

A PROSPECTIVE STUDY ON TOXIC MULTINODULAR GOITRE IN SURGICAL WARDS OF ANDHRA MEDICAL COLLEGE, VISAKHAPATNAM

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ABSTRACT

BACKGROUND

Multinodular goitre (MNG) is the most common thyroid disease in the world with more than 300 million people estimated to be affected. MNG is the result of aberrant growth of thyroid follicular cells following chronic TSH stimulation, which, via hyperplasia, leads to the nodular degeneration of thyroid tissue.

METHODS

500 patients presenting with MNG without obvious evidence of malignancy were studied, out of them 58 cases were toxic MNG. All patients presented with palpable neck swelling, were evaluated in terms of history, clinical examination and subjected for relevant investigations, taken up for surgery with prior thyroid profile, USG neck, FNAC and histopathology of resected specimen done postoperatively.

RESULTS

Toxic MNG constituted 11% of MNG. Toxic MNG is more common in females (female to male ratio is 5:1) and majority are in the age group of 41-50 years (48%). In majority (90%) of patients, duration of the swelling prior to the presentation was 2-5 years.

CONCLUSION

Total thyroidectomy is the surgery of choice for toxic MNG. Surgical therapy has major advantage of rapid control of thyrotoxicosis, minimise the cardiac effects of coexisting severe cardiotoxicity.

KEYWORDS

Multinodular Goitre (MNG), Toxic MNG.

HOW TO CITE THIS ARTICLE: Kodi S, Waddi S, Katakam, SK, et al. A prospective study on toxic multinodular goitre in surgical wards of Andhra Medical College, Visakhapatnam. J. Evid. Based Med. Healthc. 2016; 3(51), 2623-2627.

DOI: 10.18410/jebmh/2016/575

INTRODUCTION: Multinodular goitre (MNG) is the most common thyroid disease in the world, with more than 300 million people estimated to be affected. MNG is the result of aberrant growth of thyroid follicular cells following chronic TSH stimulation, which, via hyperplasia, leads to the nodular degeneration of thyroid tissue. Within a MNG, the development of hyperfunctioning nodules, in the absence of an autoimmune stimulus as is the case with diffuse toxic goitre (Graves' Disease)¹, determines the clinical picture of toxic MNG (TMNG)². The present study consists of patients admitted with nodular thyroid swelling with toxic symptoms from July 2013 to September 2015 in the surgical wards of King George Hospital, Andhra Medical College, Visakhapatnam.

MATERIALS & METHODS: A total of 500 goitre patients were examined. Out of which 58 patients with TMNG who were treated during this period were included in the present study.

Financial or Other, Competing Interest: None.

Submission 24-05-2016, Peer Review 07-06-2016,

Acceptance 16-06-2016, Published 27-06-2016.

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DOI: 10.18410/jebmh/2016/575

Among them, 54 patients were female and remaining 4 were males. All patients were admitted and a detailed history was taken, underwent thorough clinical examination and investigated as per the written proforma. Informed consent was taken and thyroid profile and a FNAC was done in all cases of nodules greater than 10 mm in diameter and nodules 5-10 mm in diameter having calcification. All cases that gave consent for surgery were explained about risk and complications of surgery and anaesthesia. Surgery was performed in all the 58 patients by making all the patients euthyroid after using antithyroid drugs³ and propranolol⁴. Preoperatively, investigations were done according to the surgical protocol including ultrasound neck and FNAC. A preoperative indirect laryngoscope was done in all cases to check for the status of vocal cords and medico-legal purposes. The type of surgery, subtotal, near total or total thyroidectomy depended on the clinical diagnosis, ultrasound of neck and FNAC report.

All the excised thyroid specimens were sent for histopathological examination. Patients were discharged after removing the sutures on sixth postoperative day and were under followup. Postoperative thyroid profile was done on 1st postoperative week and after 1 month. They were advised to consult the endocrinologist with postoperative thyroid profile for further evaluation and expert

management. Results of surgery were compared with other modalities of management.

OBSERVATION AND RESULTS: In this study, we discuss the experience of the surgical management of toxic MNG at a specialised tertiary care centre in a developing country, highlighting the minimal morbidity and satisfactory outcome in experienced hands. In the present study, the criterion for the type of surgery chosen was the surgeon's preference.

Period of Study: July 2013 to September 2015.

Total Number of Multinodular Goitre cases: 500.

Toxic Multinodular Goitre Cases: 58.

The incidence of secondary toxicosis⁵ in multinodular goitre according to literature is 30%. Surgery⁶ is the ideal treatment⁷ for toxic MNG as it reduces the critical mass of thyroid gland and achieves euthyroid state in the immediate postoperative period.

Total Multinodular Goitres	500
Number of Toxic MNG	58(11.6%)

Table 1: Incidence of Toxic Goitre

Duration of Swelling	Frequency	Percentage
1-6 Months	00	00
6-12 Months	00	00
1-2 yrs.	9	15.51
2-5 yrs.	13	22.41
5-10 yrs.	28	48.27
>10 yrs.	08	13.79
Total	58	100

Table 2: Duration of the Swelling

All the patients presented with swelling and toxic symptoms.

Presenting Symptom	Frequency
Toxic Symptoms	58
Pain	7
Hoarseness of Voice	2
Difficulty in Swallowing And Breathing	2

Table 3: Incidence of Presenting Symptoms

FNAC Report	Frequency	Percentage
Nodular goitre	4	7
Adenomatous goitre	51	88
Hashimoto's thyroiditis	2	3
Malignancy	0	0

Table 4: FNAC Finding of Thyroid Swelling

Most common USG finding ⁸
Diffuse Thyromegaly, Altered Echo, Cystic Degeneration
Nodular Goitre

Table 5: Ultrasound Finding of Thyroid

Serum TSH	Frequency	Percentage
0.1-0.5 mIU/L	5	8.62
<0.1 mIU/L	13	22.41
<0.005 mIU/L or Undetectable	40	68.96

Table 6: Thyroid Profile

In the present study irrespective of age, sex and size of thyroid swelling T3, T4 levels were elevated and serum TSH levels were less than 0.005 or undetectable in 68.96% of patients. In 22.41% of patients, T3 and T4 levels were normal with subnormal TSH levels of less than 0.1 mIU/L.

Mode of Surgery	Total No. of Cases	Percentage
Total Thyroidectomy	32	55.17
Subtotal Thyroidectomy	22	37.93
Dunhill's Operation (Near Total Thyroidectomy)	4	6.89
Total	58	100

Table 7: Mode of Surgery In Toxic MNG

HPE Report	Total No. of Cases	Percentage
Colloid Goitre	52	89.6
Hashimoto's goitre	3	5.1
Malignancy	2	3.44

Table 8: Histopathology of Thyroidectomy Specimen

In 2008, Agarwal et al stated that total thyroidectomy⁹ is a safe option in the hands of expert surgeons and that near total thyroidectomy is similarly effective and safer option.

Parameters	Total thyroid-ectomy ⁷	Dunhill's operation	Subtotal thyroid-ectomy ¹⁰
Sex:			
Male	4	0	0
Female	28	4	22
Age group	50-60	40-50	35-40
Extent of swelling	Involving both lobes	Involving both lobes	Involving single lobe
Hospitalisation after surgery	5-10 days	5-10 days	5-10 days

Table 9: Clinical profile of the patients who underwent various types of thyroidectomy¹¹

Complications ¹²	Total thyroid-ectomy	Near total thyroid-ectomy	Subtotal thyroid-ectomy
Reactionary haemorrhage	0	0	0
Transient ¹³ hypocalcaemia	4	2	2
Transient vocal cord palsy	3	1	2

Permanent hypoparathyroidism	0	0	0
Permanent vocal cord palsy ¹⁴	0	0	0
Postoperative seroma	2	1	2
Wound infection	2	0	0
Table 10: Distribution of Complications in Various Thyroid Surgeries⁹			

DISCUSSION: The prevalence¹⁵ of nodular goitres that produce hyperthyroidism is approximately 2% in women and 0.2% in men. Hyperthyroidism from toxic MNG in iodine deficient areas account for 35-40% and as per the previous studies conducted in other parts of world (Ogbera and Kuku 2011 and Santaniello et al 2012). Toxic MNG constituted 11% of MNG.

Average age group presenting with symptoms in our study is 40-50 years. The youngest age presenting with toxic MNG was 23 yrs. and the oldest was 56 yrs. Most of the patients are in between 40-50 yrs. with an average age of 48.2%. The average age incidence in our study is later age group compared to Graves's disease with average age of 20-40 yrs. Prevalence of thyroid disorders have been found to increase linearly with age (Mariotti et al 1995). The patients with toxic MNG tended to be older than those with nontoxic MNG with a greater evolution time of the goitre. Of the 58 toxic MNG cases studied, 54 patients are females (93%) and 4 patients are males (6.8%). Female to male ratio was 5:1.

There is increased female preponderance compared to males. Women are affected in about 80% of cases according to study in Hong Kong Medical Association in 1990. The incidence in males is higher in the present study compared to world literature. It may also be due to the fact that more males with toxic MNG underwent surgery and as considered earlier that patients' preference for surgery as another reason for increased incidence in males.

Studies	Sex incidence (Female: Male)
Tunbridge et al 1992	13:1
Bayer et al 1993	9:1
Vander et al 1968	11:1
Pradjes JM et al 1990	7.9:1
Leech et al 1928	6.6:1
Present study	5:1
Table 11: Comparative Incidence of Toxic MNG in Females and Males	

The chief presenting complaint in this study is swelling in front of the neck with toxic¹⁶ symptoms like palpitations, sweating and weight loss. However, 12% had swelling associated with pain, 3% had hoarseness of voice, and 3% had difficulty in swallowing and breathing. Toxic⁴ symptoms and signs were seen in almost all cases in the study group which constituted to 100%.

Adenomatous goitre⁵ is the most consistent finding in FNAC of the thyroid swellings in toxic MNG and it accounted up to 88% of the study group. 3% of cases are Hashimoto's and 7% are nodular goitre. The most common¹⁷ neck USG finding was diffuse thyromegaly, altered echoes with nodules, cystic degeneration with features suggestive of nodular goitre. Based on planimetry measurement of nodule size in scans, toxic nodules have the mass volume 3 times greater than nontoxic nodules.

Serum TSH measurements have the highest sensitivity and specificity of any single blood test in the evaluation of the study group. 68.96% of them having overt hyperthyroidism showed TSH levels of either <0.005 mIU/L or detectable TSH among the total toxic MNG cases, 22.41% showed TSH levels <0.1 mIU/L and 8.62% showed TSH levels 0.1 to 0.2 mIU/L. A study by the American Thyroid Association suggests that the relationship between free T4 and TSH is an inverse log linear relationship.

The most common histopathological report of resected thyroid specimens showed features consistent with multinodular goitre. In the study, 89.6% showed features suggestive of MNG, 5.1% showed features of Hashimoto's and 3.44% showed features of malignancy (Follicular carcinoma). Malignancy arising in the hyperthyroid goitre is an uncommon but consistent finding in most surgical series. The reported incidences range from 2.6% to 10%. Wahl RA et al studied co-existence of hyperthyroidism and thyroid cancer.

Pacine and her colleagues observed a 7.5% incidence of cancer¹⁸ in toxic MNG and 2.5% in AFTN. In the present series, 3.44% of malignancies were reported and it was comparable with the above study. The incidental thyroid cancer incidence is relevant, non-palpable nodules of similar size. Besides, the complications of total thyroidectomy are similar to conservative procedures. The recurrence of goitre and incidental thyroid cancer requires a second surgical procedure with a higher risk of complications. So total thyroidectomy¹³ is the standard surgical treatment¹⁹. Giles Y et al¹³ studied advantage of total thyroidectomy to avoid reoperation for incidental thyroid cancer.

Today, total thyroidectomy is among the most common performed procedure involving the endocrine glands. Of the 58 cases, 32 cases were subjected to total thyroidectomy, 4 cases were subjected to Dunhill's operation and remaining 22 cases underwent subtotal thyroidectomy. Surgery is indicated in patients deserving or requiring rapidly efficient definitive treatment. It is also a preferred treatment of choice for patients with suspicion of malignancy, massive goitre with local compressive symptoms, urgent need for control of disease and severe hyperthyroidism.

In 2008, Agarwal et al stated that thyroidectomy is a safe option in the hands of expert surgeon and Dunhill's operation is similarly effective safer option. There are robust data demonstrating that surgeon volume of thyroidectomies is an independent predictor of patient and economic outcomes following thyroid surgery. There is a robust, statistically significant association between increasing surgeon volume and superior patient outcomes for

thyroidectomy (Sosa JA, Bowman HM, Tielsch JM, Powe NR, Gordon TA, Udelsman R, *Ann surg* 1998).

The change in surgical procedure from subtotal to near total or total thyroidectomy in the treatment of patients with benign MNG, (Tezelman.S, Boruc.L et al) *World Journal of Surgery* 2009.

Barczynski et al reported that there was no significant difference in operation when comparing total and subtotal thyroidectomy. In this study, also more than 55% of them underwent total thyroidectomy, in that recurrence is usual with subtotal thyroidectomy when compared to other types of surgery which is 5.17%. Pattou F et al²⁰ studied hypocalcaemia following surgery; incidence and prediction of outcome.

SUMMARY AND CONCLUSIONS: Fifty eight patients of toxic MNG were evaluated and results of surgical management and postoperative outcome were analysed.

1. MNG is the commonest thyroid disease in our hospital.
2. Toxic MNG constituted 11% of MNG.
3. Toxic MNG is more common in females (female to male ratio is 5:1) and majority are in the age group of 41-50 years (48%).
4. The chief complaint in majority of cases is swelling in front of the neck with associated toxic symptoms and few patients with pressure symptoms.
5. In majority (90%) of patients, duration of the swelling prior to the presentation was 2-5 years.
6. T3, T4 and TSH levels were done in all cases and TSH levels were of the range of <0.1 mIU/L to <0.005 mIU/L.
7. FNAC and USG neck was useful in this study in patients with suspicious and large goitres.
8. Malignancy was still a surprise on postoperative histopathological examination of about 3.44%, even when there is no suspicion of malignancy clinically and with FNAC.
9. In this study, the only criterion for the type of surgery chosen was surgeon's preference and experience based on evaluation of the gland.
10. The main indications of surgery in toxic MNG are large goitre, irregular control of thyrotoxicosis, pressure effects symptoms and patient's preference.
11. Total thyroidectomy is the surgery of choice for toxic MNG because it results in rapid reliable resolution of hyperthyroidism on removal of goitre, requires no retreatment, and removes any coexisting malignancy.
12. Rapid control of thyrotoxicosis, which could minimise the cardiac effects of coexisting severe cardiotoxicity, is the major advantage of surgical therapy of toxic MNG.

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