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A prospective clinicopathological study on multinodular goiter in Iraqi patients

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Abstract

Background *Thyroid gland is a shield considered to protect the larynx and plays very important functions in the body. Thyroid swellings and enlargement are commonly encountered in clinical findings and surgical practice. Thyroid enlargement with formation of multiple distinct nodules are characteristics of Multinodular goiter (MNG). Iodine deficiency leads to increase in the thyroid stimulating hormone (TSH). Thus, prolonged stimulation by elevated TSH may develop MNG and more prone to malignant transformation. Present study was planned to study clinicopathological aspect of MNG with respect to TSH hormone levels in Iraqi patients*

Method *The present study was a hospital-based prospective study conducted in Al - Shafa hospital, Diyala, Iraq between January 2018 to January 2020. 41 patients aged between 15 to 75 yrs. Clinically diagnosed as multinodular goiter (MNG) were included in the study.*

Result *In the present study, all the recruited patients are having swelling in the anterior side of the neck. Minimum age recorded in both the genders was 22 years. While maximum age in male was 60 years and in female it was 78 years, thus total mean age was 45.5 years. Of the 40 patients, majority of cases were female that is 34 patients and remaining 6 cases were males, having sex ratio of female to male 17:3. Total thyroidectomy was performed, and histopathology study was carried out to check the malignancy.*

Inference *In our study, we have found the pathological presentation of goiter is benign and clinically swelling of the neck is observed. The majority of females were affected by MNG. Total thyroidectomy was the preferred method for the malignant cases over other types of surgeries.*

Keywords *Goiter, Multinodular, thyroid stimulating hormone, malignancy*

Introduction

Thyroid being an endocrine gland, located anterior to the human neck. Basically, it is a shield considered to protect the larynx (Medvei, 1998). It plays very important functions in the body which includes calcium metabolism, stimulation of somatic growth and regulation of basal metabolic rates thereby necessary for physiological action of most organs (Amudhan et al, 2017). Thyroid swellings and enlargement are commonly encountered in clinical findings and surgical practice. Estimation of prevalence of goiter is of 4 to 7% in the general population (Hariprasad and Srinivas, 2017). Presence of nodules either single or multiple in the gland, indicates the diseased state and nodular goiter is the most common problem in the world today. But early detection and potential curative therapy, may underscore the rate of disease. Moderate to severe deficiency of iodine is commonly affect the gland towards the disease (Amudhan et al., 2017).

Clinicopathologically, thyroid enlargement with formation of multiple distinct nodules are characteristics of Multinodular goiter (MNG). Its prevalence is almost 4 – 7 % worldwide (Wiest et al., 1998). In case of MNG, these nodules are morphologically and functionally altered completely. Size of nodules can be of various sizes from very small to several centimeters each (Frilling and Hurtl, 2001). Though pathogenesis of MNG is yet to be clear, there are various factors described for its cause, like lack of nutritional iodine, impaired hormone synthesis, obesity, smoking, presence of thyroid stimulating immunoglobulins, history having irradiation exposure, irregular iodine clearance from kidney and female sex. Iodine deficiency leads to increase in the thyroid stimulating hormone (TSH) (Amudhan et al, 2017, Brix et al., 2000, Abu-Eshy et al., 1995).

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TSH is secreted in the pituitary gland and controls the thyroid gland functions and regulation. While iodine transport activity is also controlled by TSH. Impairment with the thyroid hormones can cause changes in the structure and function of gland (Eisenberg et al., 2010). In response to this dysfunction some inflammatory/malignant cells and thyroid cells to the thyroid is involved which may develop a thyroid nodule (Wilson and Foster, 1992). Thus, prolonged stimulation by elevated TSH may develop MNG and more prone to malignant transformation. Malignancy was being questioned in case of MNG in earlier days, but recent study discovered that it can be occur even in MNG (Asmatullah et al., 2014). Due to unclear etiopathogenesis of MNG, appropriate diagnosis, sound surgical knowledge and proper treatment can be a key to manage MNG. Earlier reports suggest that, incidence of carcinoma in MNG is between 8.6 to 13% (McCall et al., 1986, Gandolfi et al., 2004). Wide variation is observed in the malignancy, while most swellings are found benign. About 8-20 % of surgical thyroid nodules are found malignant, whereas 5% malignancy was observed in clinical specimens. Some studies revealed that, incidence of cancer in MNG is as high as single nodular goiter (Sunday-Nweke et al., 2019).

There are various techniques available for the treatment of MNG, like radioactive-iodine therapy, subtotal thyroidectomy and total thyroidectomy. Of these techniques, even over the treatments with the drugs, surgical treatment like total thyroidectomy is more preferred in case of MNG (Wheeler, 1998). With this background, present study was planned to study clinicopathological aspect of MNG with respect to TSH hormone levels in Iraqi patients.

Methodology

This prospective study was undertaken on the clinicopathological aspect of multinodular goiter in Iraqi patients with respect to their biochemical reports. Whole study was conducted at the Al - Shafa hospital, Diyala, Iraq. between January 2018 to January 2020. Ethical approval for the study had taken from ethical committee of Al - Shafa hospital, Diyala, Iraq. Some inclusion and exclusion criteria were considered during the study before enrollment of a patient. Clinical examination with detailed history was carried out. Inclusion criteria were patients having written consent and well informed, patients diagnosed clinically by MNG, age group 15 to 75 years, both genders were included. While pregnant and lactating mothers, patients presenting with solitary thyroid nodule and immunocompromised, age below 15 and more than 75 were excluded. MNG was diagnosed by ultrasonography where two or more thyroid nodules have been found.

Around 41 patients were recruited, having thyroid gland enlargement with more than one nodule or nodular surface at Al - Shafa hospital, Diyala, Iraq during January 2018 to January 2020. Age of the enrolled patients were ranged between 15-75 years. As written consent was necessary, it was taken from all the patients. Patients were subjected to necessary clinical and physical examinations as symptoms favoring malignancy were also considered. Total thyroidectomy was performed for all patients diagnosed with multinodular goiter based on clinical suspicion of a probable malignancy. All the surgical specimens were evaluated for histopathology. Patients were analyzed pathologically by estimating the levels of T3, T4 and Thyroid Stimulating Hormone (TSH) to know the exact status of using thyroid function test and the results will be recorded. These parameters were carried out using commercial kit named Cobas e 411.

Surgical procedure

Total thyroidectomy was performed after taking written consent for excision of lymph node. All surgeries were done under general anesthesia by using an Endo tracheal tube. Reverse tredlenberg position (head up) with the extended neck position were given to the patients. The collar incision was used. Upper and lower flaps was placed to retractinstead of Joll's retractor. This was done by using cautery (coagulation diathermy). Ligations of middle thyroid veins was done by 3 0 vicryl followed by ligations of superior thyroid artery and veins. Inferior thyroid vessels were also ligated. During the surgery, redivac drains were used and removed after 2 to 3 days. Second generation cephalosporins antibiotics were given after surgery. After 1 week after surgery, thyroxine was given.

Statistical Analysis

The data were represented as the mean± standard error (SE). The biochemical estimation was performed in triplicate.

Results

In the present study, all the recruited patients are having swelling in the anterior side of the neck; among them three patients were shown very big nodules around the neck. Rest of the other patients was also confirmed with the MNG.

In this study minimum age recorded in both the genders was 22 years. While maximum age in male was 60 years and in female it was 78 years, thus total mean age was 45.5 years. (Table 1). In our study, of the 40 patients, majority of cases were female that is 34 patients and remaining 6 cases were males, having sex ratio of female to male 17:3 (Table 1).

Table 1. Age and sex distribution in the MNG patients

Age group (Years)	Males	Females	Total cases	Percentage (%)
0-20	-	-	-	-
20-40	2	17	19	47.5
40-60	4	15	19	47.5
60-70	0	2	2	5
Total	6	34	40	100

(Add operative procedure result related to nodule appearances and types found).

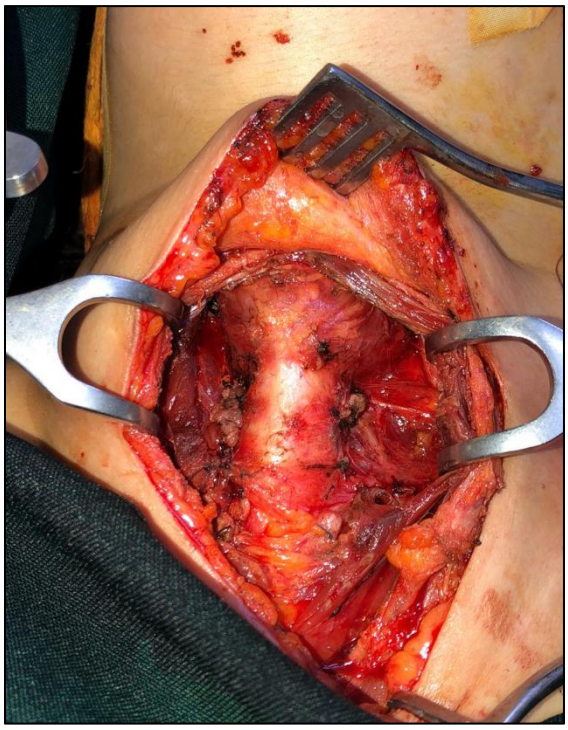

Figure 1. A

Figure 2. Macroscopic giant nodular goiter

Figure 3. Immediate postoperative incisions

Table 2. Serum Biochemical parameters of MNG patients

Serum Biochemical Parameters	**Average Values**
Thyroid Stimulating Hormone (TSH) (mU/L)	2.16 ± 1.43
T3 (ng/dl)	1.71 ± 0.92
T4 (ng/dl)	100.33 ± 60.48

Biochemical investigations like serum TSH, T3, T4 levels were analyzed in all the patients. Average TSH value obtained in our study is 2.16 mU/L. Serum T3 and T4 levels in the enrolled patients were 1.71 ng/dl and 100.33 ng/dl respectively.

Discussion

Clinically prevalence of thyroid swelling among the general population is about 4-7%. Presence of diffuse or nodular surface of swelled thyroid led us to the investigation for its malignancy (Kumbhar et al., 2018). In earlier years, multilocularity was the indication for the thyroid disease to be benign, but nowadays, it was noted that malignancy from MNG is incidentally ranging from 7.5 to 21.2% which appears to be similar in case of solitary nodules (Gandolfi et al., 2004, Koh and Chang, 1992). Pathophysiology of MNG is believed to be involved some primary and secondary factors. Primary factors are genetic heterogeneity of follicular cells with their new qualities obtained by replicating epithelial cells. Lack of iodine intake, thyroid hormonal status and inborn dysfunction in the thyroid functions are the secondary factors (Studer et al., 1989). Main concern in the MNG is fear of malignancy and it was observed that presence of carcinoma in case of MNG patients is statistically significant. But clinical confirmation is necessary to recruit the patient (Kesavalingam et al., 2017).

It was reported that incidence of malignancy in MNG cases was 14.3 % for those patients who had surgery to find out carcinoma (Yong et al., 2017). Currently practitioners are concentrating their views on dominant nodules for the evaluation of MNG (Kim et al., 2008). Because it was revealed in earlier studies that chances of presence of cancer in the dominant nodules are 72.5% while some reported the it was 64.2%. (Frates et al., 2006, Paksoy et al., 2011). Though there are certain contradictions which reports that 59% of incidence of cancer found within the nondominant nodule than the dominant one which is 41%. (Erbil et al., 2008). Overall calculating the prevalence for malignancy in MNG, all patients having MNG must undergo surgical process (Yong et al., 2017). There are various types of surgeries are available, which depend on the size and location of the thyroid swelling. Therefore, these treatments provide least morbidity and very less mortality (Raab et al., 2006).

In the present study total thyroidectomy was performed because these are the cases of long history of the disease and due to which almost whole organ is involved in the MNG or the case of malignancy (Hariprasad and Srinivas, 2017). Fine Needle Aspiration Cytology (FNAC) and ultrasonography techniques are available for the diagnosis of MNG (Gupta et al., 2013, Sunday-Nweke et al., 2019). FNAC and other methods have limitations of unable to differentiate in the follicular adenoma from malignancy (Sunday-Nweke et al., 2019) and other surgical types have more complications like damage to the laryngeal nerves, hypocalcemia, hemorrhage and reappearance of malignancy, total thyroidectomy was preferred (Hariprasad and Srinivas, 2017). While further histopathology reports were followed for the confirmation.

Normal histology of typical MNG is a homogenous parenchyma structure distorted by the appearance of one or many nodules of different sizes. It has poorly distinct margins but well capsulated follicular adenoma. Calcium depositions and extensive fibrosis was observed in the side areas of nodules, while lymphocytic infiltrations along with normal thyroid tissues were scattered in between the nodules (Medeiros, 2000, Sunday-Nweke et al., 2019).

In our study, we have studied age and gender connection with MNG as these are the associated factors of the lesions. Among the 40 patients only 6 were males and remaining 34 are female patients having total mean age of the recruited patients are 45.5 %. These results corroborate with some earlier studies where some authors stated that prevalence of MNG was highest in the middle-aged group than other groups. 30% of prevalence was found in some earlier studies in 31-40 years of age group. Our results are well compared with reported studies which focuses concern on the management of MNG in their reproductive age. (Altae et al., 2009, Sanjeeva et al., 2015). The occurrence of presentation of thyroid lesions were commonly found in the age group of 31-50 years (Kumbhar et al., 2018), which corelated to the present study. On this background some studies found that youngest patient presented goiter is of 11 years old and oldest was 83 years old male diagnosed with the malignant lesions (Kukar et al., 2013). On the other hand, among the age range of 31- 40 years, 7 year old girl patient was detected with thyroid and oldest patient was 73 years having colloid goiter (Gupta and Khushbu., 2016).

It was also stated that epidemiologically 59% of the MNG cases has highest occurrence of disease at the age of 3rd and 4th decade of life in mostly females (Athavale et al., 2019). Malignancy rates of the lesions were increases as the age increases, chances are more in the older patients of age above 60 years, while benign lesions were common in early and middle-aged patients. (Muratli et al., 2014). Out of the 69 cases enrolled for total thyroidectomy, 31 cases underwent to hemithyoidectomy, where different patterns of histo-morphological changes were observed in neoplastic and non-neoplastic lesions. (Kapoor et al., 2018). Total 50 cases were studied for the clinicopathological features of MNG and its post-operative complications. It was showed that among 50 cases 64% of patients have found colloid nodular goiter, 22% had Hashimoto's thyroiditis, while 8% and 4% were found to have adenomatous goiter and

follicular neoplasm respectively in post-operative FNAC report (Amudhan et al., 2017). Compared to the other studies around the world on incidences of cancer in MNG patients, it was reported that there are only 14.3 % patients found malignancy who had undergone surgery (Yong et al., 2017).

TSH levels were normally altered in routine post-operative treatments with thyroxine sodium tablets (Sanjeeva et al., 2015), but in our study T3, T4 and TSH levels were maintained at the upper limit of normal values. Many reviewed studies have shown that common lesions are found benign and most of them are MNG, these reports correspond our study as benign lesions were found in most of the cases in our study.

Conclusion

Multinodular goiter is commonly found in third and fourth decades of life predominates in female group. Swelling of the thyroid gland with the discomfort is the common feature of MNG. Patients presenting with cosmesis, hyperthyroidism and most cases malignancy would prefer the surgery. Total thyroidectomy surgery is nowadays most preferred technique especially in case of malignancy. Clinicians should evaluate the non-dominant nodules with the same intensity because malignancy was appreciable in both the cases.

References

1. Medvei VC. A history of endocrinology. In: Kovacs K, Asa S, editors. Functional Endocrinology. England: Blackwell Science.1998. p.1.

2. Amudhan J., Vijay A., Latha G., Anandan H. Clinicopathological Study on Multinodular Goiter: A Prospective Study. International Journal of Scientific Study. 2017, 5(1):83-85.

3. Hariprasad S., Srinivas T. Clinicopathological study of thyroid swellings - a two year prospective Study. Indian Journal of Basic and Applied Medical Research. 2017, 6(3), 152-160.
4. Wiest PW., Hartshorne MF., Inskip PD., Crooks LA., Vela BS., Telepak RJ., Williamson MR., Blumhardt R., Baoman JM., Tekkel M. Thyroid palpation versus high-resolution thyroid ultrasonography in the detection of nodules. Journal of Ultrasound and Medicine 1998;17(8):487-496.
5. Frilling A., Hertl M. Endemic goitre and benign multinodular goitre. Surgical endocrinology Philadelphia: Lippincott Williams and Wilkins, 2001,37-45.
6. Brix TH., Hansen PS., Kyvik KO., Hegedus L. Cigarette smoking and risk of clinically overt thyroid disease: a population-based twin case-control study. Achieves of Internal Medicine 2000,160:661–666.
7. Abu-Eshy SA., Khan AR., Khan GM., al-Humaidi MA., al-Shehri MY., Malatani TS. Thyroid malignancy in multi-nodular goitre and in a solitary nodule. Journal of the Royal College of Surgeons of Edinburgh. 1995,40:310-312.
8. Eisenberg MC., Santini F., Marsili A., Pinchera A., DiStefano JJ. TSH Regulation Dynamics in Central and Extreme Primary Hypothyroidism. Thyroid. 2010, 20(11):1215-1228.
9. Wilson JD., Foster DW. "The thyroid gland," Williams Textbook of Endocrinology. 1992, 8:463-465.
10. Asmatullah, Wahld FI., Khan Q., Khan MR. Multinodular goiter vs Solitary thyroid nodule, a Clinicopathological comparison. The Kaohsiung Journal of Medical Sciences. 2014, 7(2):206-211.
11. McCall A., Jarosz H., Lawrence AM., Paloyan E. The incidence of thyroid carcinoma in solitary cold nodules and in multinodular goiters. Surgery 1986,100(6):1128-1132.
12. Gandolfi PP., Frisina A., Raffa M., Renda F., Rocchetti O., Ruggeri C., Tombolini A. The incidence of thyroid carcinoma in multinodular goiter: Retrospective analysis. Acta Bio medica Ateneo parmense 2004;75(2):114-17.
13. Sunday-Nweke NA., Enemuo VC., Nwigwe CG., Oguonu AC. Clinicopathological features of goiter in Abakaliki Nigeria. International Journal of Scientific & Engineering Research. 2019, 10(11):290-298.
14. Wheeler MH. The technique of Thyroidectomy. Journal of the Royal Society of Medicine. 1998, 91(33):12-16.
15. Kumbhar S., Kanetkar S., Mane A., Khurana C., Sharma N. Clinicopathological study of thyroid lesions. Indian Journal of Basic and Applied Medical Research. 2018, 7(3):80-97.
16. Koh KB., Chang KW. Carcinoma in multinodular goitre. British Journal of Surgery 1992;79(3):266-267.
17. Studer H., Peter HJ., Gerber H. Natural heterogeneity of thyroid cells: The basis for understanding thyroid function and nodular growth. Endocrine Reviews 1989, 10(2):125-135.

18. Kesavalingam K., Karthikeyan T., Meera SS., JithuGeorge, Venkateshwar. A Prospective Observational Clinicopathological Study on Multinodular Goiter in A Tertiary Care, Academic Institution. Journal of Dental and Medical Sciences. 2017, 16(10): 55-58.
19. Yong JS., Loh KS., Petersson BF., Thong M. Multinodular Goitre: A study of malignancy risk in nondominant nodules. ENT-Ear, Nose and Throat Journal. 2017, 336-342.
20. Kim DL., Song KH., Kim SK. High prevalence of carcinoma in ultrasonography- guided fine needle aspiration cytology of thyroid nodules. Endocrine Journal. 2008, 55(1):135-142.
21. Frates MC., Benson CB., Doubilet PM., Kunreuther E., Contreras M., Cibas ES., Orcutt J., Moore D., Larsen PR., Marqusee E., Alexander EK. Prevalence and distribution of carcinoma in patients with solitary and multiple thyroid nodules on sonography. The Journal of Clinical Endocrinology and Metabolism. 2006, 91(9):3411-3417.
22. Paksoy N., Yazal K., Corak S. Malignancy rate in nondominant nodules in patients with multinodular goiter: Experience with 1,606 cases evaluated by ultrasound-guided fine needle aspiration cytology. Cytojournal. 2011, 8:19.
23. Erbil Y., Barbaros U., Salmaslioglu A., Mete O., Issever H., Ozarmagan S., Yilmazbayhan D., Tezelman S. Effect of thyroid gland volume in preoperative detection of suspected malignant thyroid nodules in a multinodular goiter. The Achieves of Surgery. 2008, 143(6):558-563.
24. Raab SS., Vrbin CM., Grzybicki DM., Sudilovsky D., Balassnian R., Zarbo RJ., Meier FA. Errors in Thyroid Gland Fine-Needle Aspiration. Am J Clin Pathol. 2006.(6);125:873-82.
25. Gupta S., Reddy CV., Chettri ST., Karki S. Clinicopathological features and complications of thyroid operations: A single center experience. Indian Journal of Otolaryngology and Head and Neck Surgery. 2013, 65(2):140-145.
26. Medeiros-Neto G. Multinodular Goiter.[Updated 2016 sep 26]. In: De Groot LJ.,Chrousos G, Dungan K ET AL.,editors. Endotext [Internet]. South Dartmouth (MA): MD Text.com.Inc.;2000.
27. Altae MA., Al Mosaui HM., Alkhafaji MM. Clinical and pathological evaluation of 11 patients with nodular goitre. Medical Journal of Babylon. 2009, 6(3-4):494-500.
28. Sanjeeva KK., Chandra B., Balkrishna MA., Ramesh DB. Clinico-epidemiological study and treatment outcome of Multinodular Goiter at a tertiary care hospital. Journal of Clinical and Diagnostic Research. 2015, 9(6):22-25.
29. Kukar N., Malhotra V., Saluja M. Analysis of Fine Needle Aspiration Cytology of Thyroid Lesions. The Internet Journal of Pathology. 2013; 15(1):1-9.
30. Gupta M and Khushbu T. Correlation of fine needle aspiration cytology with histopathological diagnosis in thyroid lesions. European Journal of Pharmaceuitical and Medical Research. 2016, 3(10), 218-221.
31. Athavale VS., Thakkar SM., Gope DD., Tulsian AR., Sree Kumar B., Gogineni JC. A clinicopathological study of multinodular goitre. International Surgery Journal. 2019, 6(3):892-897.
32. Muratli A., Erdogan N., Sezgin S., Unal I., and Akyuz S. Diagnostic efficacy and importance of fine-needle aspiration cytology of thyroid nodules. Journal of Cytology. 2014, 31(2):73–78.
33. Kapoor S., Kumar A., Singh B., Gupta G., Singh A., Seth K. Study of clinical pattern of thyroid swellings and their management. Journal of Dental and Medical Sciences. 2018, 17(2):27-35.