

Comparative Study between CT-Scan and Ultrasound in Diagnosis of Liver Tumors

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Abstract

Liver is affected by both benign and malignant tumors, the tumors may be single mass or multiple nodules or occasionally be diffusely invasive ,in our research both CT- scan and ultrasound have been used for diagnosis, and in order to investigate which of them is more accurate biopsy examination has been done for each of the tissue liver tumor. The total number of patients was 40(24 males and 16 females) their mean age was 52 year , all of them are suffering from liver tumor .They were collected from specialized surgical hospital and specialized center for GIT and liver diseases .All patients were examined by both CT-Scan and ultrasound and then their results were compare with the biopsy results .The results of ultrasound examination were :23 patient (57.5%) have malignant tumor and 9 patient (22.5%) have benign tumor while 8 cases (20%) was diagnosed as a healthy person and the results of CT-Scan examination were : 23 patient (57.5%) have malignant tumor and 17 patient (42.5%) have benign tumor, from this we conclude that the efficiency of CT-Scan in the diagnosis of liver tumors (100 %) is higher than the efficiency of ultrasound (80%).

الخلاصة

يتعرض الكبد للإصابة بالأورام الخبيثة أو الحميدة والتي تكون إما مفردة أو متعددة والتي تكون أحيانا من النوع المنتشر وقد استعمل في هذا البحث كلا من المفراس والسونار لغرض تشخيص الأورام ، ولأجل معرفة أيهما أفضل في تحديد تلك الأورام تم إجراء الفحص المختبري لكل منها. تم فحص 40 مريضا (24 من الذكور و 16 من الإناث) متوسط عمرهم 52 سنة و جميعهم يعانون من أورام الكبد . جمعت العينات من مستشفى الجراحات التخصصية و المركز التخصصي لأمراض الجهاز الهضمي والكبد .تم فحص جميع المرضى بواسطة جهاز المفراس والسونار ثم قورنت نتائج كلا الفحصين

بنتائج الفحص المختبري و كانت نتائج الفحص بالسونار هي : 23 مريضا (57.5%) مصاب بالأورام الخبيثة و 9 مرضى (22.5 %) مصاب بالأورام الحميدة بينما 8 حالات (20 %) شخصت على إنها لأشخاص أصحاء و كانت نتائج الفحص بالمفراش هي : 23 مريضا (57.5 %) مصاب بالأورام الخبيثة و 17 مريضا (42.5 %) مصاب بالأورام الحميدة.ومن هذا نستنتج إن كفاءة الفحص بالمفراش (100%) هي أعلى من كفاءة الفحص بالسونار (80%) في تشخيص أورام الكبد .

Introduction

CT-Scan is the process of creation across-sectional tomographic (slice) of any part of the body which includes a thin beam of X-rays passes through the body in the axial plane chosen for study as the X-ray tube moves in a continuous are a round the patient. Electronic detectors placed opposite the x-ray tube on the other side of the body convert the exiting beam into electrical pulses, the intensity of which depends on the amount of the x-ray beam that was not absorbed by the intervening tissues. This information is then conveyed to computer, which calculates the x-ray absorption for each voxel and creates the final CT-image [1].CT-scan used for much body application, it provides diagnostic information that can not be achieved with any other method [2]. Ultrasound is a high frequency sound wave over 20KHz, these waves inaudible to humans; it can be transmitted in beams and used to scan tissues of the body [3]. The ultrasound waves generated by a piezoelectric transducer which is capable of changing electrical signals into ultrasound waves and it is directed toward the area of interest and receive the reflected waves and change it back into an electrical signal, it form the image [4]. Ultrasound gives more information about the internal structures and does not carry the risk of ionizing radiation and there is no damage to patient or fetus, therefore consider more safety [5].

Liver tumors are abnormal masses of tissues that form when cells begin to reproduce at an increased rate [6]. Liver is affected by both benign and malignant tumors, the tumors may comprise a single mass or multiple nodules or occasionally be diffusely invasive [7]. Intravascular invasion and growth are often features and may result in tumor spread into the portal vein or inferior vena cava [8].

Objectives of study

To evaluate the accuracy and efficiency of CT-scan and ultrasound in the diagnosis of liver tumors and compare between both.

Patients and Methods

The patients were collected from specialized surgical hospital and specialized center for GIT and liver diseases during the period From November 2004 to May 2005, they were having liver tumors. The examinations of patients whom suffering from abdominal pain included CT-scan and ultrasound examinations and then done biopsy investigation , it is the most sensitive way and widely used to obtain more accuracy in detecting the tumors . A total number of 40 patient (24 males and 16 females) their range of age between (12- 80) year and their mean age was 52 year.

Examination techniques

Ultrasound investigation: The patient should be lies in supine position with coupling agents over the right upper abdomen to transit ultrasound impulses from transducer directly into the liver.

The scans should be taken are:

- 1 - Sagittal scan.
- 2 - Transverse scan.

These scans including inter and subcostal scanning done with slow rocking movement of transducer.

CT-Scan investigation: patient is placed in supine position on the table; the patient should be examined without movement to reduce the artifacts. Examination includes:

- 1 - Axial view.
- 2 -Coronal view.

Biopsy Investigation: The most important application of liver sonography is guide intervention procedure. Procedure is done by removing a small part of the tumor and analyzing it under microscope.

The patient was placed in supine position and used a large needle that is placed through the skin into the tumor and small core of tissue removed.

Results

Table (1): Age distribution of patients with liver tumors in comparison to to sex of patients

| Age | Total number of patients | | Males | | Females | |
|-------|--------------------------|------|-------|-----|---------|-----|
| | Pt. | % | Pt. | % | Pt. | % |
| 10-19 | 3 | 7.5 | 2 | 5 | 1 | 2.5 |
| 20-29 | 5 | 12.5 | 4 | 10 | 1 | 2.5 |
| 30-39 | 5 | 12.5 | 3 | 7.5 | 2 | 5 |
| 40-49 | 4 | 10 | 3 | 7.5 | 1 | 2.5 |
| 50-59 | 12 | 30 | 8 | 20 | 4 | 10 |
| 60-69 | 5 | 12.5 | 2 | 5 | 3 | 7.5 |
| 70-80 | 6 | 15 | 2 | 5 | 4 | 10 |
| Total | 40 | 100 | 24 | 60 | 16 | 40 |

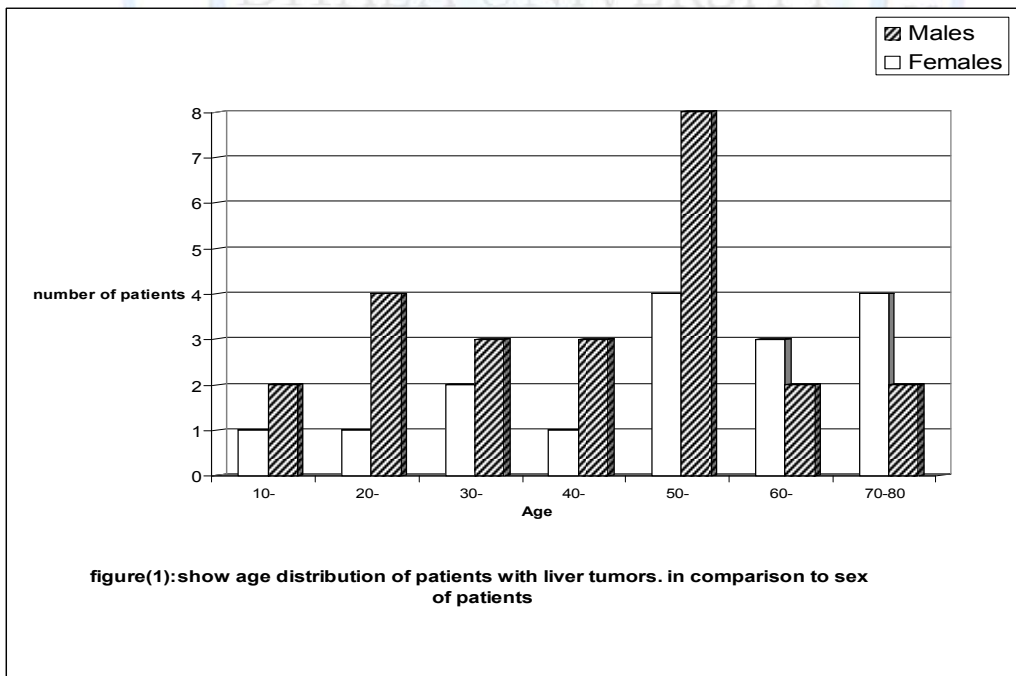


Table (2): Age distribution of patients with types of examination

| Age | Number of patients | | Types of examinations | | | | | |
|-------|--------------------|------|-----------------------|------|------------|------|--------|------|
| | | | CT-Scan | | Ultrasound | | Biopsy | |
| | Pt. | % | Pt. | % | Pt. | % | Pt. | % |
| 10-19 | 3 | 7.5 | 3 | 7.5 | 2 | 5 | 3 | 7.5 |
| 20-29 | 5 | 12.5 | 5 | 12.5 | 5 | 12.5 | 5 | 12.5 |
| 30-39 | 5 | 12.5 | 5 | 12.5 | 5 | 12.5 | 5 | 12.5 |
| 40-49 | 4 | 10 | 4 | 10 | 1 | 2.5 | 4 | 10 |
| 50-59 | 12 | 30 | 12 | 30 | 12 | 30 | 12 | 30 |
| 60-69 | 5 | 12.5 | 5 | 12.5 | 3 | 7.5 | 5 | 12.5 |
| 70-80 | 6 | 15 | 6 | 15 | 4 | 10 | 6 | 15 |
| Total | 40 | 100 | 40 | 100 | 32 | 80 | 40 | 100 |

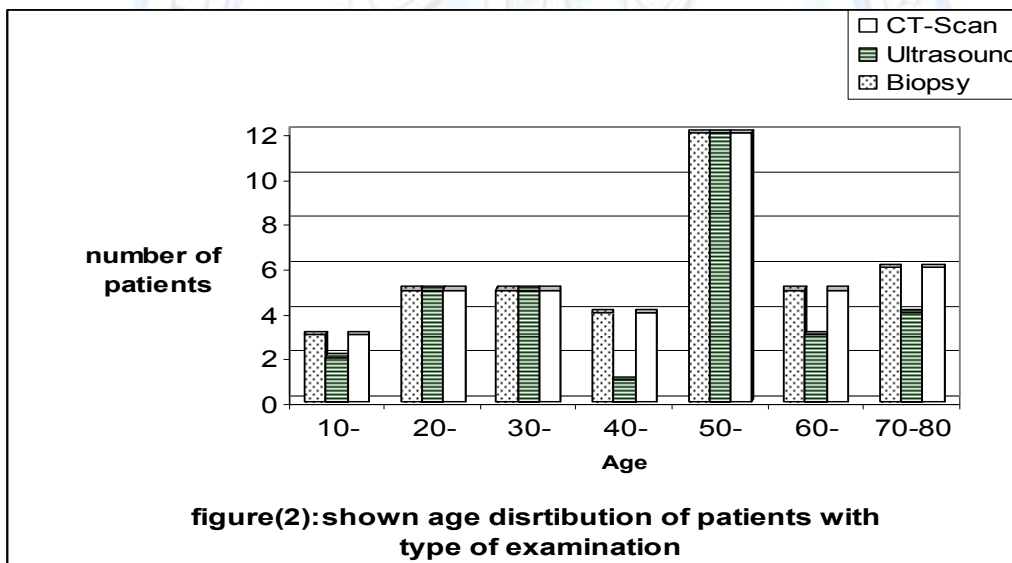




Table (3):The relationship between sex of patients with types of liver tumors examined by CT-scan.

| Types of liver tumors | Number of patients | | Sex of patients | | | |
|-----------------------|--------------------|------|-----------------|------|---------|----|
| | | | Males | | Females | |
| | Pt. | % | Pt. | % | Pt. | % |
| Malignant | 23 | 57.5 | 11 | 27.5 | 12 | 30 |
| Benign | 17 | 42.5 | 13 | 32.5 | 4 | 10 |
| Total | 40 | 100 | 24 | 60 | 16 | 40 |

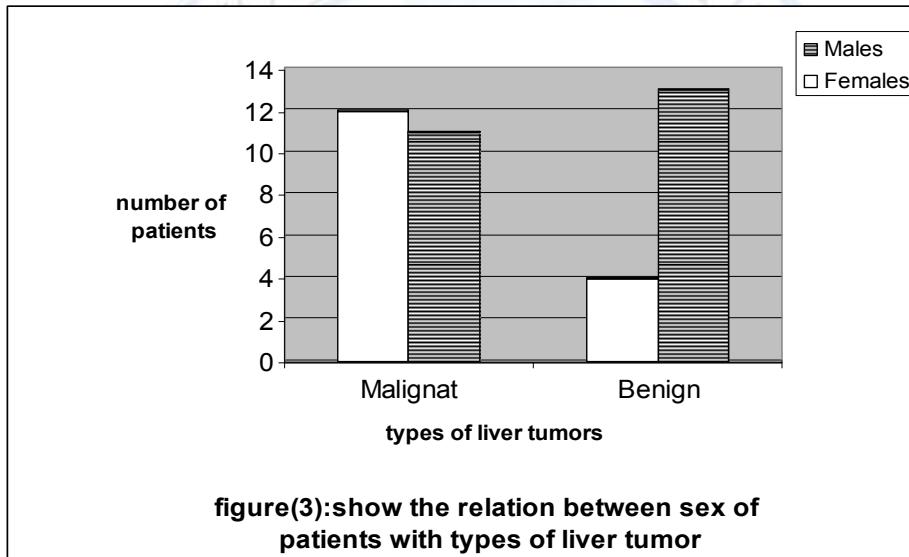




Table (4): The relationship between sexes of patients with types of live tumors examined by ultrasound

| Types of liver tumors | Number of patients | | Sex of patients | | | |
|-----------------------|--------------------|------|-----------------|------|---------|------|
| | | | Males | | Females | |
| | Pt. | % | Pt. | % | Pt. | % |
| Malignant | 23 | 57.5 | 11 | 27.5 | 12 | 30 |
| Benign | 9 | 22.5 | 6 | 15 | 3 | 7.5 |
| Total | 32 | 80 | 17 | 42.5 | 15 | 37.5 |

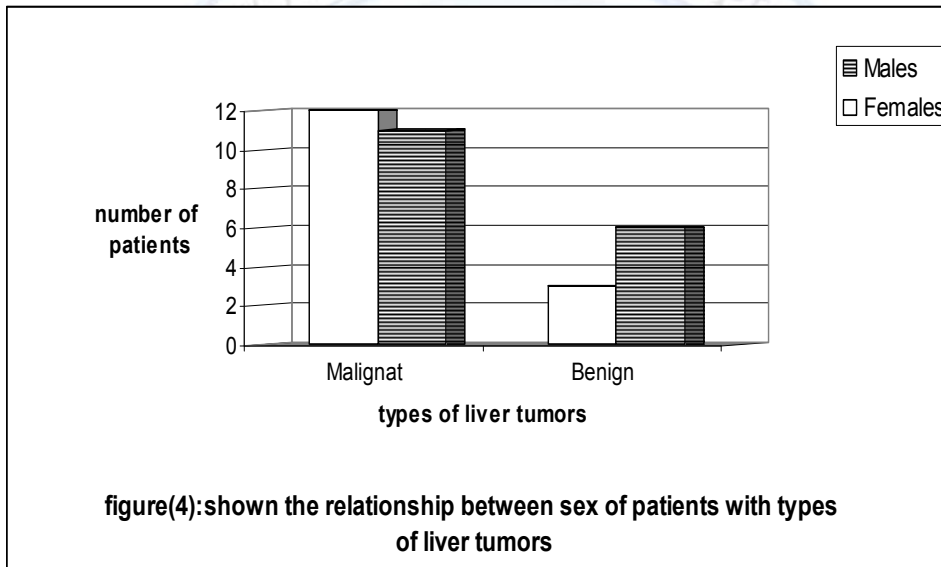


Table (5): The relationship between biopsy and ultrasound examinations

| Biopsy \ Ultrasound | | Liver tumors | | | | | |
|---------------------|-----------|---------------|----|--------------|------|-----------------|------|
| | | (-ve) Finding | | (+ve) Benign | | (+ve) Malignant | |
| | | Pt. | % | Pt. | % | Pt. | % |
| Liver tumors | Benign | 8 | 20 | 9 | 22.5 | - | - |
| | Malignant | - | - | - | - | 23 | 57.5 |
| Total | | 8 | 20 | 9 | 22.5 | 23 | 57.5 |

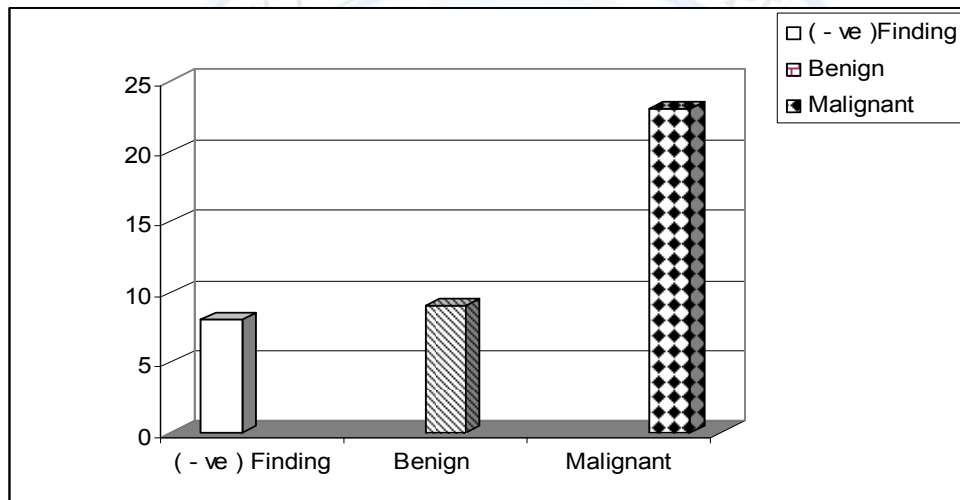


Figure (5): Shown the relationship between biopsy and ultrasound examinations

Table (6): The relationship between types and site of tumors examined by CT-scan

| Types of tumors | Site of tumors | | | |
|-----------------|----------------|------|-----------|----|
| | Right lobe | | Left lobe | |
| | Pt. | % | Pt. | % |
| Malignant | 13 | 32.5 | 10 | 25 |
| Benign | 9 | 22.5 | 8 | 20 |
| Total | 22 | 55 | 18 | 45 |

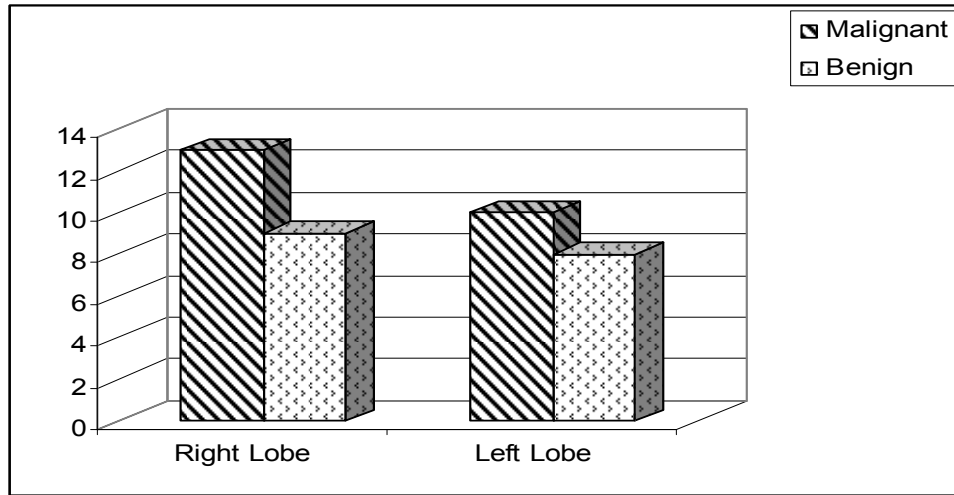


Figure (6) : Shown the relationship between types and site of tumors examine by CT-scan.

Discussion

- 1- Gender distribution: From this study we see that males were 24(60%) and the females were 16 (40%). Males were suffering from liver tumor more than the female's .This results are in agreement with males affection predominates is study done by Mahfouz and Vogl [9].
- 2- Age distribution: 12 patients (30%) of our patients have liver tumors in the age between (50-59) year (8 patients were male and 4 patients were Females), that mean patients are more affected by liver tumors in this age. This result is comparable to study done by Saab and Yao [10].
- 3- Site of tumors: From (Table 6) noted that 55% of our patients have tumors in the right lobe of the liver (32.5% of patients have malignant tumors and 22.5% of patients have benign tumors) and 45% of patients have tumors in the left lobe of the liver (25% have malignant tumors and 20% have benign tumors), so the right lobe are commonest site of tumors. This result is adequate to the study done by Buetow and Midkiff [11] .

4- Ultrasound finding: This advice helped in the diagnosis of 23 patients (57.5%) with malignant tumors, 9 patients (22.5%) with benign tumors and 8 patients (20%) showed negative finding of benign tumors and diagnosed as a healthy persons while in CT-scan and biopsy examinations gave a positive results. In ultrasound technique there is difficult to detect some of liver tumors because of limitation of ultrasound in detecting of any lesion have not acrogenic from surrounding tissues , this is agree to study of Fowlkes and Holland [12] .

5- CT-scan finding: CT-scan play very important role in a diagnosis of liver tumors. Forty patient showed positive finding of liver tumors when investigated by CT-scan, 23 patient (57.5%) diagnosed with malignant tumors and 17 patient (42.5%) diagnosed with benign tumors, this results was com-pared with biopsy finding and we obtained the results in CT-scan finding were adequate the results of biopsy finding, CT is much better in detecting liver tumors by using of small slice in examination of tumors, This is agreeing to study of Cullough [2].

Conclusion

CT-scan has efficiency and accuracy about 100% in the diagnosis of liver tumors which is higher than the efficiency of ultrasound about 80% for the same diagnosis.

Recommendation

1- If the patients have no contraindications for CT-Scan then should be examined with it because the CT-Scan image provides good anatomy details and it is more accurate than ultrasound examination. The pregnancy woman whom suffering from liver tumors should be not examined by CT-Scan because of it's affection on the fetus.

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