ORIGINAL ARTICLES

POST THYROIDECTOMY HYPOCALCEMIA – DOES ARTERIAL LIGATION PLAY A SIGNIFICANT ROLE?

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ABSTRACT

Objective: The aim of this study was to determine if bilateral inferior thyroid artery (ITA) ligation is a causal factor for the occurrence of postoperative hypocalcaemia after subtotal thyroidectomy.

Study design: Quasi experimental trial.

Place and duration of study: One year study from Jan 2005 to Dec 2005 conducted at surgical department of Rawalpindi General Hospital (UNIT–I).

Patients and Methods: One hundred patients were included in the study who underwent subtotal thyroidectomy with and without truncal ligation of inferior thyroid artery and were prospectively analyzed comparing postoperative and late serum calcium levels.

Result: A significant incidence of postoperative hypocalcaemia occurred: more in Group A (48%) as compared to Group B (22%). This difference was statistically significant shown by the P value < 0.5 on the 1st postoperative day in patients with ligation of inferior thyroid artery.

Conclusion: The ligation of the ITA tends to produce hypocalcaemia in patients undergoing subtotal Thyroidectomy.

Keywords: Thyroidectomy, parathyroid glands, hyperparathyroidism, hypocalcaemia

INTRODUCTION

Thyroid vessels must be ligated some where. Should they be so ligated as not to cut off the blood supply of parathyroid glands?

Reply to this question is impossible without definite knowledge of the blood supply to these little bodies" Halsted; Evans-1907 [1].

Post operative hypocalcaemia is a relatively frequent situation after subtotal thyroidectomy for simple multinodular goiter [2]. It is usually transitory, recovering within 6 months or, in some cases, permanent.

It is a very unpleasant situation for the patient. When intensive, it can be life threatening. Some authors have questioned the bilateral ligation of the inferior thyroid artery in subtotal thyroidectomy, which is recommended to decrease bleeding [3,4]. It is known that almost all the blood supply to the four parathyroid glands come from inferior thyroid artery (ITA), so it is a logical inference that this procedure would increase postoperative hypocalcaemia.

We have studied in this trial the influence on the parathyroid function of the bilateral ligation of the inferior thyroid artery in subtotal thyroidectomy for simple multinodular goiter.

PATIENTS AND METHODS

One hundred consecutive patients who underwent surgery for simple multinodular

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goiter in surgical department of Rawalpindi General Hospital, Rawalpindi were included in the study.

- All patients presented in the out patient department with goiter were clinically and biochemically evaluated. Those patients who had thyroid functions and serum calcium within normal limits and diagnosed as case of simple multinodular goiter were admitted in ward and included in study. Informed consent was obtained before the procedure.
- A total of 100 patients were divided into two groups: A, 50 patients with bilateral ligation of the ITA and Group B, 50 patients without ligation of ITA. Parathyroid function was checked preoperatively and after surgery by clinical examination and measurement of serum calcium and albumin.
- Bilateral subtotal thyroidectomy was done by a standard technique; each superior thyroid vascular pedicle was divided between ligatures, and the trunk of each inferior thyroid artery was simply ligated. The posterior capsule of the lobes and the parathyroid was preserved in situ. On each side a 4–6 gram remnant of thyroid tissue was left in place.
- The effect of bilateral truncal ligation of the inferior thyroid artery on post operative hypocalcaemia was prospectively analyzed in patients treated by subtotal thyroidectomy, with (Group A) and without (Group B) truncal ligation of inferior thyroid artery, comparing postoperative and late serum calcium levels.

Parathyroid function was checked in all patients on three occasions: Preoperatively, on the first and second day after the operation, by clinical examination and laboratory data.

All the patients had normal parathyroid function evaluated preoperatively by clinical examination and laboratory tests. We looked for Chovstek sign preoperatively because it occur in 5% to 15% of the normal population [5].

Laboratory tests were obtained on three occasions by measurement of serum calcium

Hypocalcaemia was defined for Serum calcium lower than 8 mg/dl (2mmol/dl) [6].

STATISTICAL ANALYSIS

The data was entered and analyzed in the Statistical package for social sciences (version 11). Descriptive statistics were applied on all continuous variables like age and serum calcium levels. Independent samples t-test was applied to determine differences between both the groups at preoperative calcium level, postoperative calcium level day 1 and postoperative calcium levels day 2.

Dependent sample paired t-test was applied to determine differences in preoperative and postoperative calcium levels between the groups.

RESULTS

The mean age in Group A was 34.06 years (SD=7.55) and in Group B it was 31.8 years (SD=.54). In Group A 46 (92%) were females while Group B 48(96%) were females (fig). Preoperatively Mean ± SD of serum albumin in group A was 3.94 ± 0.533 while in group B it was 4.035 ± 0.329. There was insignificant difference in serum albumin of both groups ($p>0.05$). Comparison of calcium levels at different times between both groups (table-1). At postoperative day 1 a significant difference was observed between both groups ($p<0.05$).

A significant decrease in calcium level was observed on postoperative day 1 in both the groups but in group A this decrease was greater as compared to group B and in group A the mean calcium level was lese than 8 mg/dl, the defined limit for hypocalcaemia.

On postoperative day 2 there was significant and mean calcium level was greater than 8 mg/dl increase in serum

calcium level in group A where as in group B there was insignificant decrease in serum calcium level (table-2).

The percentage of patients with postoperative hypocalcaemia was high in group A compared to group B where on 1st POD (p-value<0.05). While on 2nd POD percentage of hypocalcaemic patients in group A was decreased and the difference in percentage in both group become insignificant (p-value > 0.05) (table-3).

DISCUSSION

Subtotal thyroidectomy is a very good therapeutic option for patients with simple multinodular goiter. It is a safe and fast method with very low mortality and excellent results [3]. The main complications of this operation are related to the recurrent [7] and superior [8] laryngeal nerves and the parathyroid glands. When subtotal thyroidectomy is performed by an experienced surgeon, the incidence of these complications is very low.

Transient hypoparathyroidism after a subtotal thyroidectomy has an incidence as high as 83%. Most authors believe that the hypofunction of these glands occurs because of ischaemia secondary to ligation of Inferior thyroid artery. This is a logical inference, since we know that the blood supply to the parathyroid glands come mainly from this vessel. Many papers [9,10] recommend not ligating Inferior Thyroid Arteries. The ligation should be, made as distal as possible, near the capsule of the thyroid gland. On the other hand, some authors [3,7,10] recommend ligating of I.T.A, arguing the benefits are theoretical and not proven.

In our study the percentage of postoperative hypocalcaemia in group A was high where inferior thyroid artery ligation was done compared to group B. The high percentage of postoperative hypocalcaemia is similar to that reported by other [9].

In both groups it is statistically different when compared to preoperative levels.

Ligation of the I.T.A was apparently the cause of the hypocalcaemia, since there was difference in postoperative calcium levels on 1st and 2nd postoperative day between the two groups. This difference was statistically significant shown by the P value < 0.5 on the

Table-1: Comparison of base line characteristics of both study groups.

Characteristic	Ligation (Group A) n=50	Control (Group B) n=50	Diff of Means	t-value	P-value
Serum Albumin	Mean=3.94 SD ± 0.533	Mean=4.035 SD ± 0.329	0.095	-1.380	0.171
Age	Mean=34.06 SD ± 7.55	Mean=34.06 SD ± 7.55	0	0.00	1.0
Pre-op Calcium	Mean=9.341 SD ± 0.502	Mean=9.376 SD ± 0.530	-0.032	-0.310	0.757

Table-2: Compared of preoperative and postoperative calcium levels within the groups.

	Group A (n-50)	Group B (n-50)	P-value
Pre-op calcium levels (mean ± SD)	9.344 ± 0.50.2	9.376 ± 0.530	>0.05
Post - op calcium levels day 1 (mean ± SD)	7.866 ± 0.726	8.760 ± 0.968	<0.05
Post – op calcium levels day 2 (mean ± SD)	8.794 ± 0.965	8.682 ± 0.937	>0.05

Table-3: Frequency of hypocalcemia in both groups on 1st and 2nd POD.

Postoperative days	Group A (n=50)	Group B (n=50)	P-value
1st POD	25 (50%)	12 (24%)	< 0.05
2nd POD	11 (22%)	13 (26%)	> 0.05

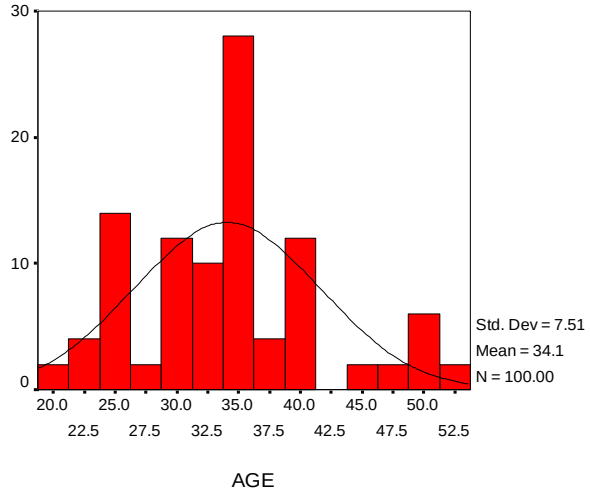

Fig: Age distribution of the patients

1st postoperative day in patients with ligation of inferior thyroid artery as compared to group B. This difference is due to transient hypocalcaemia because of parathyroid dysfunction, which recover within first few days of operation. This was the same conclusion of Nies C et al [4], and Dolapci et al [3]. However, it became statistically insignificant on 2nd day, showing improvement in blood supply.

The high incidence (60%) of postoperative hypocalcaemia is similar to that reported by other [11].

In both groups it is statistically different when compared to preoperative levels.

Ligation of the I.T.A was apparently the cause of the hypocalcaemia, since there was difference in postoperative calcium levels on 1st and 2nd postoperative day between the two groups. This was the same conclusion of Nies et al [4], et al and Dolapci et al [3].

CONCLUSION

Our results as well as those of others, indicate that the ligation of the inferior thyroid artery does appear to produce hypocalcaemia and may alter the function of the parathyroid glands transiently which recover within first few days of operations.

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