

Role of Prophylactic Administration of Calcium Gluconate in the Early Post Operative Period after Total Thyroidectomy at Ayub Teaching Hospital Abbottabad

Administration of Calcium Gluconate after Total Thyroidectomy

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ABSTRACT

Objective: To assess the role of prophylactic administration of calcium gluconate in early postoperative patients after total thyroidectomy.

Study Design: Prospective study

Place and Duration of Study: This study was conducted at the Surgery Department, Ayub Teaching Hospital, Abbottabad from January 2022 to June 2022.

Materials and Methods: A total of 72 patients were included in the study through the purposive sampling technique, but the participants were divided into two groups randomly. One was group 1 who had received prophylactic calcium gluconate while group 2 had not. All the data were collected from the patient's assessment records and laboratory reports and were analyzed by using the latest version of SPSS 24.

Results: A total of 72 patients were included in the study through the purposive sampling technique, but the participants were divided into two groups randomly. The mean age of Group 1 was 38.42 ± 9.35 , while Group 2 had 39.57 ± 10.7 years. There was male 13 (36.11 %) and female 23 (63.88) in Group 1, furthermore, in Group 2 there were male 17 (47.22 %) and female 19 (52.77 %). Multinodular goiter was the most common reason (17 (47.22%)) for surgery in both of the groups equally. The mean hospital stay in Group 1 was 2.4 ± 0.8 while in Group 2 was 3 ± 1.3 having a p-value of 0.005. Consequently, the level of Ca^{+} after 12 and 24 hours in Group 1 was 8.9 ± 0.4 and 8.9 ± 0.5 respectively, however, in Group 2 was 8.2 ± 0.3 and 8.4 ± 0.2 . Paresthesia in Group 1 after 12 and 24 hours 2 (5%) and 1 (2.7 %) was accordingly, similarly, in Group 2, 5 (13.8 %) and 3 (8.3 %) accordingly. Comparably, the intravenous calcium 1 (2.7 %) in Group 1 and Group 2, 4 (11.11 %).

Conclusion: The present study concluded that the prophylactic use of calcium gluconate in the patients who underwent a total thyroidectomy had a more prominent effect on the patient's hospital stay as well as on the postoperative serum calcium. Those in Group 1 who had received calcium had shorter hospital stays and a higher level of serum as well as requirements of IV calcium as compared to others in Group 2.

Key Words: Serum Calcium, Multinodular Goiter, Paresthesia, Grave Diseases

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INTRODUCTION

In contemporary surgical practice, a thyroidectomy ranks among the ranks of those most frequently done operations. The condition known as thyroid cancer, an enlarged thyroid as well as hyperthyroidism that causes

localized constriction is some of the conditions that call for complete thyroid removal.¹ In accordance with a meta-analysis everywhere between 19% - 38% of sufferers will develop temporary postoperatively low calcium levels, whereas lifelong a shortage of calcium occurs in somewhere between 0% - 3% of instances, leading to higher ongoing illness and longer hospitalizations.² The majority of people who acquire it won't even notice any of the symptoms, however, some will have severe manifestations that demand immediate medical attention. It is possible for it to appear up to 03 days following surgery, as well as a prompt diagnosis can be extremely important, particularly in those with susceptibility who receive the discharge from the hospital soon after the operation and continue to be treated outside of the hospital.³ Between 0.5% to 50% of patients who undergo a total thyroid removal experience a shortage of calcium.⁴ while between 0.4%

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- 13.8% of patients who undergo a procedure to remove the thyroid develop persistent hypocalcemia.⁵ Following complete thyroidectomy, low calcium levels are generally the problem that occurs most frequently among patients. After complete thyroidectomy, the percentage of patients who develop hypocalcemia varies from 5 - 60 percent.^{6,7} Hypocalcemia is the outcome of either the devascularization or the removal of the glands that produce parathyroid hormone after a thyroidectomy. It is possible for a shortage of calcium to appear undiagnosed in which there is only a minor reduction in the blood's Ca⁺ level, while it may become symptoms when the individual with the condition exhibits Chvostek's as well as Trousseau's symptoms as well as cramping in the muscles. Hypocalcemia is a common complication that occurs between 24- and 48 hours following surgery.⁸ A blood Ca⁺ concentration that is less than 8.5mg/dl indicates hypocalcemia. The typical levels of calcium levels in the blood vary between 2.10 – 2.6 mmol/l (as well as 8.5 through 10.5 mg/dl).⁹ When parathyroid glands fail to produce enough PTH, the consequence is low calcium levels after surgery. The most common consequence of total thyroidectomy is temporary hypoparathyroidism (16.5%-71% of clients), whereas persistent hypoparathyroidism develops in just 1.5%-2% of individuals.¹⁰ It is recommended to deliver via IV calcium gluconate with a dosage of 1ml/kg/h. Initially, 10-20ml containing a 10 percent solution is suggested to be delivered steadily unless complaints vanish, after which, fifty milliliters of 10 percent calcium gluconate must be mixed with 500 milliliters of a 5% dextrose solution. Preventing symptoms of low calcium levels and improving the probability of a quick discharge from the hospital following bilaterally thyroid gland surgery have also been postulated as potential benefits of regular oral supplementation with vitamin D as well as calcium.¹¹ Therefore, the purpose of the current study is to assess the role of the prophylactic use of calcium gluconate in patients who underwent a total thyroidectomy.

MATERIALS AND METHODS

The current prospective study was conducted Surgery department Ayub Teaching Hospital Abbottabad from January 2022 to June 2022 after the provision of a certificate from the institutional review board. A total of 72 patients were included in the study through the purposive sampling technique, but the participants were divided into two groups randomly. One was group 1 who had received prophylactic calcium gluconate while group 2 had not. Both groups were kept blinded regarding the treatment. Group had received 1 gm calcium gluconate after the surgery and the concentrations of calcium were monitored right away following surgery, as well as one (1) and twelve (12) hours later, and again first thing on the following

morning of the initial day following surgery. The levels of phosphate were looked at as well. Each individual was examined by an experienced nurse at regular intervals after the operation for any indications or symptoms of a lack of calcium and the results of these examinations were recorded in gathering information forms. We kept documentation of the symptomatic as well as lab incidences of hypocalcemia as well as the regularity of calcium injections for treatment. Every single patient received a discharge from the hospital within forty-eight hours following surgery, provided that their calcium levels were higher than 7.5 mg while ensuring they weren't experiencing any symptoms of hypocalcemia or having any complications following the procedure. The concentrations of calcium were determined for a week after operating in both of the groups, and patients were periodically followed out via the surgical clinic. Following clients being discharged from the hospital, they were instructed to contact their physician or return to the emergency department if they experienced any symptoms consistent with hypocalcemia. The presence of hypocalcemia indications, the delivery of additional Ca⁺, as well as hospitalizations, had been noted. All the data were collected from the patient's assessment records and laboratory reports and were analyzed by using the latest version of SPSS 24.

RESULTS

A total of 72 patients were included in the study through the purposive sampling technique, but the participants were divided into two groups randomly. One was Group 1 who had received prophylactic calcium gluconate while Group 2 had not, moreover, both the groups had an equal number of participants which was 36. The mean age of Group 1 was 38.42 ± 9.35, while Group 2 had 39.57±10.7 years. There was male 13 (36.11 %) and female 23 (63.88) in Group 1, furthermore, in Group 2 there were mal 17 (47.22 %) and female 19 (52.77 %). Multinodular goiter was the most common reason (17 (47.22%)) for surgery in both of the groups equally. In Group 1 malignancy and grave disease were 4 (11.11%) and 9 (25 %) similarly, in Group 2 as 6 (16.6%) and 8 (22.22%) accordingly. [Table1]. Table 2 highlights the comparison of both groups postoperatively. The mean hospital stay in Group 1 was 2.4± 0.8 while in Group was 3±1.3 having a p-value of 0.005. The mean serum calcium after one hour in Group 1 was 8.7 ±0.3, however, in Group 2 was 8.6±0.5. Consequently, the level of Ca⁺ after 12 and 24 hours in Group 1 was 8.9±0.4 and 8.9±0.5 respectively, however, in Group 2 was 8.2±0.3 and 8.4±0.2. paresthesia in Group 1 after 12 and 24 hours 2 (5%) and 1 (2.7 %) was accordingly, similarly, I Group 2, 5 (13.8 %) and 3 (8.3 %) accordingly. Comparably, the intravenous calcium 1 (2.7 %) in Group 1 and Group 2, 4 (11.11 %).

Table No. 1: Demographic Characteristics and Etiology

	Group 1 (N=36)	Group 2 (N=36)	P value
Age (years)	38.42 ± 9.35	39.57±10.7	0.31
Male	13 (36.11 %)	17 (47.22 %)	0.51
Female	23 (63.88)	19 (52.77 %)	
Reason for surgery			
Graves' disease	9 (25 %)	8 (22.22%)	0.03
Follicular adenoma	6 (16.6 %)	5 (13.88%)	
Malignancy	4 (11.11%)	6 (16.6%)	
Multinodular goiter	17 (47.22%)	17 (47.22%)	

Group 01= Prophylactic calcium gluconate Group 2= Nonprophylactic calcium gluconate

Table No. 2: Comparison of both groups

	Group 1 (N=36)	Group 2 (N=36)	P value
Hospital stays (days)	2.4 ± 0.8	3±1.3	0.005
Level of Ca+ after 1 hour (mean)	8.7 ±0.3	8.6±0.5	0.861
Level of Ca+ after 12 hours (mean)	8.9±0.4	8.2±0.3	0.03
Level of Ca+ after 24 hours (mean)	8.9±0.5	8.4±0.2	0.01
Level of Ca+ after a week (mean)	9.3±0.5	8.8±0.7	0.02
Paresthesia after 12 hours	2 (5%)	5 (13.8 %)	0.03
Paresthesia after 24 hours	1(2.7%)	3 (8.3%)	0.03
IV Ca+ requirements	1 (2.7 %)	4 (11.11 %)	0.002

DISCUSSION

Hypoparathyroidism remains an additional potentially dangerous challenge of surgical removal of the thyroid. The glands that make up the parathyroid are responsible for the production of PTH, a hormone that is closely entwined with the balance of blood calcium. PTH raises the amount of calcium in the blood by leading to the breakdown of bones as well as enhancing renal capacity to absorb calcium. Because the hormone PTH additionally raises the kidney's elimination of phosphorous, PTH minimal levels of this hormone lead to elevated serum concentrations of phosphorus.¹² Supplements of Ca+ are not recommended to be given to individuals that do not exhibit any symptoms of a low calcium level in immediately following surgery. In those with symptoms, weaning off supplemental mineral, calcium after two to three months can indicate that a condition called hypothyroidism is transitory by stimulating the shocked PT glands to secrete PTH. For thyroid dysfunction to be lasting, supplementation with calcium must have been required for at least 6 months.¹³ In the present study, the mean age of Group 1 was 38.42 ± 9.35, while Group 2 had 39.57±10.7 years. There were male 13 (36.11 %) and female 23 (63.88) in Group 1, furthermore, in Group 2 there were mal 17 (47.22 %) and female 19 (52.77 %). Similarly, a study conducted reported that the average age of each of the fifty participants was determined to be 35 ± 8.23 years, while 38 (76.0%) had been female whereas 12 (24.0%) were male.¹⁴ In our study, there were Multinodular goiter was the most common reason (17 (47.22%)) for surgery in both of the groups equally. In Group 1 malignancy and grave disease were 4 (11.11%) and 9

(25 %) similarly, in Group 2 as 6 (16.6%) and 8 (22.22%) accordingly, these findings were supported by a study showed that overall, 76% of our clients were found to have a multi-nodular goiter, with 20% having a solitary solid tumor and 10% having an enlarged L. Sixty percent (60%) of the FNA findings were follicular lesions, afterward 20 % were colloid goiters, and eight percent (8%) were Hashimoto's thyroiditis.¹⁵ The mean hospital stay in Group 1 was 2.4± 0.8 while in Group 2 was 3±1.3 having a p-value of 0.005. The mean serum calcium after one hour in Group 1 was 8.7 ±0.3, however, in Group 2 was 8.6±0.5. Consequently, the level of Ca+ after 12 and 24 hours in Group 1 was 8.9±0.4 and 8.9±0.5 respectively, however, in Group 2 was 8.2±0.3 and 8.4±0.2. paresthesia in Group 1 after 12 and 24 hours 2 (5%) and 1 (2.7 %) was accordingly, similarly, in Group 2, 5 (13.8 %) and 3 (8.3 %) accordingly. Comparably, the intravenous calcium 1 (2.7 %) in Group 1 and Group 2, 4 (11.11 %). A comparable study conducted by Ghafouri A et al reported that the mean hospital stays in the calcium group was 2.1±0.3 while in the non-calcium group as 2.9±1.4 days.¹⁶ Twelve hours following the operation, those who were given calcium had an average greater calcium level compared with those who were not (8.90.5 vs. 8.50.7 mg/dl, p=0.092). The groups with the calcium group had a more elevated average Ca+ level on the first day after surgery versus the non-calcium category (8.90.5 vs. 8.40.8, p=0.037).¹⁶ Hafez AT et al reported that Tetany affected just 5% of individuals in the first group but 15% within the second group. The following day after surgery, group 1 individuals had substantially greater serum Ca+ levels

versus group 2 clients, having a median range of about 8.1 ± 0.3 versus 7.8 ± 0.4 .¹⁷

CONCLUSION

The present study concluded that the prophylactic use of calcium gluconate in the patients who underwent a total thyroidectomy had a more prominent effect on the patient's hospital stay as well as on the postoperative serum calcium. Those in Group 1 who had received calcium had shorter hospital stays and a higher level of serum as well as requirements of IV calcium as compared to others in Group 2.

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Conflict of Interest: The study has no conflict of interest to declare by any author.

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