

Clinical Study of Incidence of Malignancy in Solitary Nodule of Thyroid

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Abstract

Introduction: Solitary nodule of thyroid has increased in incidence in the present day as compared to two decades before. Because of possibility of malignancy, some clinicians especially those in surgical subspecialties recommended that all nodules have to be removed.

Aim: The aim of the study to determine the incidence of solitary nodule thyroid in relation to age and sex and to determine the incidence of solitary nodule of thyroid turning out to be malignancy.

Materials and Methods: Data collection by meticulous history taking and clinical examination, appropriate laboratory and radiological investigations, operative findings, histopathological report, and follow-up of cases.

Results: About, 50 cases selected by Random Sampling Technique, incidence of solitary nodule were observed in 3rd to 5th decade, constituting 60% of the cases studied. 36% of all clinically solitary nodules turned out to be multinodular goiter. The common causes of solitary nodule was multinodular goiter (MNG) (36%), follicular adenoma (22%), adenomatous goiter (24%). 94% of cases presented with euthyroid state. Incidence of malignancy in solitary thyroid nodule was 12%.

Conclusion: Solitary nodule of thyroid is more common in 3rd to 5th decades. Solitary nodules of thyroid are more common in females. Most of the patients presenting with solitary nodule of thyroid are euthyroid and only a small percentage of patient with toxicity or hypothyroidism ultrasonography can be accurately used to detect patients with MNG who clinically present as solitary nodule of thyroid.

Key words: Euthyroid, Malignancy, Solitary nodule

INTRODUCTION

The solitary thyroid nodule (STN) has aroused interest of thyroidologist since the time of Cole and Majarakis and his study concluded that incidence of malignancy is higher when compared with multinodular goiter (MNG).¹ Thyroid nodules are very common entities, though varying in incidence in different geographical regions. The prevalence of palpable nodules in general population is 4-7%.² Solitary nodules of thyroid are about four times

more common in women than in men. Overall incidence of malignancy in STN ranges from 10% to 30%.³ Thyroid nodule is a palpably or radiologically distinct lesion from the surrounding thyroid parenchyma. There is a high risk of malignancy in STN than in multiple nodules. Because of this reason, STN have to be treated with high degree of suspicion and plan treatment in a systematic manner.⁴ Radionuclide imaging has been the mainstay in the evaluation of STN since 1939 when Hamilton and Soley demonstrated that malignant thyroid tissue concentrates less radioactive iodine than normal thyroid tissue. Thyroid nodules are further classified into cold, warm, and hot according to their ability to accumulate the radioactive isotope. Cold nodules are considered hypofunctional, whereas warm nodules are normal and hot nodules are hyperfunctional. Thyroid fine-needle aspiration (FNA) biopsy is the most accurate test for determining malignancy, and is an integral part of current

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thyroid nodule evaluation. Results are superior when FNA is performed with ultrasound-guidance FNA (USFNA). We describe herein techniques for palpation-directed FNA as well as USFNA.⁵

Aim

The aim of the study is to determine the incidence of solitary nodule thyroid in relation to age and sex and to determine the incidence of solitary nodule of thyroid turning out to be malignancy.

MATERIALS AND METHODS

The present study on “clinical study of the incidence of malignant changes in solitary nodule of thyroid” has been conducted in Department of Surgery at Tirunelveli Medical College. Prospective analysis of 50 cases of solitary nodule thyroid in the specified period done. These cases were selected by random sampling method and studied in detail clinically and recorded as per the pro forma. Routine investigations and specific investigations including FNA cytology (FNAC) of the nodule, thyroid profile, indirect laryngoscopy, plain X-ray neck, and ultrasonography (USG) neck were done in all cases. Special investigations such as radio-isotope scanning were not performed as the facilities were not available. All the patients were managed by surgery and diagnosis was confirmed by histopathological examination. The patients were grouped according to different variables such as age, sex, size of the nodule, site of the nodule, functional thyroid status, FNAC reports, and histopathological examination reports, and then analyzed and compared with the previous similar studies conducted elsewhere. Finally, conclusions were drawn accordingly.

Pre-operative

Use of antithyroid drugs, beta-blockers, blood transfusions, or any other medications were prescribed based on individual status and was noted.

Operative

Position of the patient, type of anesthesia, incision, type of operation planned, per-operative findings, and type of operation performed were recorded.

Post-operative

Every patient was followed up post-operatively during the course of management in the hospital to note the development of and management of complications.

Follow-up

Any recurrences or complications were noted. Thyroid functional status was assessed, accordingly thyroxine tablets prescribed if necessary.

RESULTS

A total of 50 cases of solitary nodule of thyroid studied and following conclusions were drawn: The age of the patients ranges from 18 years to 66 years, with peaks being in 3rd to 5th decades. The mean age of presentation is 37.24 years. Cases in 3rd to 5th decades constitute 60% of the cases studied. Solitary nodules of thyroid are much more common in females. Of 50 cases studied 46 were females and 4 were males, and the ratio comes to M:F = 1:11.5. In addition, the malignant nodules are common in females. Of 6 cases of malignancy in the study, 5 were females. All the cases in the present study presented complaint of swelling in the region of the thyroid. Only few patients presented with pain, discomfort, and dysphagia. All the mentioned additional symptoms were of mild degree. Of 50 cases, 3 cases had pain, 3 cases had discomfort, and another 2 had dysphagia. In addition, none of the patient had lymphadenopathy which was confirmed by USG examination. Two patients had symptoms of thyrotoxicosis, and one had features of hypothyroidism. The latter patients' thyroid profile confirmed the functional status. In our study, duration of onset symptoms varied from 15 days to 8 years. In addition, duration of malignant nodules extend from 1 month to 4 years.

Of 50 cases studied, 26 cases presented with nodule in right lobe of the thyroid gland and the remainder in the left lobe of thyroid. One patient among left-sided solitary nodule had undergone right lobectomy 30 years back and presented with recurrent nodule in the rest of the lobe.

In the present study, on clinical examination size of the nodule, in its largest dimension, varies from 2 cm to 12 cm. Most of the patients presented with the size of about 3-5 cm. In the study, as such there is no correlation between the size of the nodule and the occurrence malignant nodule.

Of 50 cases, two presented with features of thyrotoxicosis, one with hypothyroidism, and rest all were in euthyroid state. Patients with thyrotoxicosis were made euthyroid using antithyroid drugs and operated and both cases turned out to be toxic follicular adenoma. Patient with hypothyroidism was treated with thyroxine, USG neck revealed multiple nodules, and managed by subtotal thyroidectomy, histopathological examination confirmed the diagnosis of multinodular (Table 1).

FNAC is the important investigation in the evaluation of solitary nodule of thyroid. All 50 cases were subjected to FNAC during the course of evaluation. FNAC reports are mainly categorized into 6 entities-benign, follicular neoplasm, suspicious (of malignancy), malignant, lymphocytic thyroiditis, and cysts. In our

Table 1: Thyroid functional status

Thyroid functional status	Number of patients
Euthyroid	47
Hyperthyroid	2
Hypothyroid	1

Table 2: FNAC reports

FNAC reports	Number of patients
Benign	32
Follicular neoplasm	11
Suspicious	1
Malignant	3
Lymphocytic thyroiditis	1
Cysts	2

FNAC: Fine-needle aspiration cytology

Table 3: HPE reports

HPE reports	Number of patients
Follicular adenoma	11
Adenomatous goiter	12
MNG	18
CA	6
Lymphocytic thyroiditis	1
Simple cyst of thyroid	2

MNG: Multinodular goiter, CA: Carcinoma, HPE: histopathological examination

study, of 11 follicular neoplasms, two turned out to be follicular carcinoma (CA). One suspicious (of papillary CA) case confirmed papillary CA on histopathological examination. Three cases of papillary CA were diagnosed pre-operatively by FNAC alone. Two cases diagnosed as cysts by FNAC confirmed to be simple cysts on histopathological (Table 2).

Of 50 cases studied, common causes of solitary nodule are MNG, follicular adenoma, and adenomatous goiter; the most common being MNG which constitutes about 36% of cases. Follicular adenomas have 22% and adenomatous goiters have 24% incidences. Of 50 cases, six were malignant - 4 papillary CA and 2 follicular CA. USG detected suspicious findings in two cases among six malignant cases - 1 papillary and 1 follicular. Three cases of papillary CA were diagnosed with certainty by FNAC; one case was suspicious which turned out to be papillary CA on histopathological examination. Two cases of follicular CA were diagnosed follicular neoplasm, one of them showed suspicious features on USG (Table 3).

From the study, of 6 CA, 4 were papillary and 2 follicular: No case of medullary or anaplastic or lymphoma was detected. Papillary CA accounts to 67% and follicular CA accounts to (Table 4).

Table 4: Types of Carcinoma

CA	Number of cases (%)
Papillary	4 (67)
Follicular	2 (33)
Medullary	0 (0)
Anaplastic	0 (0)
Lymphoma	0 (0)
Total	6 (100)

CA: Carcinoma

Table 5: Age comparison

Authors	Mean age in years
Das <i>et al.</i> ⁶	35
Talepoor <i>et al.</i> ⁷	38.6
Quari ⁸	36.7
Rehman <i>et al.</i> ⁹	34.7
Anwar <i>et al.</i> ¹⁰	37
Present study	37.24

Table 6: Gender comparison

Authors	Sex incidence (M:F)
Dorairajan and Jayashree ⁴	1:09
Das <i>et al.</i> ⁶	01:05.4
Gupta <i>et al.</i> ¹¹	1:05
Present study	01:11.5

Depending upon the clinical diagnosis and FNAC features, all the 50 patients undergone surgery. Among them, 31 patients had undergone hemithyroidectomy, 12 cases undergone subtotal thyroidectomy, and 7 cases undergone total thyroidectomy.

In one case, histopathological examination (HPE) after hemithyroidectomy showed follicular CA, then completion of total thyroidectomy done. In another case with recurrent nodule (previously hemithyroidectomy was done 30 years back), total thyroidectomy was done, which showed features of MNG.

Post-operatively, suppressive dose of thyroxine was started for patients who had undergone total thyroidectomy. Three cases out of 7 cases of total thyroidectomy showed features of hypocalcemia on 2-4 post-operative day, hence, they are supplemented with oral calcium and Vitamin D3.

All the cases were followed-up for 6 months, two cases had husky voice without any change in vocal cord movements.

DISCUSSION

The observations and results of the present study were compared with the available previous similar studies.

In the study done by Quari and Talepoor *et al.* separately in 2005, reported the mean age at presentation as 36.7 years and 38.6 years, respectively. Anwar *et al.* reported in 2012, the mean age of presentation as 37 years. From the present study, the mean age at presentation found to be 37.27 years, correlates with the previous (Table 5).

In the study done by Dorairajan and Jayashree and Das *et al.*, reported ratio of sex incidence as 1:9 and 1:5.39, respectively. In the present study, it is found to be 1:11.5, which correlates with previous (Table 6).

Because of periods of fluctuations in the demands of the hormonal requirement in female in their life cycle (puberty, menstrual cycles, pregnancy, and menopause), the chances of thyroid nodule formation are very high as compared with male counterparts.

Distribution of Non-neoplastic and Neoplastic Lesions Diagnosed by FNAC

Authors	Non-neoplastic	Neoplastic	Ratio
Sarda <i>et al.</i> ¹²	487	59	8.25:1
Das <i>et al.</i> ⁶	346	85	4.07:1
Gupta <i>et al.</i> ¹¹	470	30	15.66
Talepoor <i>et al.</i> ⁷	325	70	4.33:1
Hurtado-Lopez <i>et al.</i> (2004) ¹³	80	50	1.6:1
Present study	36	14	2.57:1

In the present study, neoplastic conditions include adenomas and all malignant lesions. From the study, the ratio of non-neoplastic to neoplastic cases is about 2.57:1, which is comparable to the studies done earlier like Hurtado-Lopez *et al.* (2004).

Distribution of Malignancies by FNAC

Authors	Percentage
Sarda <i>et al.</i> ¹²	10.8
Mundasad <i>et al.</i> ¹⁴	4.16
Present study	7.27

In the present study, among 4 cases of papillary CA, 3 were diagnosed with certainty by FNAC and the rest one was suspicious of malignancy. However, both follicular CA were initially reported as follicular neoplasm. From the study, distribution of malignancy is about 7.27, which is comparable with the earlier studies.

Etiological Incidence (in percentage)

Series	MNG	Adenoma follicular	CA	Others	Total number of cases
Zaman and Bhagabati ¹⁵	83	9	8	-	2221
Bhansali ¹⁶	71	20	9	-	449
Fenn <i>et al.</i> ¹⁷	22	55	12	11	342
Present series	36	22	12	30	50

MNG: Multinodular goiter, CA: Carcinoma

From the present study, the most common cause of solitary nodule is MNG, which is comparable with the studies done by Fenn *et al.*, Bhansali. The common causes are follicular adenoma and adenomatous goiter.

Incidence of CA

Study	Year	Percentage
Fenn <i>et al.</i> ¹⁷	1980	12.00
Bhansali ¹⁶	1982	9.00
Present study	2015	12.00

From the literature, the incidence of malignancy in thyroid nodule ranges from 5% to 30%. From the present study, the incidence found to be 12%, which is comparable with the study done by Fenn *et al.*

CONCLUSION

Incidence of malignancy of solitary nodule is about 12%. Commonest presentation of solitary nodule is swelling in front of neck. The peak age at presentation of solitary nodule thyroid is 3rd to 5th decade, constituting about 60% of the cases. Solitary nodule is more common in females. The most common malignancy in solitary nodule thyroid is papillary carcinoma FNAC is an important investigation in the evaluation of the solitary nodule of thyroid. Surgery has been the treatment of choice in most of the cases, either because of cosmetic reasons or toxicity or FNAC diagnosis of follicular neoplasm or malignancy.

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