as compared to the pre op value of 9.0±0.4 with the p value of < 0.00013.

CONCLUSION

This study was carried out at Jawaharlal Nehru Medical College and Acharya Vinoba Bhave Rural Hospital, Sawangi(M), Wardha, Maharashtra, between July 2015 TO October 2017.

Meticulous dissection of thyroid lobes and respecting the anatomy of Recurrent nerves and identification of both pairs of parathyroides, preserving their blood supply are key factors a surgeon should observe during surgery in order to reduce the incidence of post thyroidectomy hypocalcemia.

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