MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.36478/makrjms.2024.1.418.421

OPEN ACCESS

Key Words
Thyroid malignancy, multinodular goiter, solitary thyroid nodule, papillary carcinoma

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Received: 20 January 2024
Accepted: 20 February 2024
Published: 23 February 2024

Citation: Pallamala Lasya, Gowbath Marliya and S. Soundararajan, 2024. A Histopathological Evaluation of Prevalence of Malignancy in Multinodular Goiter and Solitary Thyroid Nodule. Res. J. Med. Sci., 18: 418-421, doi: 10.36478/makrjms.2024.1.418.421

A Histopathological Evaluation of Prevalence of Malignancy in Multinodular Goiter and Solitary Thyroid Nodule

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Abstract
Globally, thyroid cancer incidence varies conventional wisdom holds that single thyroid nodules are more likely to be cancerous than many nodules. Data was gathered using a pre-made Excel spreadsheetSPSS version 16 was used for statistical analysis. Quantitative variables were analysed using means and percentages. With the Chi square test, the statistical significance between the various groups was ascertained. P-values less than 0.05 were regarded as statistically significant. All patients (100%), anterior neck edoema was the most prevalent clinical manifestation. Pain (10% cases in the MNG group, 19.6% cases in the STN group) and dysphagia (8.1% cases in the MNG group, 13.1% cases in the STN group) were the next most common clinical presentations. None of these individuals had a family history of thyroid cancer or a history of neck radiation. We draw the conclusion that STN had a noticeably greater cancer prevalence than MNG. However, given that malignancy was also relatively common in MNG, individuals presenting with MNG should be evaluated for potential malignant foci in advance of surgery.

INTRODUCTION

When a patient exhibits thyroid enlargement, the first concern is to rule out the potential of a malignant condition. Thyroid tumours are the most prevalent endocrine system cancer, although making up just 1% of all cancer cases in humans[1].

Typically, thyroid neoplasms manifest as one palpable nodule or many distinct nodules. Rarely, a patient may have clear metastatic illness without having an original lesion that can be clinically identified.

Thyroid cancer incidence ranges from 0.9% to 13% globally[1]. It has long been thought that thyroid nodules that are single have a higher chance of becoming cancerous than nodules that are many[2-4].

Nonetheless, a number of recent studies have shown an increase in the likelihood of cancer, even in cases with multinodular goitre[3-7]. In light of this, a research was conducted using thyroidectomy tissues for histological analysis in order to ascertain and contrast the frequency and kinds of different thyroid cancers that manifest clinically as solitary thyroid nodule and multinodular goitre.

Over the last six decades, there have been many theories put up to explain the global increase in thyroid cancer incidence. These include greater pathologic identification of clinically insignificant thyroid neoplasia, exposure to ionising radiation altered iodine dietary levels[7,8]. The yearly incidence of thyroid cancer varies greatly across registries and is rising in the USA, Canada many European nations[9]. Therefore, the presence of several goitres does not indicate a low risk of cancer and should not postpone surgery. Changes in the gland's size, the development of hard, new nodules, or cervical lymphadinopathy may be signs of a malignant transformation and a prompt surgical indication.

MATERIALS AND METHODS

The patients' case files, operation registers, histopathology records laboratory request forms provided information on the patients' demographics, clinical presentation and diagnosis, results of Fine Needle Aspiration Cytology (FNAC), ultrasonographic findings, gross features biopsy results of the resected thyroid specimens. The research eliminated individuals with inadequate clinical information, as well as those with Hashimoto thyroiditis and Grave's disease.

An impartial pathologist examined the thyroidectomy specimens' hematoxylin and eosin (H and E) stained slides. The gold standard for diagnosis was thought to be histopathological. The 2004 World Health Organisation histological categorization guidelines served as the basis for tumour typing[1].

The included patients were split into two research groups for analysis: the Solitary Thyroid Nodule (STN) group, which included instances where there was obviously only one palpable nodulethe Multinodular Goitre (MNG) group, which included cases where more than one nodule was found on clinical examination. Data was gathered using a pre-made Excel spreadsheet SPSS version 16 was used for statistical analysis. Quantitative variables were analysed using means and percentages. With the Chi square test, the statistical significance between the various groups was ascertained. $P<0.05$ were regarded as statistically significant.

RESULTS AND DISCUSSIONS

A total of 308 thyroidectomy specimens, meeting the inclusive criteria, were analyzed. Of these, 175 (56.8%) patients presented with multiple nodules (MNG group), while 133 (43.1%) patients presented with a solitary palpable nodule (STN group). The overall age and gender distribution of all these cases is depicted in Table-1.

The commonest clinical presentation was anterior neck swelling in all the patients (100%), followed by pain (10% cases in MNG group, 19.6% cases in STN group) and dysphagia (8.1% cases in MNG group, 13.1% cases in STN group). None of these patients had a history of neck irradiation or a family history of a thyroid malignancy. Data of pre-operative ultrasonography and FNAC results were available in all cases and are stated in Table 2.

Ultrasonography revealed that most of the thyroid nodules in MNG patients were of larger size as compared to that of the STN group at the time of presentation. Mean size of nodules was 4.97 cm in the MNG group and 3.55 cm in the STN group. According to FNAC results, more number of malignant cases belonged to the STN group. Post-operative histopathological analysis revealed 38 (21.7%) cases in the MNG group and 57 (42.8%) cases in the STN group had malignant focus. Papillary thyroid carcinoma (PTC) was the commonest malignancy observed in both the study groups (Table 3).

It has been suggested that the rising incidence may be caused by the development of more accurate diagnostic instruments[10] FNAC and high-resolution ultrasonography are helpful investigative techniques. Ultrasonographic characteristics such as micro calcifications, hypoechogenicity, uneven margins or lack of halo sign, solid lesion intra ocular vascularization are diagnostic of malignancy in thyroid nodules[11]. With variable sensitivity and specificity, FNAC is becoming a vital investigative tool in thyroid pathology[12]. However, post-operative histological analysis of the surgically excised thyroid gland is what ultimately determines the diagnosis. In our investigation, the majority of the removed specimen's postoperative histological findings and the FNAC results showed a strong correlation. In the STN group, FNAC was shown to be more sensitive in detecting

Table 1: Age and gender-wise distribution of cases in MNG and STN group.

Age (in years)	MNG group (n=175)			STN group (n=133)		
	M	F	T	M	F	T
<20	2	4	6	0	4	4
21-40	8	92	100	5	85	90
41-60	9	48	57	8	23	31
>60	4	8	12	2	6	8
Total	23	152	165	15	118	133

Key: M-Male, F-Female, T-Total

Table 2: USG and FNAC findings of the cases in MNG and STN group.

Investigation			MNG group (n=175)	STN group (n=133)
USG	Nodule size (in cm)	<2.0	0	22
		3.2-5.0	97	92
		5.1-7.1	67	15
		>7.0	11	4
FNAC	Colloid nodule		12	12
	Adenomatous nodule		7	22
	Multinodular goitre		131	0
	Follicular neoplasm		3	57
	Papillary carcinoma		16	42
	Medullary carcinoma		2	0
	Inconclusive		4	0

Key: USG- Ultrasonography; FNAC- Fine needle aspiration cytology.

Table 3: Histopathological findings in MNG and STN group.

Histo-pathologic diagnosis		MNG group (n=175)	STN group (n=133)
	Pure MNG	119	0
	Colloid Nodule	14	13
Benign	Adenomatous nodule	10	33
	Follicular adenoma	4	40
	Total	147(84%)	86(64.6%)
	cPTC	15	26
	mPTC	13	0
Malignant	FVPTC	9	23
	FTC	0	8
	MTC	1	0
	Total	38(21.7%)	57(42.8%)

cancer. FNAC failed to detect any instances of papillary thyroid micro-carcinoma (mPTC) in MNG (Figure 1). The chance of an undetected carcinoma cannot be completely ruled out, particularly in MNG, since there is a higher degree of error in selecting the right sample location[4]. Both USG-guided FNAC and numerous aspirations from various locations might improve sensitivity.

In both research groups, there was a noticeable female preponderance in our investigation. The majority of the patients were in their third or fourth decade of life (58% in the MNG group and 78% in the STN group). Within the MNG cohort, 13 girls and 15 men were confirmed to have cancer. In the STN group, malignancy was discovered in 8 men and 39 females. Compared to individuals with benign lesions, those with malignancies had a somewhat higher mean age. Nanjappa BA *et al.* and Pang and Chung also found similar observations[13,14].

Histopathological analysis revealed that the STN group had a greater frequency of malignancy (38.2%) than the MNG group this difference was statistically significant ($p<0.05$).

In this research, of the 308 patients, 3 had FNAC positive results for malignancy, whereas 5 had histology positive results for the same condition. 72.7% FNAC sensitivity. The mean duration of presenting symptoms for patients in this series with malignancy in multinodular goitre was 10.2 years (minimum 6 years and maximum 13 years), while the mean duration for patients with only multinodular goitre was 5.91 years (minimum 2 years to maximum 14 years). According to their research, patients who had malignancy in addition to multinodular goitre had neck swelling for 9.11 years on average, while the mean for patients who only had multinodular goitre was 5.48 years[10]. It is clear that the likelihood of malignancy increases with the length of multinodular goitre. Thirty subtotal thyroidectomies, one hemithyroidectomy, seven near-total thyroidectomies three malignant instances of a complete thyroidectomy were among the kinds of thyroidectomies that were done. It's interesting to note that every instance of mPTC was only seen in the MNG group no case was identified during the pre-operative FNAC assessment.

A thyroid papillary carcinoma with a diameter of less than 10 mm is referred to as mPTC. In situations where FNAC may overlook instances of mPTC and cystic PTC, ultrasonography-guided fine-needle aspiration cytology is recommended. Two instances of

cystic PTC were found in our dataset, one manifested as MNG and the other as STN..

CONCLUSION

We find that cPTC was the most prevalent histological subtype and that the frequency of malignancy was substantially greater in STN than in MNG. It is important to remember that malignancy was also quite common among MNG. Practically speaking, this should be kept in mind while assessing patients with MNG every attempt should be made to detect any malignant focus before to surgery so that a suitable treatment plan may be developed..

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