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Research Article

RATE OF OCCURRENCE OF POST-SURGICAL HYPOCALCAEMIA AMONG PATIENTS WHO UNDERWENT TOTAL THYROIDECTOMY

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Abstract:

Objective: All the patients who underwent total thyroidectomy are present with high risk for post-surgical hypocalcaemia, which can cause a significant morbidity for short as well as long terms. This research work aimed to find out the rate of occurrence of post-surgical hypocalcaemia in the patients who underwent total thyroidectomy.

Methodology: A sum of eight hundred and fifty-four patients who had to undergo total thyroidectomy from 2012 to 2019 at Surgical Department of Aziz Bhatti Shaheed Teaching Hospital Gujrat, were the participants of this research work. The collection of the information carried out for the characteristics of demography, diagnosis before surgical intervention, levels of calcium after surgery, extent of operation and final pathology after surgery.

Results: A sum of eight hundred and fifty-four patients underwent total thyroidectomy. Among total patients, 748 (87.58%) patients were malignant and 106 (12.41%) patients were benign. In both types of patients, 404 (47.30%) patients underwent total thyroidectomy and 450 (52.69%) patients had to undergo completion thyroidectomy. Overall rate of occurrence of transient hypocalcaemia was 7.0% (n: 60) and rate of occurrence of permanent hypocalcaemia was 0.110% (n: 1).

Conclusion: Hypocalcaemia is matter of serious concern after the total thyroidectomy. Scrupulous techniques of surgery, detection and protection of vascularity of parathyroid glands are important in the prevention of hypocalcaemia after surgical intervention of total thyroidectomy.

KEYWORDS: Pathology, Hungry Bone Syndrome, Hypocalcemia, Scrupulous, Intervention, Demography.

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INTRODUCTION:

The complication which is most common after the application of total thyroidectomy, is hypocalcaemia, which has two types permanent or transient. The range of the reported prevalence of transient hypocalcaemia is from 1.0% to 68.0%, and range of reported prevalence of permanent hypocalcaemia is from 0.0% to 13.0% [1-5]. Furthermore, about 20.0% transient hypocalcaemia occurs after application of total thyroidectomy only, it has 50.0% to 60.0% increase with the bilateral dissection of central neck [6]. There is extreme uneasiness in the patients present with symptomatic hypocalcaemia, and this condition increases the stay in hospitals. Symptoms of this complication includes sensation of tingling, cramps, tetanic contraction, paresthesia, spasms of muscle, and prolong interval of QT on electrocardiogram [7]. Most important reason of post-thyroidectomy is damage to the parathyroid gland. This may be because of the devascularisation of parathyroid, inadvertent excision and impediments of venous drainage. Other mechanisms recommended for the hypocalcaemia after total thyroidectomy comprises HBS (Hungry Bone Syndrome) in which there is fast calcium transfer into the bones following surgical therapy of the patients with thyrotoxicosis before surgery and intra-operative haemo-dilution [4, 8]. Current research works are emphasizing on search for suitable early markers of post-surgical hypocalcaemia. The monitoring of total calcium (Ca) in serum or (iCa++) ionized calcium, circulating slopes in alteration of Ca or iCa++, calculating intra-operative or standard level of intact parathyroid hormone and making an advance algorithm with the combination of higher than 2 of these values, have all been stated as effective markers [5]. Though, these markers also facilitate the specialist surgeon of field, early discharge of the patients from the hospital and there can be saving of the expenses of hospital [9]. The rationale of this research work was to find out the rate of occurrence of post-surgical hypocalcaemia who underwent total thyroidectomy.

MATERIAL AND METHODS:

This observational study was conducted at Aziz Bhatti Shaheed Teaching Hospital Gujrat. In this research work, we analyzed the medical records of eight hundred and fifty-four patients with benign & malignant diseases of thyroid who underwent total thyroidectomy from 2012 to 2019. Patients present with the concomitant of dissection of central neck lymph node, patients who were present with prior or associated parathyroidectomy, acknowledged hyperparathyroidism, hypocalcaemia before surgery and history of the chemotherapy and radiotherapy

related with neck and head got exclusion from this research work. The studied outcome was the hypocalcaemia after total thyroidectomy on 1st, 2nd, and 5th day after surgical intervention and at six months after the surgery.

The determination of the serum calcium after the surgical intervention carried out on 1st, 2nd and 5th day of surgery. There was no proper standard for the measurement of the level of serum calcium after 1st post-surgical day in patients with normal level of serum calcium. The definition of the transient hypocalcaemia describes that level of serum calcium lower than 8 mg/dl (2.0 mmol/L) on minimum 2 consecutive calculations or hypocalcaemia symptoms and signs. The definition of the permanent hypocalcaemia states the requirement for supplements of Vitamin-D or/and calcium to maintaining the normocalcaemia at complete 6 months or greater duration after surgical intervention [8]. The Parathyroid Hormone after surgical intervention carried out only in single patient suffering from permanent hypocalcaemia because of limited clinical resources. We reviewed the clinical records of the patients for various variables as age of the patient, gender, diagnosis before surgery, extent of the surgery, levels of calcium after surgical intervention, the presence of transient & permanent hypocalcaemia and records about the histopathology of the patients. We used the SPSS V.20 for the statistical analysis of the collected information. We obtained the ethical approval from the institute for the conduction of this research work. As this research work was a retrospective research work, therefore there was no need of consent from the patients of this research work.

RESULTS:

In this current research work, we analyzed the medical records of eight hundred and fifty-four patients. There were total 78.45% (n: 670) female and 21.54% (n: 184) male patients in this research work. The average age of the patients was 42.10 years with a range of age from 14 to 76 years. Among the included patients, 47.30% (n: 404) patients had to undergo total thyroidectomy and 52.70% (n: 450) patients had to undergo completion thyroidectomy. Among total patients, 748 (87.58%) patients were malignant and 106 (12.41%) patients were benign. Among sixty patients who were present with the development of hypocalcaemia, 56.60% (n: 36) patients were malignant and 43.30% (n: 26) patients were benign and one other patient who was present with the development of the permanent hypocalcaemia was from the group of benign.

Table-I: Frequency of Transient and Permanent Hypocalcemia at Different Periods

Parameters		No	Percent
Overall frequency		60	7%
Transient Hypocalcemia incidence	1st postoperative day	23	2.69%
	2nd postoperative day	29	3.39%
	5th postoperative day	7	0.81%
Permanent hypocalcaemia		1	0.11%

Highest rate of occurrence of transient hypocalcaemia was on second day after surgery that is 3.390% in twenty-nine patients and its delay was up to 5th day after surgery in 0.81% (n: 7) patients. There was only single patient (0.11%) who needed supplement of Vitamin-D and calcium for greater than 6 months after the surgery and complete follow up till one year and it was considered as permanent hypocalcaemia, we also did the levels of Parathyroid Hormone after surgery in this patient and found it much low.

DISCUSSION:

Hypocalcaemia after total thyroidectomy is the acknowledged abnormality which can lead to high rate of morbidity for short as well as long term [4, 8,10]. This complication increases the duration in hospital and it also enhances the overall expenses of thyroidectomy as well as discomfort in the patients experiencing it [11]. Many surgeons are prescribing the supplements of Vitamin-D and calcium for the patients who are undergoing total thyroidectomy to reduce the complication of hypocalcaemia. However, this very practice can decrease the amount of the symptomatic patients, but it can be much problematic as this treatment is very costly and adversely tolerated. It can mislead the rate of incidence of hypocalcaemia after surgery particularly when definitions are based on levels of serum calcium [12]. The most ideal way is to forecast which patient will suffer from development of hypocalcaemia. By this method, we can give the treatment to the patients who truly requires the replacement treatment. The intra-operative PTH (Parathyroid Hormone) assay (Quick- Parathyroid Hormone) has been utilized as a trustworthy and fast procedure to identify the hypoparathyroidism. Though, the high expense of the quick- Parathyroid Hormone has often obstructed its application [13, 14]. In this research work, we assessed the level of serum calcium on 1st, 2nd and 5th day after surgical intervention for the prediction of the hypocalcaemia as a substitute to level of quick- Parathyroid Hormone because of low level of resources and much expenses of Parathyroid Hormone [15].

Post-surgical hypocalcaemia is commonly examined in 2 to 5 days after the application of total or sub-total thyroidectomy. Though in majority of the patients, hypocalcemia reverses impulsively [16], but it can remain everlasting or permanent if it is due to the irreversible injury to the parathyroid glands. The permanent hypocalcaemia is much severe and lethal abnormality and this complication

requires treatment for complete life and complete routine follow up. In this current retrograde research work, postsurgical hypocalcaemia was examined in 7.0% out of eight hundred and fifty-four patients who underwent total & completion thyroidectomy and this described rate is much low as stated by Esimontas in his research work [17]. He reported the 64.20% rate of prevalence of transient hypocalcaemia in total two hundred and fifty-seven patients. In one other local research work, the rate of prevalence of transient hypocalcaemia was 21.620% in seventy-four patients which is also much higher as compared to the results of this current research study [18]. However, various research works utilized different descriptions and these definitions of those various research works are not comparable with each other.

In this research work, we found the permanent hypocalcaemia in only one patient (0.11%) which is much low as compared to the results of research work conducted by Edefe O [19], who stated 5.50% rate of prevalence of permanent hypocalcaemia in two hundred and twenty patients. Following surgery of thyroid, there is variation in the range of postsurgical hypocalcaemia stated in this literature [1]. There are different factors which are responsible for these variations in this literature such as kind of the thyroid disease, difference in hypocalcaemia definitions, and utilization of surgical method for thyroidectomy. All the patients present with the local thyroidectomy with dissection of the central lymph node had an enhanced risk of acquiring temporary hypocalcemia. However, the exclusion of the patients carried out from this research work who were present with malignancy and required the dissection of the central lymph node. In this research work, 87.58% patients underwent surgeries for malignant thyroid diseases and 12.40% patients underwent surgeries for benign diseases of thyroid [20].

There was development of the hypocalcaemia in 56.60% patients of malignant thyroid disease and 43.0% patients with benign disease of thyroid. The results of this current research work are comparable with the findings of research works conducted by Kumar. Our main policy in this research work for the procedure of total thyroidectomy is to preserve the vascularity of parathyroid glands. The identification of parathyroid glands carried out before dissection for the identification and the saving recurring laryngeal nerve, prevent any electro thermal and contact of ultrasonic device near to the parathyroid glands [21]. We normally initiate the mobilization of superior pole of the thyroid gland from direction of medial to lateral with individual ligation of branches from superior artery of thyroid, by this movement the supply of blood of the superior parathyroid gland can be saved. Liberal resection & auto-transplantation of this parathyroid glands have a higher risk of transient but noteworthy hypocalcaemia [22]. When there is compromise in the supply of blood of parathyroid glands, and its selectively resection carried out and its placement carried out in the iced saline. The mincing of parathyroid gland carried out in small pieces and auto-transplanted in muscle of ipsilateral sternocleidomastoid. The amount of the parathyroid glands or unintentionally excised were not analyzed because of small amounts of sub-groups. The most important limitations of this research work were the frozen section and intra-operative and postsurgical Parathyroid Hormone was not carried on regular basis for examination.

CONCLUSION:

Hypocalcaemia is the main concern after the surgery of total thyroidectomy. Careful techniques of surgery, preservation and detection of the vascularity of the parathyroid glands are significant in the prevention of the hypocalcaemia after surgery of total thyroidectomy. Postsurgical monitoring of the calcium in serum and treatment at very early stage can prevent the morbidity in initial stage.

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