Evaluation of the importance of pyramidal lobe of thyroid gland anatomically in the surgical fields in Erbil

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ABSTRACT

Background and Objectives: Dealing with the pyramidal lobe of the thyroid gland was not principally and cautiously under run in the surgery of the thyroid gland as the other two lateral lobes formerly. For this reason, the present work planned to study the anatomy and histopathology of the pyramidal lobe and to evaluate the degree their significance in surgical fields.

Methods: The study included patients' preparation for operation, recording age, gender distributions, and measurement of pyramidal lobe moreover to view of directions. Blood supply and histopathology of the pyramidal lobe investigated during thyroid operations of 113 patients in Rizgary teaching hospital in Erbil.

Results: Goiter patient's sex distributions were as the following; 94 (83%) female and 19 (17%) male. PL frequency was 61/ 113 case (74%); 50 (82%) females and 11(18%) males. pyramidal lobe directions were 21 directed right, in 40 cases to left. Arterial supplies of 34 cases were from a branch of the superior thyroid artery, in 27 cases were from isthmus. Venous drainage was joining venous plexus of the thyroid isthmus. Age distribution; females were commonly affected at (25 to 45y). Males were (28-62y). Pyramidal lobe mean length was (3.2± 1.8cm) and the width (1.6± 0.7cm). Histopathologically; pyramidal lobe involved by principal thyroid lobes pathologies in 43 (71%) of the patients.

Conclusions: This study alert us that the pyramidal lobe mustbe managed as a principal lobe during operations, because It may be a source of pitfall during the operation or it may be a future source of mucinous carcinoma of thyroid.

Key words: Thyroid gland, goiter, Pyramidal lobe, embriology.

INTRODUCTION:

Goiter is an enlargement of thyroid gland and is endemic in the north Iraq region. Embryology of thyroid gland (TG) declared by Davis [1] and Mark Hill [2], they reported that thyroid gland was first identifiable in embryos of about 20 somits or (in 24 days of gestation), as a median thickening of endoderm, caudal to median tongue bud. The distal part of the duct commonly differentiates variably as the pyramidal lobe (PL) and levator muscle of the thyroid [1,2]. As had been demonstrated that in day 24 thyroid endodermal thickening start to appear, and in 11 weeks age embryo colloidal Appearance of thyroid is clear, The hormonal assay of thyroid in newborn shows - TSH levels increase, thyroxin (T3 and T4) levels increase to 24 h, then after 5-7 days postnatal, decline to normal levels [1, 2]. Hegedus L *et al* [2] and Dominique Dorion *et al* [3] stated that a conical pyramidal lobe often ascends towards the hyoid bone from the isthmus or the adjacent part of either lobe (more often the left). To which it may be attached by fibromuscular band (Levator of the thyroid gland), Vestiges of the thyroglossal duct usually persist between the isthmus and the foramen caecum of the tongue, sometimes as

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accessory nodules or cysts of thyroid tissue near the midline or even in the tongue [3]. Braun EM, *et al* [4] confirmed that the pyramidal lobe could be a source of danger in thyroidectomy, due to its frequency but unreliable preoperative diagnosis on scintigraphic images. Anterior part of the neck has to be investigated very carefully preoperatively and special attention has to be paid to the pyramidal lobe to avoid leavings of residual tissue when complete removal of the thyroid is indicated [4,5]. Presence of different controversial figures and results regarding PL in different international studies encouraged us to perform this study in our region, in which thyroid diseases are endemic [2,3,5,7]. In addition, hard trial served to find out source of (PL) blood supply. **Aim of the study:** To identify anatomical parameters, location, direction, blood supply and the incidence of the pyramidal lobe among this region patients. As well as to define and possibly restriction of avoidable interferences and complications.

PATIENTS AND METHODS:

This study performed in Erbil Rizgary Teaching Hospitals, in the surgical theater from the period of 1/1/2004 up to 31/12/2007. Preoperative patients vocal cord functions examination performed, and hormonal assays carried out for all the patients, thyrotoxicosis revealed In 33 cases, rendered euothyroid by Neomercazole (Methimazole) by (15- 40) mg in three divided daily doses and atenelol (Tenormin) (20 -40) mg twice daily and operated, they returned normal in a period of (3-6) weeks and entered the study(18).The pyramidal lobes of the 113 patients suffering from goiter were examined during the performance of the surgery of their thyroid glands. Examination time for each case PL measurement was 5-10 minutes. A classical surgical approach were performed by transverse (Collar) incision (2cm above supr-asternal notch), platysma incised on the same line (flaps mobilized down to supr-asternal notch and up to thyroid cartilage. The straps muscles were separated in midline and laterally retracted. The thyroid capsule incised and middle thyroid vein was ligated by vicryl 2/0. The PL origin, direction, length from the tope to the base and width where it joins to the isthmus were measured (by stainless steel caliber). The pyramidal lobes were examined before excision and after to find whether if they were involved grossly by hyperplasia and nodularity, the hyperplastic PL cases not included in the dimension sum only after leaving a ribbon like base line, which is not affected by hypertrophy in order to compare to the known values. The arterial supply and their venous drainage of the pyramidal lobes were searched after and examined in every case carefully. The remnant of the procedure run away as a classical method used for total or nearly total thyroidectomy leaving 4-8 gm of thyroid behind except in one of the cases (papillary carcinoma) complete thyroid removal and neck lymph nodes dissection were done. All the samples in this study were sent for histopathology study. In all the cases whom operated in this study only 35 (31%) cases received (500 1000) ml pints of blood and patients checked after 5 days, and stitches removed. The follow up is sustained by observation of the pathological results. All the ligations performed by absorbable suture materials. Statistical programs (SPSS) are used and proved significant frequent incidence of PL according to gender (P-value<0.05) and no significances of the age incidence on the frequency of the pyramidal lobe (P-value->0.05), by application of Eta-test.

RESULT:

Total number of thyroid goiter included in this study were (113) cases, of these 94 (83%) were females and 19 (17%) cases were male, in a ratio of 5:1(table-1). The dimensions of the (PL): The widest dimension was in the base. There were no definite venous drainage found in the lobe originating to outside, but there were

venous plexus joining it to the remnant of thyroid gland, which are drained by inferior thyroid veins, Frequencies of pyramidal lobe were repeated in 61 (54%) cases. Gender distribution were 94 (83%) females; 50 of them had PL. and the male patients were 19 (17%); 11 of them had (PL) (Figure 4 and 5). Origin of PL lobe in 40 cases was to left side while in 21 cases to right. The arterial supply of 34 cases were from sub branch of the superior thyroid artery, the rest 27 their pyramidal lobe received branches from the isthmus. Significant statistical relation observed between female patients and arterial supply by branch of superior thyroid artery. No definitive venous drainage observed for the pyramidal lobe, other than their drainage to venous plexus joining the remainder of the gland inferiorly to inferior thyroid veins. [Most of (seventy-six) female patients were at age of (25-45), and 18 cases at age more than fifty-five. The ages for the males were variable and infrequent arranged in (28-62) years]. The mean length of the PL was (3.2± 1.8) cm and the width (1.6± 0.7) cm. statistical analysis showed no significant changes due to gender (P-value > 0.005) (table -1). All the measurements of the PL performed on the frame of the trachea on which the lobe attached and fixed by thyroid capsular septet, which allowed antero-posterior increase dimension but not side to side in the cases of hypertrophy or hyperplasia, so the measures remained fixed on the tracheal frame not changed by pathologies unlike the surfaces which are more liable to extension. The results revealed; declining the incidence of goiter annually like the following: in year 2004 total were 32 cases, in 2005 were 31 cases, in 2006 were 26 cases and in 2007: 24 cases included (Figure 1). Histopathology revealed as the followings; pyramidal lobes involved by follicular changes in 18 cases of follicular hyperplasia (51 cases). In the 57 cases of multinodular goiter, PLs were involved in 23 cases, single thyroid nodule are seen in two patients with non involvement of pyramidal lobe, hemorrhagic cystic-changes are seen in 1 case. Two cases of papillary carcinoma were observed and the PLs were involved. Totally, in 71 % of the patients PL involved by same principal lobes pathology.

Table1: Review of the findings

Number of the patients									
Total	**M**	**F**	**PL Frequency**	**F PL**	**M PL**	**ISTHMU Bl00d**	**BSTA Blood**	**Aver-age Length (cm)**	**Average width (cm)**
113	**19**	**94**	**61**	**50**	**11**	**27**	**34**	**3.2±1.78**	**1.7± 0.74**
100	**17**	**83**	**54**	**82**	**18**	**34**	**66**		

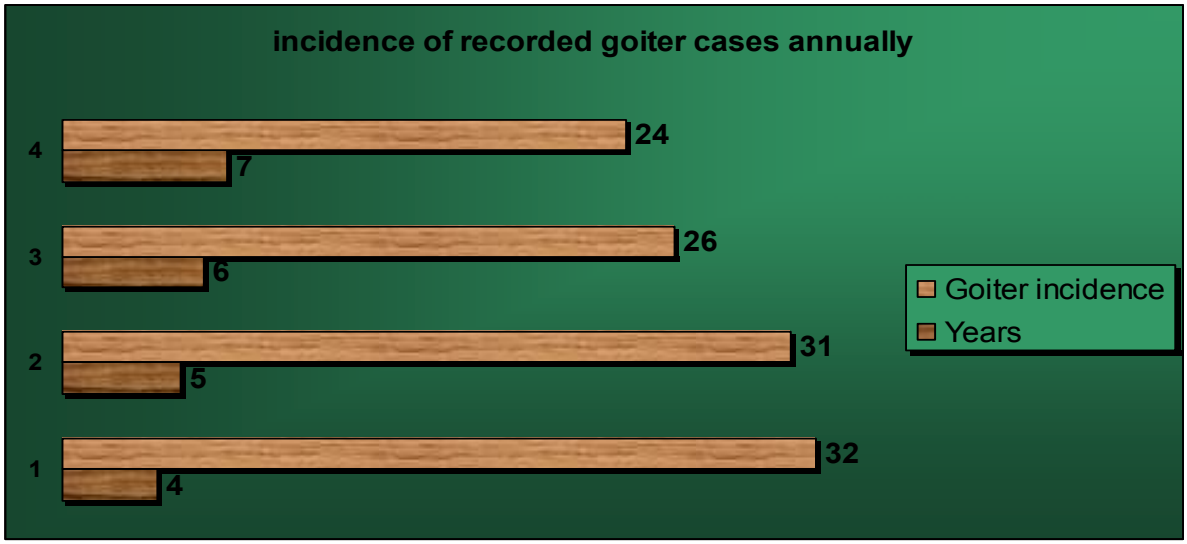

Figure 1: incidence of goiters annually

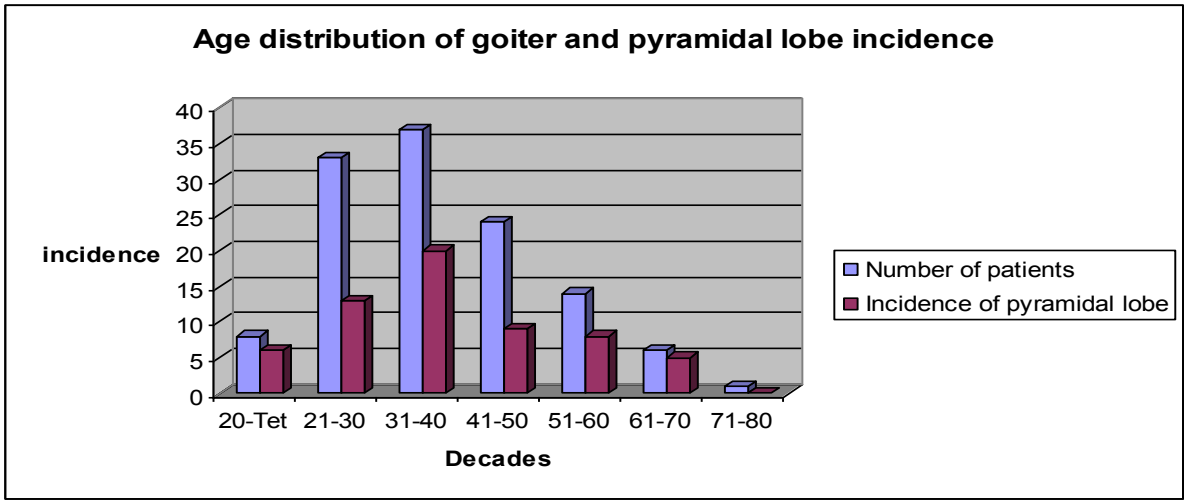

Figure2: pyramidal and goiter distribution

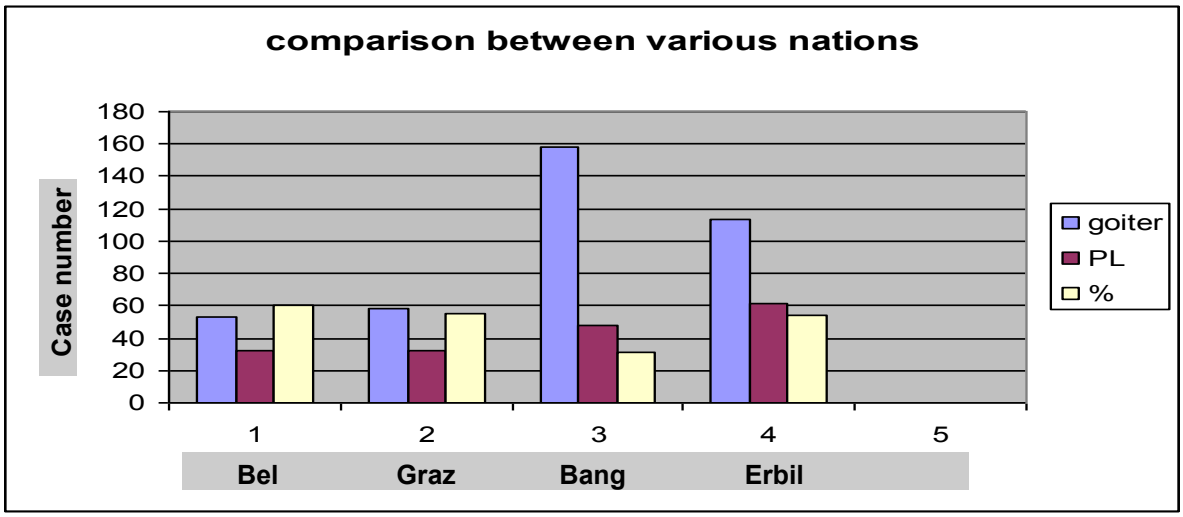

Figure 3: Statistical pyramidal lobe observation in various countries**.**

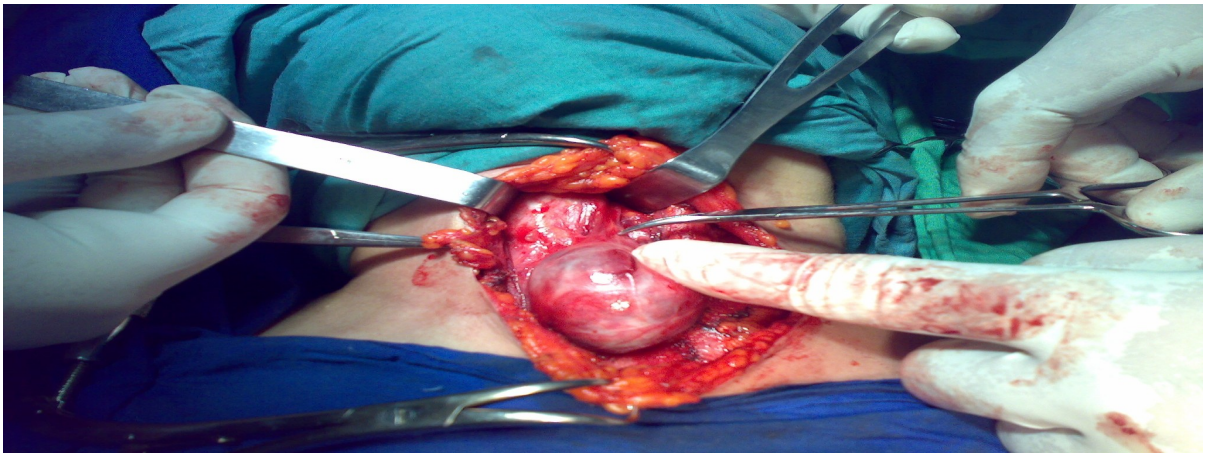

Figure 4: Right thyroid lobe and PL exposure

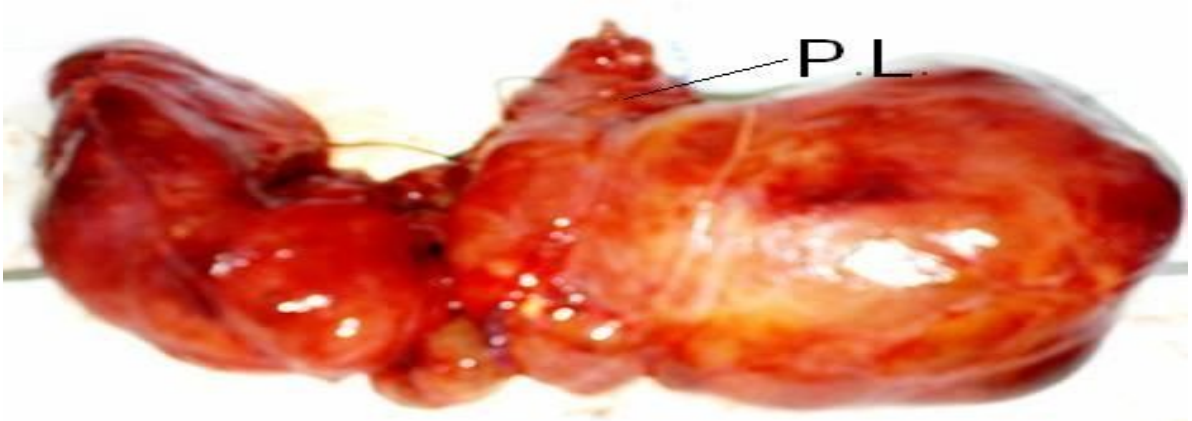

Figure 5: Huge goiter in 52 years female (PL appointed) involved

DISCUSSION:

This study confirmed the idea of dealing with thyroid as four lobes or partitions not only two[3]. In addition to international pyramidal lobe frequency comparison. Incidence of PL occurrence according to various references and textbooks are 50 % [2, 5,14]. With one or two exceptions [10], other wise the research results are nearly similar to the other regions results of the world. The present research as shown in the (figure. 2) the pyramidal lobe of the thyroid gland appears to be present in the females (82%), more than that observed in males (18%). While in two different other studies, male priority are observed [5,6,9], Results of PL variability according to sexes, means there are variability in different regions and communities, which should be observed. The percentage of the (PL) differs from that obtained in the thyroids of fetuses, also proves age variability [11,13], but in harmony with others (52% in males) and (41% in females) [5,9]. We can say all in general there are approximate degree of resemblance of PL incidence internationally [3,5,6 ,11]. It was also observed by the different studies, that PL was commonly situated on the left side. In the majority of cases (56.66%), bases of the pyramidal lobes were distant to the upper border of the isthmus with or without encroachment on the adjacent part of the left lobe. The range of length and breadth of the pyramidal lobe was from 18 to 35mm and 13 to 19mm respectively. In 73.33% cases, pyramidal lobe was associated with levator glandulae thyroideae and in only 26.66% cases pyramidal lobe was found independently [3,5,12]. In this study only in four cases this association are found and observed. In this respect, the present work agrees, and indicates that in most of females, and males PL was found in the left side. Study by Siragi *et* al [11], stated that the pyramidal lobe mainly arises from the midline rather than lateral sides of the isthmus of the thyroid in a scintigraphic assessment. The pyramidal lobe is not reliably diagnosed by scintigraphic imaging as it not gives morphological image. Therefore, the anterior cervical region has to be investigated very carefully during operation in order not to leave residual thyroid tissue in total thyroidectomy[4,5]. Radiological studies stress on that the radiology report should talk about four components of the thyroid gland, the right and left lobes, the isthmus that crosses the windpipe and joins those lobes, and the pyramidal lobe. Care must be paid to PL as it may hypertrophy and cause recurrences, it harbors (Delphian) lymph node, it may be the origin of thyroid cancer and may absorb all radioactive element which may be used as therapy [4,8]. At the Institute of Anatomy of the Medical University of Graz 60 cadavers were dissected and analyzed. All of them were embalmed according to Thiel's method using complex combinations for topographic study and expansion of PL. Pyramidal lobe was found in 55% of the cadavers (32/58). It was found more frequently in men than in women. Branching and directions were 16 from the left, 7 from right, and 9 from midline [5,7]. [There appears to be a correlation between elevated thyroid function studies (likely in thyroid mass) and the incidence of a pyramidal lobe on thyroid scans in diffuse toxic goiter which had been noted by previous studies [7,8] this result makes to evaluate (PL) not less than the remnants of thyroid gland in importance]. Blumberg NA [7]; Found that (PL) present on the left side in 60 - 65% of subjects. The same results obtained by study of levator glandulae thyroideae (LGT) were performed in 410 male and 160 female adults in northwest India during medicolegal autopsies preparation [12], they found that the incidence of the PL and LGT were 28.9% and 19.5%, respectively [12]. The pyramidal lobe branching site was studied by, Braun EM and et al (2007) Among Sixty cadaver specimens, they reported that it was branching was more frequently from the left part of the isthmus [16] than from the right [7] or the midline [9]. In two cases, it originated from the left lobe[5]. Nearly same as this study finding. Kitagawa W .(1993) found that the occurrence

of pyramidal lobe was 48.6%, and the superior thyroid artery was found to be a single branch from the parent artery in 100% of cases on the right and in 94.1% on the left. Microscopical examination in this study found that not in all the cases affected by main lobe pathologies accordingly (PL) can be left not excised instate of known (8) grams remnant (functional thyroid remnant) postoperatively[13,14]. Another important point for concentration on PL study is that solid cell nests (SCN) are found within the thyroid parenchyma and frequently were located in the isthmus lobe and even in the pyramidal lobe. Studies suggest that SCN are of endodermal origin and that they may be closely related to mucoepidermoid carcinoma of the thyroid gland. Due to this observation, the PL should be seriously treated and managed in all thyroid surgical cases[14]. The decreased incidence of goiter year after year may be due to prophylactic measures through increased popular education, by taking more iodine salts, other dietary habit changes which may needs further statistical studies

CONCLUSION:

Pyramidal lobes are present more frequent in females, the PL located mainly in left side, Incidence and dimension concur with other studies in the other areas. Not necessarily in all the goiter cases, PL involved in the pathologies. Moreover, to variability of blood supply.

RECOMMENDATION :

Further studies of thyroid PL are needed in this locality especially in non goiterous persons with the aid of Computerized axial tomography (CAT) with and with out contrast for further evaluation and decision about PL in Erbil, which is endemic area for thyroid diseases.

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