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RESEARCH ARTICLE

CORRELATION OF PRE OPERATIVE ULTRASONOGRAPHY (USG) AND POST OPERATIVE HISTOPATHOLOGY REPORT IN THYROID DISEASE

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ABSTRACT

Aim: To find the correlation of preoperative ultrasonography (USG) and post operative histopathology report in thyroid disease. **Objective:** To correlate pre-operative USG and post operative histopathology report in benign and malignant thyroid diseases. To study the incidence of benign versus malignant lesion of thyroid disease in our setting. To determine the sex predilection among benign versus malignant thyroid disease in our setting. **Methods:** It was a prospective, descriptive, cross sectional study. Patients presenting with thyroid swellings and undergoing thyroid surgery were included in this study. Patients underwent USG neck using GE VOLUSON E8 scan machine and Linear probe 9L Frequency and were reported regarding the shape, size, echogenicity, calcifications, margins, vascularity, and lymphnode status. After the surgery thyroid specimen was sent for HPE analysis to confirm the final diagnosis. Histopathology report were collected and correlated with pre op USG findings. **Results:** 45 patients were included in this study out of which 11 patients turned out to be malignant and 34 benign. Out of 45 patients 37 were female and 8 were male. USG features. **Conclusion:** Malignant thyroid nodules demonstrated ultrasonography characteristics of hypoechoic texture, micro calcifications, shape of taller than wider, internal vascularity, irregular margins, size >3cm and presence of lymphnodes. The ultrasonography test has 93.5% diagnostic accuracy to differentiate malignant from benign lesions. In this region thyroid lesions were predominantly benign and more common in females.

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INTRODUCTION

Thyroid gland is the largest endocrine gland in the body and first to develop in fetal life. There is approximately 4-5% incidence of clinically palpable thyroid nodules in the general population. The majority (90%) of thyroid nodules are benign as malignancy occurs in only 1 in 10 thyroid nodules (Lokhande, 2015). Thyroid lesions may be developmental, inflammatory, hyperplastic and neoplastic (Gupta, 2016). Ultrasound is generally the first choice for the evaluation of thyroid morphology because of its high sensitivity for small nodule detection. The advantages of ultrasound are that it is an easily accessible, inexpensive, non-invasive and highly sensitive imaging modality for distinguishing cystic from solid lesion. Color Doppler study helps in assessment of blood flow in addition to depiction of the morphology (Dhanadia, 2014). Ultrasound criteria to differentiate between benign and malignant nodules of thyroid gland have been the point of research in many scientific papers. Many of the published papers proved that ultrasound is highly sensitive but less specific in detection of malignant thyroid nodules.

Ultrasound features for prediction of malignancy include hypoechogenicity, microcalcifications, taller than wide shape, irregular or microlobulated margins and increased intranodular vascularity (Sanchez, 2014). The aim of this study was to prove ultrasonography as a valid tool which can be utilised in diagnosing benign versus malignant condition of the thyroid gland by correlating with the histopathology report. Histopathological examination (HPE) of the removed thyroid swelling is the most accurate way to determine the pathology, but it requires preparation of the patient, hospitalization, anaesthesia and surgery. The problem in clinical practice is to distinguish reliably the few malignant tumours from the many harmless benign nodules so that a definitive pre-operative diagnosis of malignancy allows planning of appropriate surgery and relevant patient counseling (N R, B V, T G, 2012).

MATERIALS AND METHODS

It was a Prospective, Descriptive, cross sectional study. It was done on patients presenting with thyroid swellings and undergoing thyroid surgery at Yenepoya Medical College Hospital Mangalore. A detailed patient information brochure was provided to all participants and they were appraised of the study. Written and informed consent was obtained from all the

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patients. Patients presented with thyroid swellings were examined thoroughly and advised USG neck, using GE VOLUSON E8 scan machine and Linear probe 9L Frequency. Features studied in USG were size, shape, echogenicity, calcification, margins, vascularity and presence of lymph nodes. After these Patients underwent the required thyroid surgery, the specimen was sent for histopathological analysis to confirm the final diagnosis. Histopathology reports were collected and correlated with pre-op USG findings. Even though FNAC was done as a part of diagnosis in all these patients; report were not correlated because the goal of this study is to exclusively assess the ability of USG in identifying benign versus malignant lesions of thyroid.

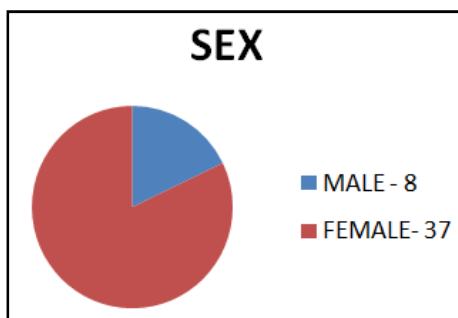
Exclusion Criteria

- Patients not willing for surgery.
- Patients not willing to participate in the study.

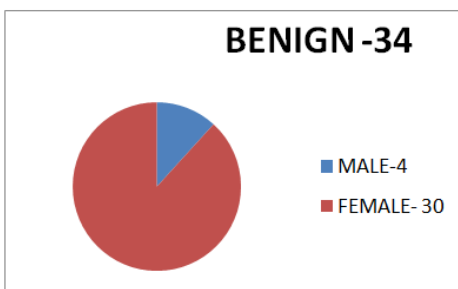
This study was done from the month of May 2017 to May 2018. Forty five patients participated in it. Sampling technique used was purposive sampling. Data obtained was recorded in MS Excel sheets and statistical data analysed using Windows SPSS version 22 software program. Objectives of this study were to correlate pre operative USG and post operative histopathology report (HPR) in benign and malignant thyroid diseases, to study the incidence of benign versus malignant lesions of thyroid in our setting and to determine the sex predilection among benign versus malignant thyroid diseases in our setting.

RESULTS

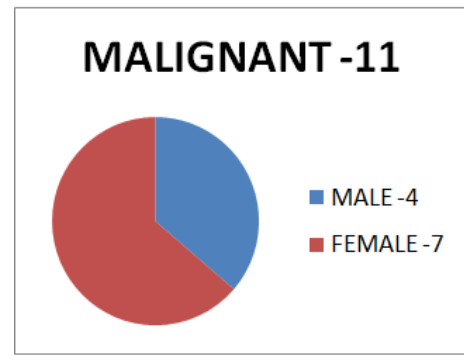
Out of 45 patients 37 were female patients (82.2%) and 8 were male patients (17.8%) (graph 1). Minimum age was 20 years and maximum was 84 years with mean age being 41 years. Out of 45 patients, 11 patients were found to have malignant lesions and 34 patients were benign lesions. In 34 benign lesions 30 were found in females and 4 were in males. In 11 malignant lesions, 7 were found in females and 4 in males (Graph 2, 3).



Graph 1. Sex distribution

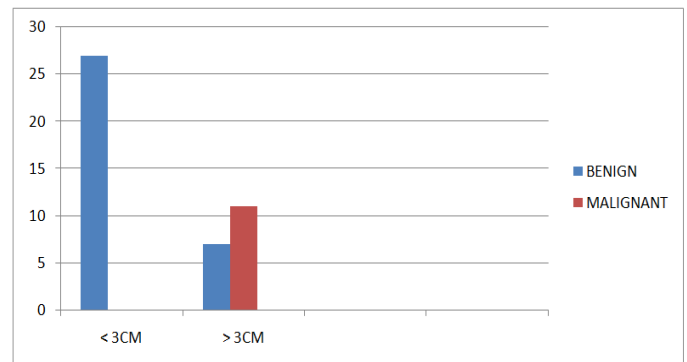


Graph 2. Sex distribution among benign



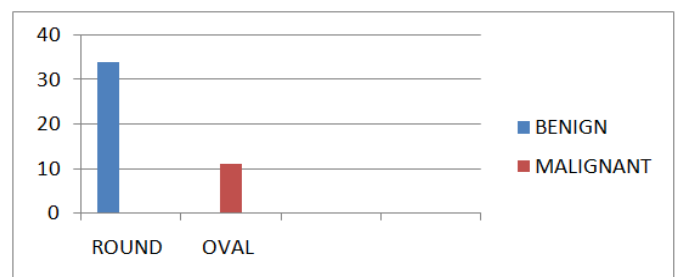
Graph 3. Sex distribution among malignant

Size: It was considered into two different group of <3cm and >3cm. 27 patients (60%) had <3cm in size that of a single nodule or the largest node in multinodular goitres. Out of 27 patients all histopathology report turned out to benign. 18 patients (40%) who had >3cm in size and 11 patients histopathology report was found to be malignant and 7 patients were benign (Graph 4).



Graph 4. Size distribution

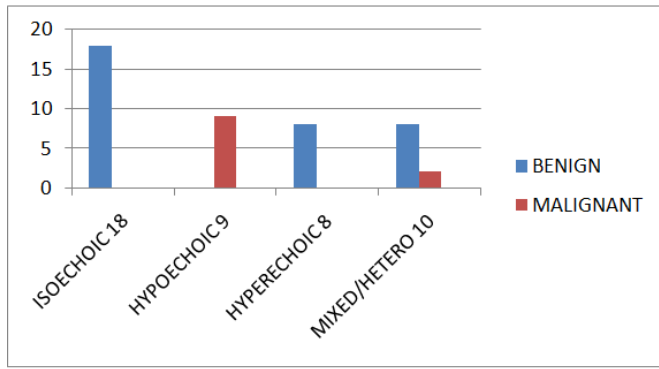
Shape: There are two types of shapes noted in USG, round and oval. Round is otherwise known as wider than taller and oval shape is taller than wider. Round shape was seen in 34 cases and all were benign lesions, 11 cases showed oval shape which were found to be malignant (graph 5).



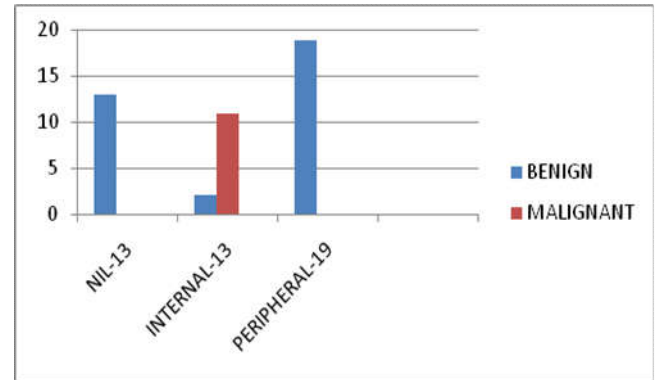
Graph 5. Shape distribution

Echogenicity: Four types of echogenicities were seen. Hypoechoic pattern was seen in 9 patients and all turned out to be malignant and out of 10 with mixed/hetero echogenicity 2 patients turned out to be malignant in histopathology report (Graph 6).

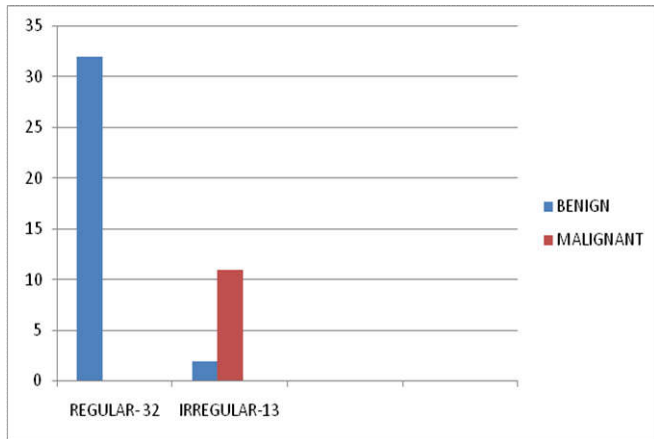
Margins: Regular and irregular margins were seen in 32 and 13 patients respectively. Out of 32 all the patients turned out to be benign and out of 13, 2 were benign and 11 were malignant (Graph 7).



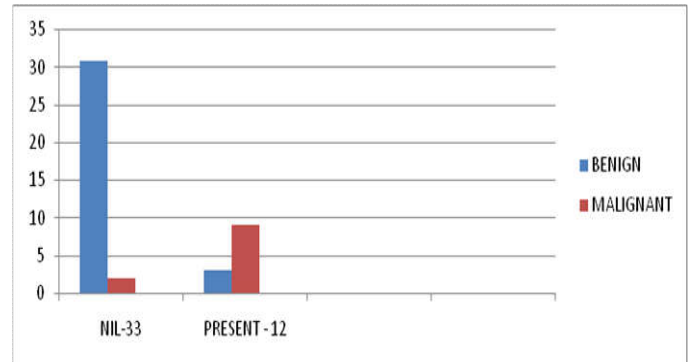
Graph 6. Distribution of echogenicity



Graph 10. Lymph node distribution

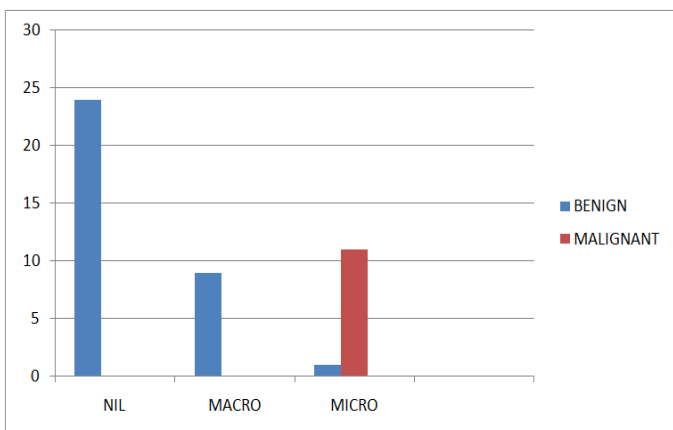


Graph 7. Distribution of margins



Graph 10. Lymph node distribution

Calcifications: Micro-calcifications were seen in 12 patients and 11 turned out to be malignancy and 1 benign. 9 patients showed macro-calcification and all were benign. However 24 patients did not showed any calcifications (Graph 8).



Graph 8. Distribution of calcifications

Vascularity: Raised internal vascularity was seen in 13 cases and 11 turned out to be malignant and 2 benign. Out of 19 patients who had peripheral vascularity they were benign, no vascularity was seen in 13 patients and all were benign (Graph 9).

Lymph Nodes: Absence and presence of lymph nodes were studied. Lymph nodes were not seen in 33 patients in which 31 turns out to be benign and 2 were malignant. Twelve patients had presence of lymph nodes in which 9 patients had malignancy and 3 were benign (Graph 10).

DISCUSSION

This study was done in department of ENT at Yenepoya medical college, Mangalore. In this study 45 patients who presented with thyroid swelling, pre operative USG was done and post operative histopathology report was correlated. We did this study to look for various factors in USG which can suggest whether it is a benign or malignant thyroid lesion. In the present study youngest patient was 20 years old and the eldest was 84 years. The mean age was 41 years. In a similar study by Ankush Dhanadia et al (2011) the age range was from 18 and 74 years with mean age of 39 years.

Gender distribution

In the present study, 82%(37) patients were female and 18% (8) were male. The male to female ratio was 1:4.82 So, females are more commonly affected than males. In a study by Ankush Dhanadia et al 72% patients were females and 28% males. Out of 37 female patients 30 were benign and 7 patients malignant(30:7), out of 8 male patients 4 were benign and 4 were malignant (1:1). Size distribution: In our study we have taken into consideration two variant sizes, >3cm and <3cm. >3cm was suspicious of malignancy. In a study done by Jeffrey R et al (2002) Benign nodules size were a mean of 2.9 cm (Wienke, 2003). Size of the nodule at initial presentation is a good predictor of malignancy because nodules, which are malignant, tend to grow fast and present with a large size^[7]. In a study done by Rahul sarkar (2014) more than 4cm sized nodule was 66.6 sensitive and 80.6 specific to detect malignancy and in our study >3cm size nodule was 78.5 sensitive and 82.9 specific. Shape: In our study two shapes were seen oval and round shape. Oval shape were seen in 24.4% patients and round shape seen in 75.6% patients. Moon and colleagues (Moon, 2008) reported that an oval shape as

compared with a round shape is higher specific (91.4%) for malignancy. Sheila Sheth (2010) stated in her review of US appearances of thyroid nodules, that cancers tend to grow across the tissue planes and assume a spherical shape to maximize their oxygen supply whereas benign lesions respect normal thyroid parenchyma (Sheth, 2010).

Echogenicity: Echotexture of solid nodules is another important criteria taken when analyzing nodules. Echotexture of the nodule is compared with that of surrounding thyroid parenchyma and the strap muscle (Sheth, 2010). Nodules are described as isoechoic, hypoechoic, hyperechoic and mixed. In our study 9 out of 11 malignant thyroid nodules showed hypoechoogenicity, 2 out of 10 mixed echogenicity showed malignant thyroid nodules. Twenty six patients showed isoechoic and hyperechoic echogenicity which were benign. In a study by Niranjana Sahu et al hypoechoogenicity was observed in 11 out of 12 malignant nodules; whereas half of the total benign nodules demonstrated hyperechoic echogenicity (Sahu, 2018). In a study by Peter Jun et al sonographic features were nonspecific as 55% of benign nodules were hypoechoic (Jun, 2005).

Margins: Margins may be regular and irregular, it refers to the border separating a thyroid nodule from the surrounding thyroid parenchyma, on sonography it can be either well defined or poorly defined depending on the extent of tumor invasion (Jun, 2005). In our study regular were 71.1% (32) and all were benign, whereas out of 28.9% (13) irregular margins 11 were malignant and 2 were benign. In a study by Ankush Dhanadia (2011) Margin was well-defined in 77.7% and ill defined in 22.3%. Irregular margin were 84.6 % sensitive and 94.1 % specific for malignancy in this study. In a study by Sung-Hun Kim et al (2009) spiculated or ill-defined margin seen in 17 out of 21 (Kim, 2009).

Calcification: The presence of calcification is also not a straightforward diagnostic criteria. Micro calcifications are relatively more common in malignant lesions than benign and may represent psammoma bodies which have been reported as demonstrating a 95.2% specificity for thyroid cancer and a low sensitivity of 59.3 % and a diagnostic accuracy of 83.8% (Solbiati, 1992). In our study 12 patients showed micro calcifications out of which 11 were malignant and 1 turn out to be benign and it showed 91.6 % sensitivity and specificity of 97%. The presence of micro calcifications in thyroid nodule has a high specificity of 91.3% to 96.3% in Sheila Sheth review (2010).

Vascularity: Color or power Doppler USG provides useful additional information in the characterization of solid nodules by depicting nodular vascularity. It is postulated that malignant nodules are more likely to have internal vascularity and generally thyroid cancers tend to be hypervascular compared with the adjacent thyroid parenchyma (Sheth, 2018). Papini et al defined an intranodular vascular pattern on color Doppler USG as most suspicious, with sensitivity of 74.2% and specificity of 80.8% (Papini, 2002). In our study internal vascularity was seen on 13 patients out of which 11 patients were malignant and 2 benign with sensitivity of 84.6% and specificity of 86.6 %.

Lymph node: Malignant thyroid lesion have a propensity for early metastasis to cervical lymph nodes and up to half of all patients may present with concomitant lymphadenopathy. In 15% of patients, enlarged lymph nodes are the only sign of an occult PTC (Jun, 2005). In our study lymph node presence were seen in

26.7% with sensitivity of 84.6% and specificity of 91.1% for malignancy.

Conclusion

Ultrasonography is optimal imaging modality for the detection and characterization of thyroid nodules which is a non-invasive and effective tool in itself. USG can differentiate malignant lesions from benign lesions based on nodular size >3cm, shape (oval), hypoechoogenicity, micro calcifications, internal vascularity, irregular margins and presence of lymph nodes. Thyroid malignancy can be diagnosed on USG with various sonographic features in combination. Using these multiple features ultrasound has sensitivity of 81.1% and specificity of 89.4% for detecting thyroid malignancy as per our study. Hence surgery can be planned based on USG findings to avoid unwarranted total thyroidectomy surgeries. However larger sample size studies are needed for more accurate results.

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