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Original Research Article

A study of parathyroid hormone deficiency after total and near total thyroidectomy: its occurrence and time for recovery

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ABSTRACT

Background: Parathyroid hormone (PTH) deficiency or hypoparathyroidism occurring after total thyroidectomy is not an uncommon postoperative complication. Patients developing PTH deficiency are likely to develop hypocalcemia if not treated in time. These patients will require immediate injectable followed by oral calcium supplements and activated vitamin D (1, 25-dihydroxycholecalciferol or calcitriol). The incidence of hypoparathyroidism reported in the literature varies between 1% to 37%. The aim of our study was to evaluate parathyroid hormone deficiency and the time taken for recovery of parathyroid function in total and near total thyroidectomy patients.
Methods: An observational descriptive study was carried out at a tertiary care center with 50 patients who underwent total or near total thyroidectomy. Exclusion criteria- Patients in whom PTH was found to be below 10 pg/ml or above 65pg/ml preoperatively, those in whom neck dissection was done previously, those with abnormal calcium levels preoperatively and those on calcium replacement preoperatively.
Results: 12% of patients developed PTH deficiency following total thyroidectomy, but only 2% continued to have prolonged depression of PTH level. A significant relation between fall in PTH on post op evening was found with the development of hypocalcaemia in the post op period.
Conclusions: Immediate post operative PTH can be used as an indicator to predict hypocalcemia in the post operative period in patients undergoing total or near total thyroidectomy.

Keywords: Parathyroid hormone, Thyroidectomy, Post op hypoparathyroidism, Hypocalcemia

INTRODUCTION

Parathyroid hormone fall after a thyroidectomy can present as hypocalcaemia. Post thyroidectomy hypocalcaemia is a common complication after thyroidectomy, although thyroidectomy is still a safe procedure. It is usually transient, however in some cases it may become permanent due to loss of functioning

parathyroid gland. Hypocalcaemia has been reported in literature to occur transiently in 30% of patients and permanently in up to 2% of patients.[1,2] This can cause significant discomfort to the affected patients, who eventually will need to take oral calcium supplements and vitamin D for a long time. The possible causes of hypocalcaemia are due to direct injury to the parathyroid glands or insult to its blood supply, extensive resection including neck dissection with total thyroidectomy, Graves' disease, carcinoma and hemodilution. Among them, parathyroid gland injury is the most common factor for developing hypocalcaemia. To minimize parathyroid injury, an attempt to look for all the parathyroid glands and preserve its their blood supply should be done during the operation. However, it is difficult to identify all parathyroid glands and to preserve them due to high probability of inflicting damage compromising the blood supply due to damage during the search process and dissection. (Also, the extent of thyroidectomy and node dissection increases the likelihood of damaging the blood supply of the parathyroid glands.) The incidence of hypoparathyroidism after thyroidectomy that has been reported in literature has varied between 1% to 37%. While much has been published on the incidence of hypocalcaemia in postoperative thyroidectomy patients little is known about the incidence of PTH deficiency and the long-term outcomes of these patients.[3,4] Therefore, this study was aimed to determine the occurrence of post op hypoparathyroidism in patients undergoing total and near total thyroidectomy and to determine the time taken for the recovery of the same.

METHODS

An observational descriptive study was carried out at a tertiary care Armed Forces hospital from January 2015 to April 2016. A total of 50 patients of both sexes undergoing total or near total thyroidectomy were selected. Patients in whom PTH was found to be below 10 pg/ml or above 65pg/ml preoperatively, those in whom neck dissection was done previously, those with abnormal calcium levels preoperatively and those on calcium replacement preoperatively were excluded from the study. A detailed history and thorough general and otolaryngological examination was carried out. Preoperatively all patients were euthyroid. Pre op serum calcium & PTH was measured on the pre operative evening. Patients were taken up for a total or near total thyroidectomy the following day under General Anesthesia. Post op the patients were shifted to the acute surgical ward and serum calcium & PTH were measured on post op evening and on Post Op Day-1 and 2. Patients who had PTH levels of less than 10pg/m and serum calcium less than 8 mg/dl on all the three occasions were followed up with repeat PTH and serum calcium levels after one week, one month and three months after surgery. Patients who manifested with symptoms of hypocalcaemia were started on calcium supplementation in the form of either infusion (10 percent calcium gluconate) or oral supplementation. Appropriate statistical tools were used for analysis.

RESULTS

A total of 50 patients who underwent total or near total thyroidectomy and met the inclusion criteria were recruited into the study. It was found that out of the 50 cases that underwent thyroidectomy, 6 (12%) developed PTH deficiency. This is shown in Table 1.

Table 1: Overall distribution of PTH deficiency in the group.

PTH	Number of patients	Percentage
Abnormal	6	12.0
Normal	44	88.0
Total	50	100.0

Table 2: Distribution of patients with respect to abnormal PTH.

Distribution	Number of patients	Percentage
Post op evening	6	12.0
Day 1	6	12.0
Day 2	5	10.0
1 week	5	10.0
1 month	3	6.0
3 month	1	2.0

Table 3: Relationship between abnormal PTH and Ca.

PTH	Calcium		Total
	Abnormal	Normal	
Abnormal	5	1	6
Normal	2	42	44
Total	7	43	50

All the 6 patients who developed PTH deficiency showed low PTH on the post op evening itself. The number of patients with low PTH over the course of the study (3 months) has been shown in Table 2. This shows that just one measurement in the immediate period is sufficient to detect hypoparathyroidism due to the short half life of PTH. It is seen that at the end of 3 months only 1 patient (2%) continued to have PTH deficiency while all others had recovered.

With respect to fall in calcium in the post op period it was noticed that only one patient manifested with hypocalcaemia on the post op evening while maximum patients manifested hypocalcaemia only on post op day 2 or after 1 week. However, a significant relation between fall in PTH on post op evening was found with the development of hypocalcaemia in the post op period.

The relationship between patients developing fall in PTH with those developing hypocalcaemia can be seen in Table 3.

From the above table we come to the conclusion that the sensitivity of fall in PTH to predict fall in calcium was 71.43 % while the specificity for the same was 97.67%.

DISCUSSION

Hypocalcaemia from hypoparathyroidism is a well-recognized complication of thyroidectomy. It might be temporary in up to 50% & permanent in up to 10% of patients. It can take up to four days to reach its nadir (lowest values) and can lengthen a patient's hospital stay considerably. The rationale for early identification of patients developing post op hypocalcaemia is that the nadir of calcium decline and the onset of symptoms do not occur till 24 to 48 hours post op. The patient may also need repeated blood samplings and routine calcium supplementation. If certain factors that predict the onset of hypocalcaemia on the post op evening itself could be identified, then it could help in considerable shortening the hospital stay of the patients. Recently the PTH assessment which has been used in parathyroid surgery for more than two decades was introduced as an early predictor of parathyroid dysfunction and subsequent hypocalcaemia in thyroidectomy patients.[5] Various authors have also tried to determine the causes leading to a fall in PTH following thyroidectomy surgeries. The cause and pattern of PTH fall can help us to determine the risk for any possible hypocalcaemia and guide us regarding steps that can be taken to prevent the same.

In our study group which consisted of 50 adults who underwent near total or total thyroidectomy, all the patients were screened as per inclusion and exclusion criteria and selected without any gender bias. The maximum patients in our study were in the age group of 41-50 years (42%) with female dominance (88%). However, no correlation was found between fall in PTH or hypocalcaemia with respect to the age or sex of the patients. This is however contradictory with regards to the study performed by Abboud et al which states that there was a statistically significant difference in gender distribution of hypocalcaemia with a preponderance of women in the hypocalcaemia group 10. Of the 50 thyroidectomy patients 6 (12%) had a post op PTH level of less than 10 pg/ml. This falls within the transient hypoparathyroidism incidence range of 7% to 37% shown by various previous studies.[6,7] The mean value of PTH for the hypoparathyroidism group in the post op period has remained below 10 pg/ml in the first week after which it has slowly risen to normal values after a month. In most studies a recovery has been seen to start within the first week itself.[8] This discrepancy is probably because of the small number of patients in our study. No significant difference was found in the mean of the pre op PTH between the two groups of patients who had a fall in their post op PTH and those who didn't. Nor was any difference found between the pre op PTH of the patients who developed hypothyroidism for a shorter time than those who developed hypoparathyroidism for a longer time post-surgery. This is unlike the study done by Ritter et al where pre op PTH was found to be higher in patients who developed permanent hypoparathyroidism than those who developed transient hypoparathyroidism.[8] This difference in low post op PTH between patients undergoing total thyroidectomy and near total thyroidectomy has been found to be statistically significant. Earlier studies have shown a similar relationship between hypocalcaemia with near total thyroidectomy and hypocalcaemia with total thyroidectomy. Hypocalcaemia was found to be more in the total thyroidectomy group.[9] Of the total number of patients who developed hypoparathyroidism post-surgery i.e., 6, only 1 patient (2%) continued to have hypoparathyroidism till the end of the study period of 3 months. 50% of the patients recovered within a month itself. This time course is almost similar to the study conducted by Ritter et al predicting the occurrence and recovery of hypoparathyroidism after thyroidectomy.[8] The slight variation can be explained by the larger number of patients in their study. However, a comment about permanent hypoparathyroidism cannot be made, as in most places the diagnosis of permanent hypoparathyroidism is ascertained only when it persists for 6 months or more. Since our period of follow up was only 3 months we cannot comment on the same. It was also observed that as an early predictor of hypocalcaemia the sensitivity and specificity of fall in PTH as an indicator was relatively high and hence it can be used as a tool for the same and help in decision making relating to early discharge of patients.

Limitations of the study

Different operating surgeons and short follow up period.

CONCLUSION

Early post operative PTH can be used as a predictor of hypocalcemia in patients undergoing Total or Neat total thyroidectomy. This can be used as a tool to decide on early discharge of patients who have a normal PTH instead of waiting for hypocalcemia to manifests which generally happens much later than the fall in PTH.

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