

Original Research Article

Clinico-pathological features and surgical management of multinodular goitre

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ABSTRACT

Background: Enlargement of thyroid gland is the most common manifestation of thyroid disease. Most of the patients come from endemic zones. This study was designed to study various aspects of clinicopathological presentations of multinodular goitre and their optimal surgical management.

Methods: This was a prospective observational study of 50 cases of multinodular goitre with an adequate follow up to look for epidemiological parameters such as clinical presentation, pathological behaviour and modality of management including post operative complications over a period of 02 years.

Results: Females were predominant in number over males with a sex ratio 24:1. FNAC was done for all patients and was found to be 100% accurate. Majority of the patients were treated with total thyroidectomy (56%), followed by hemithyroidectomy (44%). Complications included wound infection (4%) and seroma formation (4%).

Conclusions: Multi nodular goitre is more common in females and majority are in the age group of 31-39 years. The chief complaint in majority of the patients is swelling in front of the neck and few patients with pressure symptoms. FNAC is an invaluable, minimally invasive, highly accurate and cost-effective procedure for preoperative diagnosis and management of multinodular goitre. The main indication for surgery in MNG is cosmetic problem and total thyroidectomy is the ideal treatment of MNG with minimal complications.

Keywords: FNAC, Hemithyroidectomy, Multinodular goitre, Thyroid gland, Total thyroidectomy

INTRODUCTION

Thyroid gland and its diseases are known to clinical practice since the time of Hippocrates and is still an important subject of interest. Enlargement of thyroid gland is the most common manifestation of thyroid disease.¹ The enlargement may be either generalized or localized, which again may be, toxic or nontoxic. The nontoxic goitre is further divided on etiological basis as endemic goitre and sporadic goitre.² The endemic goitre is defined as one where more than 10% of population shows thyroid enlargement.¹ The thyroid gland functions primarily to produce thyroid hormones. It stimulates the oxygen consumption of most cells in the body, helps regulate lipid and carbohydrate metabolism and is necessary for normal growth and maturation.³ Nodular

goitre is probably the most common endocrine problem in the world today.⁴

The commonly accepted definition of goitre is “a thyroid gland i.e., at least twice its normal size”. In general, the term is applied to the benign enlargement of thyroid gland.⁵ Multinodular goitre is defined as a thyroid enlargement with follicles that are morphologically and functionally grossly altered that usually develops over years. Multinodular goitre is more common in women than men and increases in prevalence with age.⁶ Appropriate diagnosis and proper treatment are the need of the hour, and MNG has to be managed appropriately. FNAC is increasingly being used for evaluation of thyroid swellings.⁷ The study of multinodular goitre is essential, as it is a commonly

encountered endocrine problem in clinical practice. Although multinodular goitres are common, they typically do not cause symptoms. Infrequently, they cause either local or systemic symptoms depending on size, location, or extent of the goitre, especially when it extends into the thoracic cavity (substernal goitre) resulting in obstruction or pressure on adjacent structures. This may result in airway compression, dysphagia, hoarseness, or superior vena cava syndrome, which requires surgical intervention. Often with normal thyroid-stimulating hormone (TSH), MNG can sometimes cause hyperthyroidism, commonly known as Plummer disease.⁷ The major concern in modern thyroid gland surgery is morbidity. Besides hemorrhage and hypoparathyroidism, damage to the recurrent laryngeal nerve is the complication most feared by both patient and surgeon. It represents a serious complication causing serious functional sequelae such as phonatory, respiratory and psychological problems that limit working capacities and social relationships of the patients, especially when bilateral.

Post-operative respiratory complications may need either lifesaving endotracheal intubation followed by tracheostomy or immediate tracheostomy.

Multinodular goitre is common in this part of India. Hence, this study was designed to study various aspects of clinicopathological presentations of multinodular goitre and their optimal surgical management.

METHODS

The present study was a single-center, cross sectional observational study conducted on patients admitted with multi nodular goitre (MNG) in the surgical wards of Mamata General Hospital from October 2020 to September 2022. Prior initiation of study clearance was obtained from Ethical and Research Committee Mamata Medical College, Khammam. During this study, a total of 62 Multinodular goitre patients were reviewed in OPD, among which 50 (80.64%) patients were enrolled into the study according to inclusion criteria and 12 (19.36%) patients were excluded according to exclusion criteria.

Patients were included in the study based on the inclusion and the exclusion criteria as mentioned below:

Inclusion criteria

Patients with enlargement of thyroid gland, with more than one nodule. Palpable or enlarged thyroid gland with nodular surface. Both toxic and nontoxic multinodular goitres. Patients willing for the study.

Exclusion criteria

Diffuse hyperplastic goitre. Solitary nodule of thyroid. Patients not undergoing surgery. Patients not willing for the study.

Method of collection of data

Patients admitted under general surgery with multinodular goitre were included in the study after taking their consent.

Detailed history and thorough physical examination of the patients to be included under the study was done and recorded in a proforma for each patient separately.

All patients were subjected to investigations like thyroid function tests, USG of thyroid and neck, FNAC of thyroid nodules and radioiodine uptake test (if indicated).

Operative procedure like hemithyroidectomy, subtotal thyroidectomy and total/near-total thyroidectomy was decided by the consultant on a case basis.

The excised specimen was sent for histopathological examination (HPE), the results were recorded.

Data collection

All the data was collected from patients who attended surgical out-patient department and got admitted in the wards with multinodular goitre with detailed history and thorough physical examination. It included age, sex, nationality, complaints, duration of symptoms, predisposing factors and previous surgeries. Telephone contact numbers and detailed address were collected for follow up.

Statistical analysis

The collected data was entered into Microsoft Excel Worksheet-2010 and data was taken into IBM SPSS Statistic for windows, version 24 (IBM Corp., Armonk, N.Y., USA) software for calculation of frequency, percentage, mean, standard deviation and probability value.

RESULTS

A total number of 50 patients with multinodular goitre were studied. Following observations and results were obtained in this study.

The maximum age recorded was 65 years and minimum age recorded was 18 years with the mean age of 37.24 years. Age distribution is described in Table 1.

Among 50 patients, 48 patients (96%) were female and 2 (4%) were male. Female to male ratio was 24:1. All the 50 patients (100%) presented with swelling in front of the neck. Statistically, p value of 0.01 indicated that swelling and pain were major significant symptoms in multi nodular goitre patients.

Table 1: Age distribution of patients.

Age group (years)	No. of patients	Percentage
0-10	2	2.85
11-20	0	0
21-30	12	17.14
31-40	14	20
41-50	14	20
51-60	18	25.71
61-70	4	5.71
71-80	6	8.87
Total	00	00

Table 2: Mean and standard deviation for T3, T4 and TSH levels.

S. No.	Thyroid function rests	Mean	SDV
1	T3 (ng/dl)	114.54	26.89
2	T4 (mg/dl)	8.3	1.89
3	TSH (μIU/ml)	2.43	1.20

Table 3: Intra operative finding distribution.

S. No.	Intraoperative finding	Number (n=50)	Percentage (%)	P value
1	Multinodularity	31	62	0.001
2	Single lobe enlarged	11	22	
3	Both lobes enlarged	7	14	
4	Cystic lesion	1	2	
5	Total	50	100	

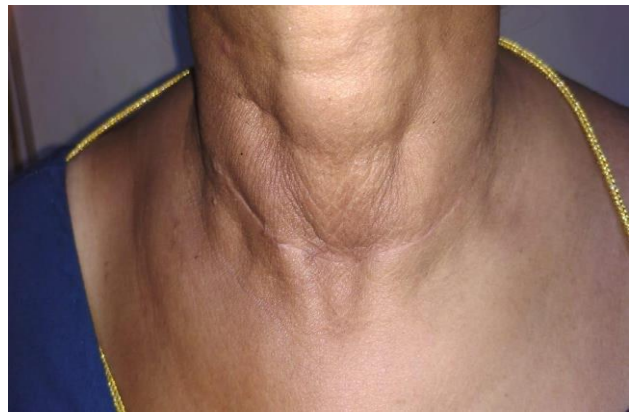
Table 4: Histopathological finding.

S. No.	Histopathologic finding	Number (n=50)	Percentage (%)	P value
1	Multinodular goitre	10	20	0.003
2	Colloid goitre	24	48	
3	Follicular Adenoma	10	20	
4	Papillary carcinoma	04	08	
5	Thyroid cyst	02	04	
6	Total	50	100	

Majority of the cases i.e. 18 (36%) had duration since equal/more than 10 years, with a p value of 0.07, it indicated that the duration of the neck swelling were similar in most of the patients. In the present study 42 cases (84%) had multi-nodularity and 08 cases (16%) had smooth surface.

In this study, in all the patients, T3, T4 and TSH levels were measured with mean and standard deviation. Mean

T3 levels was 114.54 ± 26.89 , T4 levels was 8.3 ± 1.89 and TSH level was 2.43 ± 1.20 as detailed in Table 2.

**Figure 1: Multi nodular goitre patient (pre-operative).****Figure 2: Postoperative picture after total thyroidectomy.**

In this study, 27 cases (54%) had multinodular goitre, 20 cases (40%) had colloid goitre and remaining 3 cases (6%) had neoplastic etiology. Statistically, p value 0.04 indicated that multi nodular goitre was the most significant USG finding in the study.

In this study, 23 cases (46%) had colloid goitre, 11 cases (22%) had multinodular goitre (cellular follicular lesions), 8 cases (16%) had neoplastic adenomatous goitre, 5 cases (10%) had Hashimoto's thyroiditis, 2 cases (4%) had papillary carcinoma thyroid and 1 case (2%) had Grave's disease. Statistically, p value of 0.02 indicated that colloid nodular goitre was significant FNAC findings in multinodular goitre patients.

Multinodularity was seen among 31 cases (62%), 11 cases (22%) had single lobe enlargement, 7 cases (14%) had both lobes enlarged and 01 case (2%) had cystic lesion. Statistically, p value of 0.001 indicated that multinodularity was the significantly most common intraoperative finding in multinodular goitre patients as described in Table 3.

In this study 28 (56%) patients had undergone total thyroidectomy and remaining 22 (44%) patients had undergone hemithyroidectomy. All the cases of papillary carcinoma (8%) were subjected to total thyroidectomy.

Histopathological study revealed colloid goitre in 24 cases (48%) followed by Follicular adenoma and Multinodular goitre 10 cases (20%) each. Papillary carcinoma was seen in 4 cases (8%). Statistically, p value of 0.003 indicated that colloid nodular goitre was a significant histopathological finding in multinodular goitre patients as described in Table 4.

In this study out of 50 patients, 4 patients (8%) developed minor complications like wound infection (4%) and seroma (4%).

DISCUSSION

All cases were evaluated clinically and cytologically before surgery followed by histopathological analysis. All these observations and results were compared with those of other authors as per available literature.

The etiopathogenesis of MNG is not very clear. A mild dietary deficiency of iodine, slight impairment of hormone synthesis, increased iodide clearance from the kidneys, and the presence of thyroid-stimulating immunoglobulins have been suggested as the various causes.

In this study, the maximum age recorded was 65 years and a minimum of 18 years, out of 50 cases 19 belong to age group 30-39 (38%) years. Maximum distribution was observed in 3rd and 4th decade and least was seen in 6th decade onwards.

In the study conducted by Athavale et al in 2019, majority of cases belong to the 3rd and 2nd decades, least was in the 6th decade.⁸

Kondur et al reported that out of 103 cases, 36% cases were in the age group of 30-39 years with maximum distribution in the third decade and least in the 6th decade (4%).⁹

In the study conducted by Amudhan et al in 2017, majority of cases belonged to the 3rd and 4th decades; least was in the 6th decade.¹⁰

The present study is comparable to the above studies. MNG was more common in 3rd-4th decades due to higher TSH fluctuation noted during adolescence and in reproductive age group.

It was observed in the current study that out of 50 cases 48 (96%) were females and 2 (4%) were males with a sex ratio of female to male was 24:1.

Athavale et al reported that out of 100 cases, 88 cases (89.9%) were females and 12 cases (12%) were males with a sex ratio of 7.3:1.⁸

A study by Kondur et al showed a female to male ratio of 15.6:1.⁹

In the study conducted by Patil et al, out of 50 cases 36 (72%) were females and 14 (28%) were males with a sex ratio of 2.5:1¹¹

In all above studies there is a female preponderance. The result of the recent study is comparable to the above studies. Almost all the thyroid related disorders are common in women and MNG is not an exception, the reason being more TSH fluctuation seen in women during adolescence, pregnancy, child birth and so on.

All patients presented with swelling in front of the neck (100%). Other symptoms were pain and discomfort in 26 cases (52%), dysphagia in 19 cases (38%), palpitations in 4 cases (8%), dyspnoea in 9 cases (18%), voice changes in 6 cases (12%) and heat/cold intolerance in 2 cases (4%).

Kondur et al in their study observed swelling in front of the neck in all the cases (100%). Other symptoms were pain and discomfort in 10 cases (20%), palpitations in 5 cases (10%), dysphagia in 1 case (2%), dyspnoea in 1 case (2%), increased sweating in 4 cases (8%), increased appetite in 3 cases (6%) and weight loss in 3 cases (6%).⁹

Amudhan et al in their study observed swelling in front of the neck (100%). Other symptoms were pain and discomfort in 24 cases (48%), palpitations in 16 cases (32%), dysphagia in 22 cases (44%), dyspnoea in 9 cases (18%), heat/cold intolerance in 6 cases (12%), Hoarseness of voice in 10 cases (20%).¹⁰

In this study majority of patient, the duration of swelling prior to presentation was ≥ 10 years in 36% cases, 28% patients had neck swelling with duration of 4-6 years and 26% patients presented with neck swelling of 7-9 years' duration. In the study by Sreenivas et al, majority of the cases (42%) had duration less than 1 year; 20% cases had duration of 1 to 3 years; 12% cases had duration of 4 to 6 years and remaining 10% cases had duration equal/more than 10 years.¹²

In the present study, 42 cases (84%) cases had multi-nodularity and 08 cases (16%) had smooth surface. In the study of Athavale et al, 86% cases had multi-nodularity and 18% cases had smooth surface.⁸ The present study had similar observation.

In this study in all the patients, T3, T4 and TSH levels were measured and mean and standard deviation were calculated. T3 level was 114.54 ± 26.89 ; T4 level was 8.3 ± 1.89 and TSH level was 2.43 ± 1.20 . A study

conducted by Shah et al, showed T3 levels 98.46 ± 17.57 , T4 levels 9.99 ± 2.9 and TSH level 1.42 ± 1.7 .¹³

A study conducted by Paz-Filho et al, revealed T3 level 115.5 ± 23.62 , T4 level 10.7 ± 1.3 and TSH level 2.5 ± 1.14 .¹⁴ Nearly same values were found in the present study.

In this study, USG was done in all cases. 54% cases had Multinodular goitre, 40% cases had colloid goitre and remaining 6% cases had neoplastic etiology. Similar findings were observed in the study by Athavale et al in 2019- 56% cases had multinodular goitre features, 37% and 7% cases had colloid goitre and neoplastic features respectively.⁹ Padmawar et al in 2014 in their study observed multinodular goitre in 98% cases and others (colloid goitre) in 2% cases.¹⁵

FNAC was found to be very useful in the evaluation of MNG. In majority of the cases where the FNAC was benign, it proved to be benign MNG on postoperative histopathological examination. FNAC was found to be 100% accurate. FNAC is an invaluable, minimally invasive, highly accurate and cost-effective procedure for preoperative assessment of patients with thyroid lesions.

In this study FNAC revealed 46% cases to be colloid goitre, 22% cases multi nodular goitre, 10% cases Hashimoto's thyroiditis, 16% adenomatous goitre, 4% cases papillary carcinoma thyroid and 2% cases Graves' disease.

Athavale et al in their study observed from FNAC, 62% cases to be colloid goitre, 27% cases multinodular goitre, 3% cases Hashimoto's thyroiditis, 2% cases papillary carcinoma thyroid and 8% case to have other findings.⁸

Amudhan et al in their study observed that FNAC showed 64% cases to be colloid goitre, 22% cases Hashimoto's thyroiditis, 8% cases adenomatous goitre and 6% cases had other findings.¹⁰

Sreenivas. et al in their study observed that FNAC revealed 78% cases to be colloid goitre, 14% cases Hashimoto's thyroiditis and 6% case to have other findings.¹²

In this study, 62% cases had multinodular goitre; 22% cases had single lobe enlargement; 14% cases had both lobes enlargement and 2% cases had cystic lesion. The intra operative findings of Athavale et al revealed the findings to be 44%, 30%, 17% and 01% respectively.⁸

In this study, all the 50 cases were subjected to surgery. 28 (56%) patients had undergone total thyroidectomy and remaining 22 (44%) patients were subjected to hemithyroidectomy. 01 case of Grave's disease was operated after bringing to euthyroid state. Total thyroidectomy was done in MNG involving both the lobes, whereas only hemithyroidectomy was contemplated in single lobe involvement. All the cases of

papillary carcinoma (8%) were subjected to total thyroidectomy.

In the study conducted by Athavale et al, 31 cases underwent Hemithyroidectomy and 69 cases had undergone total thyroidectomy. Total thyroidectomy was done for patients, in which intra-operatively malignancy was suspected⁸

Raj et al in their study found that 50% patients needed total thyroidectomy, whereas remaining 50% patients were subjected to hemithyroidectomy.¹⁶

In this study, 48% cases had colloid goitre. 20% cases had multinodular goitre. Follicular adenoma was seen in 20% cases. 8% cases had papillary carcinoma and 4% case had thyroid cyst.

The study conducted by Athavale et al, revealed that 22% cases had colloid goitre, 67% cases had multinodular goitre, 2% cases had papillary carcinoma; and 1% case had thyroid cyst.⁸

In 2017 Sreenivas et al found 78% cases to be colloid goitre, 6% had follicular adenoma, whereas 6% cases had papillary carcinoma.¹²

The study conducted by Patil et al in 2016 revealed that 74% cases had colloid goitre, 10% cases had papillary carcinoma and 2% cases had follicular adenoma.¹¹

All the above studies were comparable with the fact that colloid goitre was the commonest histopathological finding.

In present study out of 50 patients, postoperatively 4 (8%) patients developed minor complications like wound infection and seroma formation.

Sreenivas et al, in their study found 4% patients to develop wound infection after surgery.¹² Similarly, Mobayen et al in their study found an incidence of 2.8% patients developing seroma after surgery.¹⁷

The major limitations of our study were the small number of cases (n=50), single institutional study and short follow up period.

CONCLUSION

Multinodular goitre is a common surgical problem in this part of the country, as most of these patients are from the endemic zone. FNAC is an invaluable, minimally invasive, highly accurate and cost-effective procedure for preoperative diagnosis and management of MNG. The main indications for surgery in MNG are cosmetic problem and total thyroidectomy is the ideal treatment of MNG. A single lobe enlargement due to any benign cause can be easily treated with hemithyroidectomy.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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