



ORIGINAL RESEARCH PAPER

General Surgery

POST OPERATIVE HYPOCALCEMIA IN HASHIMOTO'S THYROIDITIS

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INTRODUCTION

Hashimoto's thyroiditis, also termed chronic lymphocytic thyroiditis, is an autoimmune disorder characterized by progressive destruction of thyroid tissue due to lymphocytic infiltration and the production of anti-thyroid antibodies, such as anti-thyroid peroxidase (anti-TPO) and anti-thyroglobulin (anti-TG) antibodies. This condition predominantly affects women, with a female-to-male ratio of approximately 6:1, and typically manifests between the third and fifth decades of life. Histopathologically, the thyroid gland exhibits follicular atrophy, Hurthle cell metaplasia, and stromal fibrosis interspersed with lymphoid germinal centers. While many patients remain euthyroid initially, the disease often progresses to hypothyroidism, necessitating lifelong thyroid hormone replacement. Genetic predisposition (e.g., HLA-DR3/DR4 alleles) and environmental triggers¹ (e.g., iodine excess, viral infections) are implicated in its etiology. Hashimoto's is the most common cause of hypothyroidism in the United States, India and globally. It can occur to anyone, but it is seen more often in women, those with a family history of thyroid disease and more frequently with advancing age².

Thyroidectomy in Hashimoto's thyroiditis is reserved for specific clinical scenarios. Indications include suspicion of malignancy (e.g., due to dominant nodules or cytological atypia), compressive symptoms (dysphagia, dyspnea, or hoarseness), refractory pain, or cosmetic concerns from a bulky goiter. Despite medical management with levothyroxine, persistent structural or symptomatic disease often necessitates surgical intervention. However, the fibrotic and adherent nature of the inflamed gland complicates dissection, increasing the risk of intraoperative injury to adjacent structures, particularly the parathyroid glands and recurrent laryngeal nerves. Postoperative hypocalcemia is a significant complication following total thyroidectomy, with transient rates ranging from 6.9% to 49% and permanent hypoparathyroidism occurring in up to 33% of cases. In Hashimoto's thyroiditis, this risk is exacerbated by glandular fibrosis, adhesions, and compromised parathyroid vascular supply during dissection. Hypocalcemia manifests as neuromuscular irritability (e.g., paresthesia, tetany), life-threatening laryngospasm, or arrhythmias, often requiring prolonged calcium and calcitriol supplementation. Delayed recovery of normocalcemia further burdens healthcare resources and patient quality of life. Despite its clinical relevance, the incidence and predictors of this complication in Hashimoto's patients remain underexplored in diverse populations. This prospective cohort study aimed to determine the incidence, recovery patterns, and risk factors of postoperative hypocalcemia in patients with cytologically confirmed Hashimoto's thyroiditis undergoing total thyroidectomy³. By analyzing preoperative thyroid status,

surgical variables, and serial calcium measurements, the study sought to identify actionable insights to optimize perioperative care and reduce morbidity in this high-risk cohort.

This prospective cohort study, conducted from January 2023 to January 2024 in Al-ameen medical college hospital, Vijayapura, evaluated 150 patients diagnosed with Hashimoto's thyroiditis via fine-needle aspiration cytology (FNAC) who underwent total thyroidectomy. The target sample size, calculated as 205 using the formula:-

$$N = \frac{4PQ}{d^2}$$

Where,

$$P=33\%, Q=67\%, d=6.6\%$$

Here the data was adjusted to 150 due to availability constraints. Inclusion criteria encompassed individuals aged >13 years with cytologically confirmed Hashimoto's thyroiditis requiring total thyroidectomy, while exclusion criteria excluded patients undergoing completion thyroidectomy, concurrent lymph node dissection, preoperative calcium supplementation, or those with preexisting hypocalcemia. Preoperative assessments included clinical evaluations, thyroid hormone profiling, ultrasound imaging, FNAC for suspicious nodules, contrast-enhanced CT for retrosternal extension, and direct laryngoscopy for vocal cord function. Surgical procedures employed capsular dissection under general anesthesia, emphasizing parathyroid and recurrent laryngeal nerve preservation; auto-transplantation into the sternocleidomastoid was performed for compromised parathyroid viability. Postoperative monitoring measured corrected serum calcium levels at 24 hours, 48 hours, and 2 weeks, with hypocalcemia (<8 mg/dL) managed via oral calcium/calcitriol or intravenous gluconate for severe symptoms. Data on demographics, thyroid status, and calcium recovery were analyzed using CSC sepi-info software, applying Chi-square, Z-test, and ANOVA for qualitative and quantitative assessments.

RESULTS

The study included 150 patients with Hashimoto's thyroiditis (mean age: 37 years; female-to-male ratio: 1:5.67) undergoing total thyroidectomy. Of these, 48 patients exhibited clinical features of hypocalcemia postoperatively, while biochemical confirmation (corrected serum calcium <8 mg/dL) was observed in 39 cases (26% incidence). A statistically significant association between Hashimoto's thyroiditis and postoperative hypocalcemia was noted (odds ratio: 2.3; 95% CI; *p* <0.0001). Among the 39 hypocalcemic patients, recovery rates were delayed: only 5 (12.8%) regained

normocalcemia by 48 hours, while 24 (61.5%) recovered by the 2-week follow-up, leaving 15 patients (38.5%) with persistent hypocalcemia. Preoperative thyroid status analysis revealed that 24 hypocalcemic patients (61.5%) were hyperthyroid, and 15 (38.5%) were euthyroid prior to surgery.

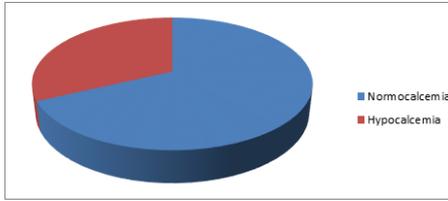


Fig.1. Incidence of hypocalcemia

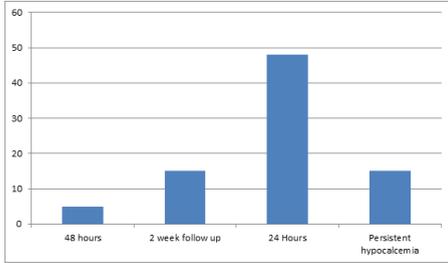


Fig.2. Patients with Hypocalcemia and their recovery time

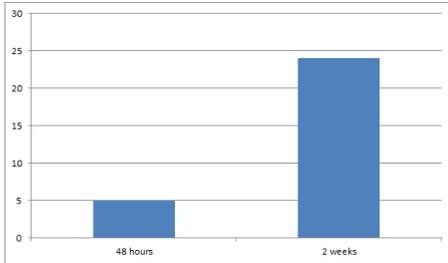


Fig.3. Recovery

DISCUSSION

This study of 150 patients with Hashimoto's thyroiditis undergoing total thyroidectomy highlights critical insights into postoperative hypocalcemia, aligning with broader epidemiological and pathophysiological patterns of the disease. Key findings and their implications are discussed below:

- **Demographic and Clinical Patterns** - Female Predominance: The female-to-male ratio (1:5.67; 128 females, 22 males) and peak incidence in the 30–50-year age group reflect the autoimmune nature of Hashimoto's thyroiditis⁵, consistent with its known hormonal and genetic associations.
- **Surgical Indications:** Compressive symptoms, cosmetic concerns, or suspicion of malignancy drove thyroidectomy, emphasizing the clinical challenges posed by glandular fibrosis and adhesions.
- **Incidence and Recovery of Hypocalcemia** - High Incidence: Biochemical hypocalcemia occurred in 26% of patients (39/150), underscoring the elevated risk compared to non-inflammatory thyroid conditions. This aligns with literature attributing the risk to gland fibrosis and parathyroid trauma during dissection. Delayed Recovery: Only 12.8% (5/39) recovered normocalcemia by 48 hours, rising to 61.5% (24/39) at 2 weeks. Persistent hypocalcemia in 38.5% (15/39) suggests chronic inflammation or vascular compromise impairs parathyroid function.
- **Risk Factors** - Preoperative Hyperthyroidism: 61.5% (24/39) of hypocalcemic patients were hyperthyroid preoperatively, likely due to altered calcium metabolism or bone turnover. Chronic Disease Duration: 40% (6/15) of persistent cases had >20-year disease history, implicating long-standing fibrosis in complicating parathyroid preservation.

- **Pathophysiological Correlates-** Histopathological features, such as lymphoplasmocytic infiltration, Hurthle cell metaplasia, and stromal fibrosis, correlate with intraoperative challenges. The dense fibrosis in advanced cases disrupts tissue planes, increasing inadvertent parathyroid injury or devascularization.

Clinical Implications

- **Preoperative Optimization:** Achieving euthyroidism and assessing vocal cord function remain vital.
- **Intraoperative Vigilance:** Meticulous capsular dissection and parathyroid auto-transplantation for ischemic glands may mitigate hypocalcemia risk.
- **Postoperative Monitoring:** Prolonged calcium monitoring (beyond 48 hours) is crucial, particularly in hyperthyroid or long-standing Hashimoto's cases³.

Limitations And Future Directions

- **Sample Size Constraints:** Despite adjustment to 150 patients, the original target (205) was unmet, potentially affecting statistical power.
- **Single-Center Design:** Generalizability may be limited; multicenter studies are needed.
- **Long-Term Data:** Follow-up beyond 2 weeks could clarify permanent hypoparathyroidism rates.

CONCLUSION

Hashimoto's thyroiditis significantly elevates hypocalcemia risk post-thyroidectomy, necessitating tailored surgical and postoperative strategies. Recognizing preoperative hyperthyroidism and chronicity as risk factors, alongside adopting meticulous surgical techniques, can optimize outcomes in this high-risk cohort. Hashimoto's thyroiditis, a chronic autoimmune thyroid disorder, exhibits a pronounced female predilection, with a female-to-male ratio of approximately 6:1, and predominantly manifests in individuals aged 30–50 years, correlating with hormonal fluctuations and genetic susceptibility linked to HLA-DR alleles. The pathologic features of lymphocytic infiltration, especially of T cells, and follicular destruction are the histological hallmark of autoimmune thyroiditis (AIT), that lead to gradual atrophy and fibrosis⁵. While medical management with levothyroxine remains the cornerstone of therapy, surgical intervention via total thyroidectomy is reserved for select cases, including compressive symptoms (e.g., dysphagia, dyspnea), refractory pain, cosmetic concerns, or suspicion of malignancy arising from nodular transformation. The diagnosis of HT is determined by biochemical (positive circulating thyroid autoantibodies) and imaging tests (hypoechoic inhomogeneous thyroid structure in ultrasonography) with characteristic clinical features⁶. However, thyroidectomy in this cohort carries a heightened risk of postoperative hypocalcemia (26% incidence in this study), attributable to glandular fibrosis, perithyroidal adhesions, and intraoperative challenges in preserving parathyroid vascular integrity. The inflammatory milieu of Hashimoto's thyroiditis, characterized by lymphoplasmocytic infiltration and stromal fibrosis, often obscures anatomical planes, increasing iatrogenic injury to parathyroid glands—critical regulators of calcium homeostasis via parathormone (PTH) secretion. Furthermore, preoperative hyperthyroidism, identified in 61.5% of hypocalcemic cases, may exacerbate calcium dysregulation through osteodystrophy or heightened skeletal calcium mobilization. Persistent hypocalcemia, observed in 10% of patients at 2 weeks, underscores the role of chronic disease duration (>20 years in 40% of unresolved cases) in potentiating irreversible parathyroid damage. To mitigate these risks, meticulous surgical techniques such as capsular dissection, intraoperative parathyroid identification, and autotransplantation of devascularized glands are imperative. Given the delayed recovery trajectory—only 12.8% achieving normocalcemia within 48 hours—prolonged postoperative monitoring and calcium supplementation are

essential. Consequently, thyroidectomy should be judiciously employed in Hashimoto's thyroiditis, prioritizing stringent patient selection, multidisciplinary preoperative optimization, and surgeon expertise to balance therapeutic efficacy against procedural morbidity.

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