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RESEARCH ARTICLE
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DIAGNOSTIC ACCURACY OF ULTRASONOGRAM NECK VERSUS THYROGLOBULIN FOR FOLLOW UP OF PAPILLARY CARCINOMA PATIENTS WITH TOTAL THYROIDECTOMY.

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Abstract:
Objective: To assess the diagnostic accuracy of ultrasonography neck (Neck US) and thyroglobulin (Tg) tests for the follow-up of patients with papillary thyroid carcinoma (PTC) following total thyroidectomy.
Methods: This study looked at neck US and Tg levels in detecting disease residual or recurrence in PTC patients who had undergone total thyroidectomy. A total of 100 patients were included in the analysis, and Tg testing and Neck US were performed on them at regular follow-up intervals.
Results: The Thyroglobulin (Tg) test demonstrated a higher sensitivity of 83.33% than Neck US, which had a sensitivity of 66.67%. This suggests that the Tg test is more effective in detecting true positive cases of recurrence or residual disease. But because Neck US had a higher specificity, it was better at ruling out false positives. Early detection was aided by Tg, and recurrence or residual disease was confirmed by Neck US. Tg and Neck US offered complementary diagnostic data when combined.
Conclusion: The Thyroglobulin (Tg) test is more sensitive and, as a result, more successful in detecting recurrence or residual disease in PTC patients following a thyroidectomy. Neck ultrasonography continues to be a helpful confirmatory test to assist clinicians in making decisions and excluding false positives due to its higher specificity. A combined approach that makes use of both tests is recommended for PTC patients in order to provide the best follow-up care.

Keywords: Thyroglobulin, neck Ultrasonogram, Papillary carcinoma, thyroidectomy

Introduction: The most prevalent kind of thyroid cancer is papillary thyroid carcinoma (PTC), which frequently necessitates a complete thyroidectomy and radioactive iodine (RAI) treatment. [1]. Long-term follow-up is essential to identify disease recurrence or persistent disease, which can affect up to 30% of patients, even with advancements in surgical and adjuvant treatment. The prognosis is improved and the right interventions are guided by accurate and timely recurrence detection [2,3].
Neck ultrasonography (US) and serum thyroglobulin (Tg) measurement are the two main methods used for post-treatment surveillance [4]. Because serum Tg is only produced by thyroid follicular cells, it is a sensitive biochemical marker for residual or recurrent disease. An undetectable Tg level typically signifies a successful course of treatment in patients who have had total thyroidectomy and

RAI ablation, while increasing levels imply a recurrence of the disease. However, the presence of anti-thyroglobulin antibodies (TgAb) may compromise the accuracy of Tg monitoring, potentially producing false-positive or false-negative results [5].

Contrarily, neck ultrasonography is a popular imaging technique that allows for the direct visualization of tumor recurrence, lymph node involvement, and residual thyroid tissue in the cervical region. It is an affordable, non-invasive tool that offers comprehensive structural data [6,7]. But because of its high operator dependence, it can produce false-positive results, which could result in needless biopsies and treatments. The effectiveness of these diagnostic techniques, both separately and in combination, in identifying PTC recurrence must be assessed due to their complementary nature. In the follow-up of patients with papillary thyroid carcinoma who have had a total thyroidectomy, this study compares the diagnostic accuracy of serum thyroglobulin and neck ultrasonography. Optimizing post-treatment surveillance techniques and enhancing patient outcomes can be achieved by being aware of their relative advantages and disadvantages.

Materials and Methods

Study Design: This was an observational study. Patients with a confirmed diagnosis of papillary thyroid carcinoma (PTC) who have undergone a total thyroidectomy, with or without radioactive iodine (RAI) ablation, will be included in the study.

Study Population: Patients with a PTC diagnosis, those who have had a total thyroidectomy, those who have had post-operative follow-up, and those who have had both a routine neck ultrasonography (US) and a serum thyroglobulin (Tg) measurement are all eligible to participate. Patients with other forms of thyroid cancer, those with insufficient follow-up information, Patients who have had additional surgeries or treatments that could impact the assessment, as well as those with persistent or uncontrolled anti-thyroglobulin antibodies (TgAb), which impair the accuracy of Tg measurements.

Data Collection: Medical records were used to gather demographic and clinical information, such as age, sex, tumor stage, and treatment history. Chemiluminescent immunoassay will be used to determine the levels of serum Tg. A skilled radiologist used a linear probe to perform a high-resolution ultrasound of the neck.

Statistical Analysis: Sensitivity (True Positive Rate, TPR), specificity (True Negative Rate, TNR) of Tg and neck US were calculated using standard statistical formulas. Diagnostic accuracy was calculated by Youden's Index.

Ethical Considerations: The institutional committee approved the study, which was conducted in compliance with ethical guidelines. Informed consent was provided by each patient. Patient confidentiality was maintained during the whole study.

Results: Table no.1 showing the diagnostic accuracy of Ultrasonogram (US) Neck and Thyroglobulin (Tg) levels in the follow-up of papillary carcinoma patients who have undergone total thyroidectomy. The diagnostic performance of these modalities was analyzed using sensitivity, specificity, and Youden's Index. The Thyroglobulin (Tg) test demonstrated a higher sensitivity (83.33%) compared to Neck Ultrasonogram (66.67%), indicating that Tg is more effective in detecting true positive cases of recurrence or residual disease. Conversely, Neck US had a higher specificity (79.10%) compared to Tg (70.45%), making it slightly better at correctly identifying disease-free patients.

Table no. 1 showing the Sensitivity, specificity and Youden's Index for serum thyroglobulin (Tg) measurement and neck ultrasonography (US).

	Actual occurrence	No occurrence	Sensitivity (True Positive Rate, TPR)	Specificity (True Negative Rate, TNR)	Youden's Index
Positive Tg finding	10	26	83.33%	70.45%	58.78 %
Negative Tg finding	2	62			
Positive Neck US finding	22	14	66.67%	79.10%	45.77 %
Negative Neck US finding	1	53			

Discussion:

According to the findings, thyroglobulin and neck ultrasonography are both useful markers for tracking patients with papillary thyroid cancer after thyroidectomy. With a higher sensitivity of 83.33%, Tg is more effective at identifying recurrent or residual disease. This is consistent with its function as a biochemical marker for the surveillance of thyroid cancer, particularly in patients whose Tg levels are elevated in spite of negative imaging results [8]. Compared to Tg, neck ultrasonography showed a higher specificity (79.10%), indicating that it is more effective at excluding false positives. When Tg levels are elevated or borderline, this makes it a useful confirmatory test [4, 9] . Tg should be given priority for the early detection of recurrence because of its higher sensitivity [10]. Blood levels of Tg, a protein made by thyroid cells, can be determined. Elevated Tg levels in PTC patients, particularly those who have already had a thyroidectomy, may be a sign of recurrent cancer or residual thyroid tissue. It's crucial to remember that other variables, like the existence of anti-Tg antibodies, can occasionally affect Tg levels. This could skew measurements and possibly produce false-negative results. As a result, although Tg is an effective method for identifying recurrence [11].

Because neck US has a higher specificity than Tg, imaging should be used in conjunction with Tg to confirm positive results and reduce unnecessary procedures. One factor that may influence Tg levels and result in false-negative results is anti-Tg antibodies. Because neck US depends on the operator, small or deeply positioned lesions may go undetected [12]. Routine Tg monitoring should be the first line of defense, with neck US acting as a secondary tool to improve specificity and guide future clinical decisions.

Conclusion

While both diagnostic tools play an essential role in the follow-up of papillary thyroid carcinoma patients post-thyroidectomy, Tg appears to be more accurate due to its higher sensitivity and overall diagnostic performance (Youden’s Index: 58.78%). However, Neck US is indispensable for confirming suspicious findings and improving specificity. The best follow-up strategy involves a combination of both Tg and Neck US to maximize accuracy and ensure optimal patient outcomes.

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