

Solitary thyroid nodules and malignancy: A prospective study

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Abstract

Background: Nodular goitre is a worldwide disease and is encountered commonly in clinical practice by primary care physicians, endocrinologist, surgeons and otolaryngologists. They may be asymptomatic with normal TSH or may be associated with systemic thyrotoxic symptoms. The solitary thyroid nodule is a common presentation and the incidence of carcinoma in single thyroid nodule is between 8-20% and in multinodular goitre is about 5%. **Material and Methods:** The present study is a prospective study, carried out on 50 euthyroid cases of solitary thyroid nodules attended the department of ORL-HNS, Govt Medical College and AG Hospitals, Kota during the period of June 2017 through June 2019. For the purpose of inclusion in this study a solitary thyroid nodule is defined as a single clinically palpable swelling involving either lobe or isthmus of the thyroid gland. **Conclusion and Results:** The present study was undertaken with a view to evaluate the solitary thyroid nodules by various diagnostic tools, the surgical management with a goal of selection of those patients who have a higher likelihood of harboring malignancy in the nodules. Solitary thyroid nodules occur predominantly in females in all age groups. The female to male ratio is 5.3:1. Solitary thyroid nodules occur more frequently in the age group of 21-40 years. The overall incidence of malignancy in solitary thyroid nodules is 12%. The incidence is higher in males 25% as compared to females 10.5%.

Key Words: Solitary thyroid nodules, malignancy.

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Received Date: 02/06/2019 Revised Date: 13/07/2019 Accepted Date: 08/09/2019

DOI: <https://doi.org/10.26611/10161135>

Access this article online

Quick Response Code:



Website:

www.medpulse.in

Accessed Date:
11 September 2019

INTRODUCTION

Thyroid gland is unique among endocrine glands in that it is the first endocrine gland to appear in the fetus, largest of all endocrine glands (weighing about 25gm.) and because of its superficial location it is the only one, which is amenable to direct physical examination. Nodular goitre is a worldwide disease and is encountered commonly in clinical practice by primary care physicians, endocrinologist, surgeons and otolaryngologists. Nodular goitres are common in woman than in men, with

advancing age and after exposure to external irradiation. They may be asymptomatic with normal TSH (Non-toxic) or may be associated with systemic thyrotoxic symptoms (Toxic Multi Nodular Goitre or Plummer's disease). The solitary thyroid nodules is a common presentation and the incidence of carcinoma in single thyroid nodule is between 8-20% and in multinodular goitre is about 5%. The concern is warranted as the most neoplasm originate in a focus of replicating cells and present as solitary thyroid nodule in early stages of malignancy. Prevailing opinion in the management of solitary thyroid nodule has changed from time to time in the past. Nevertheless, because of the possibility of cancer some clinicians, especially those in the surgical specialties, recommend that all nodules be removed, while others have suggested that surgery was almost never necessary as surgery posed a greater risk to the patient than the nodule itself¹. Thyroid surgery has a significant risk of complications². The goal of diagnostic work-up now is to select those patients for surgery, who have likelihood of harboring malignancy in the nodule. At one extreme the diagnosis of malignancy may be strongly suspected on clinical

How to cite this article: Shivkumar, Deepak Saharan, Suresh. Solitary thyroid nodules and malignancy: A prospective study. *MedPulse International Journal of ENT*. September 2019; 11(3): 67-72. <https://www.medpulse.in/ENT/>

grounds and such patients generally require open exploration regardless of finding of various laboratory test i.e. fine needle aspiration cytology, tru-cut needle biopsy, ultrasound, Radio-isotope scan, excisional biopsy and frozen-section. There is ongoing debate as to the appropriate evaluation and management of individuals with solitary thyroid nodules. The purpose of this study is to address these issues in diagnosis and management of solitary thyroid nodule with specific relevance to surgical management.

MATERIAL AND METHODS

The present study is a prospective study, carried out on 50 euthyroid cases of solitary thyroid nodules attended the deptt. of E.N.T., Govt Medical College and AG Hospitals, Kota (Raj.) during the period of June 2017 through June 2019. For the purpose of inclusion in this study a solitary thyroid nodule is defined as a single clinically palpable swelling involving either lobe or isthmus of the thyroid gland.

OBSERVATIONS

Table 1: Age and Sex Distribution

Age group (Years)	Sex		Total
11-20	00	05	05
21-30	02	15	17
31-40	05	13	18
41-50	01	05	06
51-60	00	04	04
Total	08	42	50

This table shows that females predominate over males. In our series 42 patients were females constituting 84% of total cases and 8 cases were males constituting 16% of the total cases. The higher incidence of solitary thyroid nodules in females is more or less constant for all age groups. This table shows that solitary thyroid nodules are more frequent in the age of 21-40 years, while they are less common at the extreme ages.

Table 2: Distribution of patients according to FNAC

Classification of aspiration	Total
Benign	44 (88%)
Malignant	3 (6%)
Suspicious	3 (6%)

Suspicious: Denotes follicular neoplasm

This table shows the FNAC finding obtained in 50 cases. Among 50 aspirates 44 were benign (88%), malignant 3 (6%) and 3 (6%) were diagnosed suspicious as follicular neoplasm.

Table 3: Risk of Malignancy in Clinically Solitary Thyroid Nodule compared between Males and Females

Sex	No. of Patients	Malignant
Male	08	02
Female	42	04
Total	50	06

This table shows the comparison of risk of malignancy between males and females in solitary nodules. The overall incidence of malignancy in solitary thyroid nodules was 12%. The incidence of malignancy in solitary thyroid in males was very high i.e. 2 out of 8 males (25%) as compared to 4 out of 42 females (10.4%) had malignancy in the nodules.

Table 4: Distribution of malignancy in solitary thyroid nodule in different age group

Age group (Years)	Total No. of STN	Malignancy	Sex	
			Male	Female
11-20	05	00	00	00
21-30	17	00	00	0
31-40	18	03	02	01
41-50	06	01	00	01
51-60	04	02	00	02
Total	50	06	2	04

This table shows most of the malignant tumors are encountered in 31-60 years of age group. Malignancy encounter in 03 cases above 40 years of age groups and 3 cases below 40 years of age group. The overall malignancy 12% out of cases of malignancy, 3 (50%) were in 31-40 years of age groups among which 2 (66.6%) were in females and 1 (33.3%) were in males.

Table 5: Distribution of malignancy with size of solitary thyroid nodule

Size (cm.)	Benign	Malignant	Total
≤ 3	17	00	17
> 3	27	06	33
Total	44	06	50

This Table shows risk of malignancy increases with increasing size of the solitary thyroid nodule. No malignancy seen in nodules ≤ 3 cm. in size. All the malignancies were encountered in nodules > 3 cm. in size.

Table 6: Correlation of USG echotexture with malignancy

Echotexture	Histopathology		Total
	Benign	Malignant	
Cystic	12	00	12
Complex	01	00	01
Solid	31	06	37
TOTAL	44	06	50

This table shows the Ultrasonography echotexture of solitary thyroid nodules. of 50 cases of solitary nodules 12 were cystic (24%), 01 mixed (2%), and 37 were solid (74%), 6 (12%) patients with the solid lesion found to have malignant thyroid nodule. None of the cystic nodules showed malignancy.

Table 7: Surgical procedure performed in 50 cases of solitary thyroid nodules

Surgical Procedure Performed	No. of Cases
Hemithyroidectomy	38 (76%)
Subtotal Thyroidectomy	05 (10%)
Total thyroidectomy	01 (02%)
Lumpectomy	04 (08%)
Isthmusectomy	02 (04%)
TOTAL	50

This table shows surgical procedures performed in 50 cases of solitary thyroid nodules. Hemithyroidectomy performed in 38 (76%) cases, 5 (10%) had subtotal thyroidectomy, 1 (2%) case underwent total thyroidectomy and 2 (4%) isthmusectomy, 4 (8%) underwent for lumpectomy.

Table 8: Correlation of FNAC with surgical Procedure Performed

FNAC	Surgical Procedure Performed					Total
	Hemi Thyroidectomy	Subtotal Thyroidectomy	Total Thyroidectomy	Lumpectomy	Isthmusectomy	
Noduular Goitre	04	01	00	01	01	07
Colloid Goitre	26	00	00	03	01	30
Thyroiditis	02	00	00	00	00	02
Follicular adenoma	05	00	00	00	00	05
Follicular Carcinoma (Suspicious)	02	01	00	00	00	03
Papillary Carcinoma	00	02	01	00	00	03
TOTAL	39	04	01	04	02	50

This table shows correlation of FNAC with extent of surgery, FNAC proved benign lesion (37 cases) underwent hemithyroidectomy. Other than benign lesion hemithyroidectomy also performed in 2 cases of follicular carcinoma (Suspicious). Out of 03 cases of cytologically detected papillary carcinoma, 1 had total thyroidectomy. 1 case of (Suspicious) follicular carcinoma and 2 cases of papillary carcinoma underwent subtotal thyroidectomy.

Table 9: Correlation of histopathology with Surgical procedure performed

Histopathologic Diagnosis	Surgical Procedure Performed					Total
	Hemi Thyroidectomy	Subtotal Thyroidectomy	Total Thyroidectomy	Lumpectomy	Isthmusectomy	
Nodular Goitre	15	01	00	01	01	18
Colloid Goitre and Cystic Changes	15	00	00	03	01	19

Thyroiditis	02	00	00	00	00	02
Follicular adenoma	02	01	00	00	00	05
Follicular Carcinoma (Suspicious)	02	01	00	00	00	03
Papillary Carcinoma	00	02	01	00	00	03
TOTAL	39	04	01	04	02	50

This table shows correlation of histopathologic diagnosis with surgical procedures performed. Hemithyroidectomy underwent in 39 (78%) cases and among these 15 were diagnosed nodular goitre, 15 cases were colloid and cystic changes 05 cases were follicular adenoma and 02 cases were thyroiditis and 2 cases were follicular carcinoma. Total thyroidectomy performed in 1 (2%) case which was diagnosed as papillary carcinoma. Subtotal thyroidectomy performed in 4 (8%) cases, 1 in follicular carcinoma and 1 in nodular goitre and 2 in papillary carcinoma. Lumpectomy performed in 4 (8%) cases out of which 3 (6%) were colloid goitre and cystic change and 1 (2%) were nodular goitre. Isthmusectomy performed in 2 (4%) cases, out of there 1 was nodular and 1 was colloid goitre with cystic changes.

DISCUSSION

The purpose of this study was to evaluate the solitary thyroid nodules through the various diagnostic tools for determination of incidence and type of malignancy in the solitary thyroid nodule and to plan the type and extent of surgery in detected cases of malignancy in solitary thyroid nodules and to detect cases of thyroid carcinoma preoperatively in patients with solitary thyroid nodules and subsequently advise surgery in these selected patient only, without missing any malignancy. The goal of the investigating modalities used is that they should detect maximum (ideally all) cases of carcinoma and minimize the number of patients who might end up with unnecessary surgery. Age distribution showed that maximum number of patients was in 21-40 year of age. The mean age of the male and female patients was 30.5 and 33.5 respectively. Patients with thyroid cancer had a mean age of 34.5 in males and 50 in females. Our observations were also consistent with those of Kapur and Sarin³ who found maximum number of solitary thyroid nodules in 3rd, 4th and 5th decade. The usual victims of thyroid enlargement were females as indicated in this study where 42 patients were female constituting 84% of total cases and 8 patient were males constituting 16% of total cases. Female to male ratio was 5.3:1. The overall incidence of malignancy in solitary thyroid nodules varies from 9% to 30% according to various studies. In our series of 50 cases of solitary thyroid nodules, the overall incidence of malignancy was 12% which was high in males i.e. 2 out of 8 (25%) as compared to females i.e. 4 out of 42 (10.4%). This is in consistency with the

Mazzaferri^{4,5} who stated that males had a twofold greater likelihood of having cancer than females in solitary thyroid nodules. This should not cloud the fact that thyroid cancers occur with greater frequency in women, simply because they had eight times as many thyroid nodules as males. Although the patients sex has not always been found to be an important variable predicting as nodules nature, when a difference has been reported, males generally have had a higher incidence of cancer in their nodules than females. That's why thyroid nodules in males should always be regarded with greatest suspicious than nodules than female. Kendall and Condon *et al*⁶ reported in their series an overall 20.3% incidence of malignancy in solitary thyroid nodules. Age less than 20 years and more than 60 years has been used as strong indication of malignancy and surgery was recommended for all patients in these age groups if the decision is based upon clinical criteria. In this study, one of two patients (50%) of less than 20 years of age had carcinoma. This gives a risk of malignancy of 50% which is very high figure when compared with the group average. Clinical factors more commonly associated with malignancy in childhood included a history of prior irradiation, rapid growth in the nodules and hard consistency of the mass. Raab *et al*⁷ recently published a multicentric study evaluating solitary thyroid nodules in children and reported the overall incidence of thyroid cancer to be about 18% in clinically solitary thyroid nodules. Ultrasonography detects nodule as small 3 mm. in diameter. Simeone *et al*⁸ stated that the detection of more than 1 cm lesion with ultrasonography reduce the probability of malignancy to 1 to 6%. So the use of ultrasonography in this regard would be most helpful in diminishing the number of patients who would need to undergo unnecessary thyroid surgery. Tan and Gharib⁹ stated that clinical palpation is less sensitive than thyroid USG in identifying multiple nodules. In our series of 50 clinically palpable solitary cases 5 cases were multiple on USG examination. The most important routine aspects of the diagnostic evaluation of solitary thyroid nodules include a through history and physical examination, Serum TSH level and FNAC of the nodule, Assuming patient has access to an experienced cytopathologist. Subsequent management of solitary thyroid nodule is an indication for surgical referral. Exception may be made in the case of malignant lymphoma, which typically is not managed surgically and in cases of anaplastic carcinoma in which surgical intervention may be futile. Thyroid

nodules associated with benign cytopathology of FNAC can be managed without routine surgical referral in most cases, provided adequate follow-up is possible. The incidence of false negative results with FNAC is low most physician Although recommend a repeat FNAC for confirmation 6-12 months after benign diagnosis or if nodule characteristics changes on follow up examination. Surgical referral in confirmed benign diagnosis is reasonable for patients having symptoms such as dysphasia discomfort or concerns about cosmesis. Make a surgical referral for suspicious or follicular cytopathology on FNAC because such nodules will be diagnosed as malignant as often as 30% of the time when aspirates are non-diagnostic, repeat then possible with added ultrasound guidance. Nodules that are associated with repeated non-diagnostic aspirates ultimately may require surgical referral. The present discussion will be limited to the problem of surgery of the thyroid gland itself, when cancer is found grossly involving one lobe. In recent years, the trend has been towards more extensive resection of the thyroid gland. With rare exceptions general agreement has come that anything less than total lobectomy is inadequate and not curative in this situation because of the high incidence of residual cancer (20%) found on completing the lobectomy or of stump recurrence. Beyond this point, authoritative opinion is divided among those who advocate total lobectomy with isthmus (Hemithyroidectomy) or with resection of isthmus, those who advocate total lobectomy plus resection of some portion of the opposite lobe (Near-total thyroidectomy) and those who advocate total thyroidectomy. Support for use of the more extensive procedures has come from the observation of intraglandular spread or "multicentric involvement by cancer, reported after routine surgical pathological examination as 11% to 30% involvement of the opposite lobe. As a result, a programme for evaluating the problem was initiated whereby patients had undergone previous "curative lobectomy" would either be submitted to prophylactic resection of the remaining lobe or would be observed clinically on a long term basis. A corollary project was undertaken to study the resected gland, mode of intraglandular dissemination and the true incidence of contralateral lobe involvement. The Present report concerns that group of patients with thyroid cancer whose initial surgical management was total lobectomy with or without thyroid resection or careful observation for possible future clinical evidence of recurrence. In our series after thyroidectomies, the incidence of papillary and follicular were 50% and 50% respectively, where the incidence of papillary, follicular and medullary carcinoma was 75%, 17% and 5%. Incidence of follicular carcinoma is low as compared to papillary, Re-mine W H and Mc

Conahay W M¹⁰ in their reported 62% and 18% incidence of follicular carcinoma, which was too much close to our series.

CONCLUSION

The present study, a series of 50 patients, was undertaken with a view to evaluate the solitary thyroid nodules by various diagnostic tools, the surgical management with a goal of selection of those patients who have a higher likelihood of harboring malignancy in the nodules. Solitary thyroid nodules occur predominantly in females in all age groups. The female to male ratio is 5.3:1 Solitary thyroid nodules occur more frequently in the age group of 21-40 years. The overall incidence of malignancy in solitary thyroid nodules is 12%. The incidence is higher in males 25% as compared to females 10.5%. FNAC is safe, reliable and cost effective pre-operative investigating modality for selection of cases of surgery with a high sensitivity of 100% and specificity of 50% and turns out to be single best technique of pre-operative investigation. High resolution real time ultrasonography is a safe, non invasive, non tissue damaging procedure which elucidates, the physical characteristics of the thyroid nodule. Majority of solitary thyroid nodules are solid (62%). Prevalence of malignancy in solid nodule 19.32% is high. No malignancy encountered in cystic nodules. There is no consensus regarding the appropriate management of solitary thyroid nodules because of the possibility of thyroid cancer in solitary thyroid nodule, we prefer that all nodules to be removed. Extent of surgery required for well-differentiated thyroid cancer has always been controversial. Tumour less than 4 cm. in size was treated by Hemi thyroidectomy with identification and preservation of recurrent laryngeal nerve, the parathyroid glands and their blood supply. Total thyroidectomy was performed in one cases of well-differentiated papillary carcinoma. Rest of malignant cases (5) were underwent for partial thyroidectomies (In 3 cases subtotal thyroidectomy and in 2 cases hemithyroidectiom) after positive histopathological report these cases underwent for radiotherapy by iodine-131.

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Source of Support: None Declared
Conflict of Interest: None Declared

