US OF THE KNEE: SCANNING TECHNIQUES, PITFALLS WITH CORRELATION TO COMMON PATHOLOGICAL CONDITIONS.

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ABSTRACT

Background: *Among the most frequent causes of medical attention in the outpatient environment is knee pain or another knee condition. The capacity to guide percutaneous procedures and the fact that ultrasound may be performed anywhere, at any time, for a low price, and with excellent spatial resolution and image quality are all significant advantages of ultrasound. The patient may interact with the US machine in real time, allowing for quick clinical correlation and the opportunity and contrast the affected knee to the unaffected one. Structured assessment of the tendons, ligaments, joint space, osseous structures, peripheral nerves and vasculature, and the knee joint itself is possible by dividing the knee into anterior, medial, lateral, and posterior compartments.*

Aim of the Work: *to assess US's capacity to characterise normal Knee anatomy, to explain US methodologies for thorough examination of the Knee, and to detect US manifestation of frequent pathologic diseases, as well as typical pitfalls/mimics of illness.*

Patients and Methods: *Thirty people experiencing severe knee pain participated in this trial (less than three months duration). The orthopaedic outpatient clinic at Ain Shams University Hospitals and the ultrasonographic Imaging division of the Department of Radiology at Ain Shams University Hospitals collaborated on this work.*

Results: *Regarding the demographic characteristics in the studied patients, it was found that Patients' ages varied widely, from eighteen to 70. with mean ±SD was 42.75± 13.1 years and median was 43.5 years. 18 (60%) patients were males and 12 (40%) of them were females with male to female ratio was 1.5:1. Regarding meniscal degeneration among the studied group, we found that the posterior horn is one of the most common areas for degenerative meniscus. Posterior horn medial meniscus degeneration was found in more than half (53.3%) cases while bone tenderness was found in 43 (95.6%) cases while the. Posterior horn lateral meniscus degeneration was found in eight (26.7%) cases.*

Conclusion: *Ultrasound can help rule out potential causes of knee pain during the first stages of diagnosis. Joint effusion, tears to the posterior horn medial meniscus and the posterior horn lateral meniscus, bursitis of the anserinus, osteoarthritic alterations, cysts of the popliteal artery and duct, and tendinitis of the patellar tendon were the most common abnormalities detected by ultrasound. To verify our findings and assess US's diagnostic accuracy in knee pathology, more investigations are required with bigger sample sizes and longer follow-up.*

Keywords: *Scanning Techniques, Pitfalls, pathological conditions*

INTRODUCTION

Knee pain and other knee diseases are frequent presenting complaints in the outpatient environment. The capacity to guide percutaneous procedures and the fact that ultrasound may be performed anywhere, at any time, for a low price, and with excellent spatial resolution and image quality are all significant advantages of ultrasound. The patient may interact with the US machine in real time, allowing for quick clinical correlation and the opportunity to contrast the affected knee to the unaffected one. A systematic examination of the knee's tendons, ligaments, joint space, osseous structures, peripheral nerves, and vasculature is made possible by dividing the joint into anterior, medial, lateral, and posterior compartments.

Knee injuries, such as those to the quadriceps and patellar tendons, as well as fluid accumulation around the knee and joint effusions, are especially amenable to evaluation by US. Baker cyst and other juxta-articular cystic collections can also be evaluated, as well as the distal hamstring tendons and tract, the superficial patellar cortex, the common peroneal nerve, the popliteal and iliotibial veins, and the juxta-articular space. An expert in the evaluation of knee diseases can benefit from a thorough understanding of the anatomy related to sonography, the most prevalent pathologic conditions, the most common errors, and the best ways to avoid them. Ultrasound in the management of acute knee injuries **(1).**

Anterior compartment of the knee: The primary structures to evaluate in the anterior compartment of the knee are the extensor mechanism (quadriceps tendon, patella, and patellar tendon), the patellar Retinaculum, the suprapatellar joint recess, the medial and lateral joint recesses, the front knee bursae, and the femoral articular cartilage.

Medial compartment of knee: The MCL, the body and anterior horn of the medial meniscus, and the tendons of the pes anserine are the main structures to check in the knee's medial compartment (Sartorius, gracilis, and semitendinosus).

Lateral compartment of Knee: The essential structures to examine in the lateral knee include the iliotibial band (or iliotibial tract), the LCL, the biceps femoris, the common peroneal nerve, the popliteus, and the body and anterior horn of the lateral meniscus. Also, US can examine the anterior lateral ligament (ALL).

Potential pitfalls during examination of lateral compartment of knee: An significant risk factor is that knee valgus angulation can cause the LCL to look wavy, leading to anisotropy and instability. The distal tendon of the biceps femoris may seem heterogeneous because the fibres bifurcate (to go superficially and deep to the LCL), but this should not be confused with tendinosis.

Posterior compartment of knee: Examination of posterior knee area should focus on the Baker cyst, the posterior horns of the menisci, the posterior cruciate ligament, and the popliteal neurovascular bundle. The patient is positioned prone with the knee extended so that the back of the knee may be examined.

The semimembranosus tendon is located medially by following the medial head of the gastrocnemius back towards the calf. If a Baker cyst exists, it will be between these two organs. The Baker cyst's neck can be found among the medial head of the gastrocnemius and the semimembranosus tendon. One potential trap at US is misdiagnosing a tiny Baker cyst as anisotropy of the semimembranosus or medial head of the gastrocnemius tendons.

Pathologic Conditions: Locations of Interest and Common Conditions as: Leg Muscle Tendon From mild tendinosis to

more serious injuries including partial or total rips, the quadriceps tendon has a wide spectrum of potential pathologies. Because of tendinosis. In the case of quadriceps tendon partial rips, dynamic ultrasound might be a helpful diagnostic tool. Any damage to the tendon's fibrillary and laminar architecture, such as a partial rip, will show up on ultrasound as localised areas of hypoechoic noise. When it comes to diagnosing high-grade partial and complete tears, both of which may require surgical treatment, US provides outstanding sensitivity and specificity. A complete tendon rip will present itself as a complete separation of the ends of the tendon. One possible error in diagnosing chronic quadriceps tears with US is that a full tear may appear to be just partial due to intervening scar tissue.

Joint Fluid Leakage When the knee is flexed ever so slightly, a joint effusion can be fluid is present among the prefemoral and suprapatellar fat pads, causing a distention of the suprapatellar recess deep to the quadriceps tendon.

Effusions from the joints can range in complexity. Synovitis and complicated joint effusions, both of which might seem heterogeneously hypoechoic on US, can be differentiated with the help of colour Doppler imaging. Nevertheless, colour Doppler US can show enhanced vascularity inside the thickened synovium [(1).]

Patella: Cortical discontinuity or step-off deformity can be utilised to diagnose a fracture of the patella's superficial cortex; however, a bipartite patella, in which the superolateral ossification centre is unfused, should not be misdiagnosed as a fracture. The superolateral patella develops a bipartite structure**[(2)].**

AIM OF THE WORK:

The goals of this research are to assess the accuracy with which US can depict normal knee anatomy; to explain US methodologies for thorough examination of the knee; and learn to detect the US appearance of common pathologic diseases, including typical pitfalls/mimics of illness.

PATIENTS AND METHODS:

Study Setting: Ain Shams University Hospitals will serve as the site for the research.

Source of Data: The main source of data for this study will be the prospectively conducted scans and clinical history of the patients referred from the outpatient orthopedic clinic, Ain Shams University hospitals to the ultrasonographic Imaging section of the department of Radiology, Ain Shams University Hospitals.

Study Population: Adult patients with acute knee pain (less than three months duration)

Inclusion criteria: Age group: adult age (18-60), both sexes will be included and Any adult patient with acute pain (Pain for less than three months duration) will be included, either following traumatic insult, or associated with Swelling, deformity &/or Limitation of movement.

Exclusion criteria: persistent and intense pain not allowing long time to keep the leg straightened at the knee joint and As ultrasound can be conducted on a patient while they are sitting comfortably in a chair, there are no risks associated with it, it is noninvasive, and it does not utilise ionising radiation, making it the ideal diagnostic tool.

Type of Study design: Descriptive study.

Sample size: Nazarian et al. (2011) found that the mean trochlear notch thickness and two third lateral thickness shown by ultrasound knee among patients with knee pain was (3.09 ± 0.70 and 2.21 ± 0.85 respectively),so they concluded that a

sample size of at least 30 patients with knee pain would be sufficient to achieve study obje thirtypatients; using PASS11 Naz reviewed the findings of prior studies to determine the appropriate sample size, assuming a 95% confidence level and a margin of error of ± 0.05.

Study Period: 6 months data collection.

Study Tools and procedure: Clinical history and imaging findings of the included patients will prospectively obtained from the picture archiving and communications system (PACS) of the radiology department, Ain Shams university hospitals. This study will include thirty patients whom will be informed consent prior to the Ultrasound Imaging. Each patient who will be included in the study will be subjected to full clinical history taking.

General US Technique: (US) examination of the knee is performed with the patient in the supine position, scanning will be performed using a high-frequency linear transducer, with the obvious and major exception of assessment of the posterior structures, for which the patient rests prone (7.5–12 MHz). The patient lies supine on the exam table, exposing both knees. The US examination of the knee begins with the anterior aspect, and then moves to the medial, lateral, and posterior aspects in both longitudinal and transverse planes to assess the main structures of these compartments.

Following check list: **a)** Anterior: quadriceps tendon and Supra patellar recess. b) Medial: medial Meniscus and medial Patellar retinacula. c) Lateral: lateral Meniscus and lateral Patellar retinacula.
d) Patellar tendon. e) Infra and pre patellar bursa. f) Femoral articular cartilage

Duration of procedure: 10 to 20 minute.

Ethical Approval: All patients will be given a full explanation of the study's goal and methodology before giving their written consent, which will be reviewed and approved by the Ethical Research Committee of the Radiology Department of the Faculty of Medicine at Ain Shams University.

Risks of The Study: Ultrasound is the ideal diagnostic technique since it is safe, noninvasive, does not include the use of ionising radiation, and can be conducted on a patient while they are seated in a chair, all of which are features that make this research noninvasive.

Data management and statistical analysis: Statistics, both descriptive and inferential, will be applied appropriately. Information will be compiled, checked, coded, and recorded into an Excel spreadsheet. The SPSS statistical package will be used to examine the data.

When describing categorical variables, we shall use frequency and percentages for our descriptions. For continuous data, we shall calculate a mean(±SD) or a median (interquartile range). Depending on the data at hand, the appropriate statistical tests for doing group comparisons will be used. A p-value of less than or equal to 0.05 will be seen as signifying a substantial break in the data.

Statistical analysis: Data will be entered into SPSS (Statistical Program for the Social Sciences) 26.0, Microsoft Excel 2016, and MedCalC (19.1) for tabulation and statistical analysis.

For numerical parametric data, descriptive statistics were calculated as mean ± SD (standard deviation), minimum, and maximum; for numerical non-parametric data, descriptive statistics were calculated as median and 1st–3rd interquartile range; and for categorical data, descriptive statistics were calculated as number, and percentage.

For quantitative variables, we performed inferential analyses using the independent t-test for The Mann–Whitney U test is used to contrast 2 non-parametric groups, and the Chi-square test is used to compare contrast 2 parametric groups.

RESULTS:

This study was carried out on 30 patients with acute knee pain (less than three month's duration). This research was conducted in an outpatient orthopedic clinic, Ain Shams University hospitals to the ultrasonographic Imaging section of the department of Radiology, Ain Shams University Hospitals.

Ethical Consideration:

The research had been reviewed by Ethics Committee at the Faculty of Medicine Ain Shams University under no review: MS 253/2022

Table (1): Patients' demographics were analysed in this study.

Parameters		Studied patients (n=30)	
		N	%
Gender	Male	18	60.0%
	Female	12	40.0%
Age (years)	Mean ±SD	42.75±13.1	
	Median	43.5	
	Range	18.0-70.0	

SD= standard deviation,

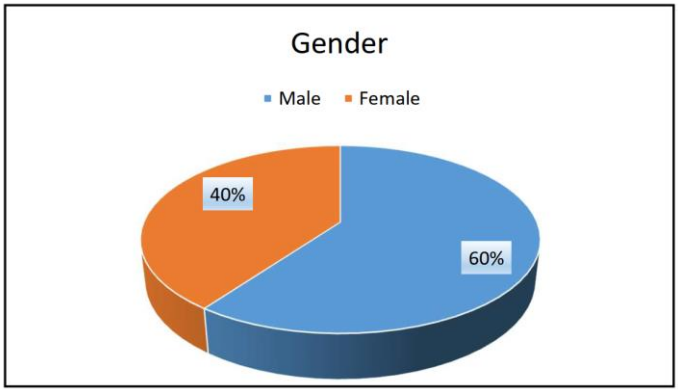


Figure (1): Distribution of the examined patients with respect to gender

Table (1) reveals demographic features of the patients that were analysed. Patients' ages, reported as mean SD, spanned from 18 to 70. was 42.75± 13.1 years and median was 43.5 years. 18 (60%) patients were males and 12 (forty%) of them were females with male to female ratio was 1.5:1.

Table (2): Distribution of the studied patients regarding meniscal degeneration

Meniscal Degeneration		Studied patients (n=30)	
		N	%
PHMMD	No	14	46.7%
	Yes	16	53.3%
PHLMD	No	22	73.3%
	Yes	8	26.7%

PHMMD: Posterior Horn Medial Meniscus degeneration, PHLMD: Posterior Horn Lateral Meniscus degeneration

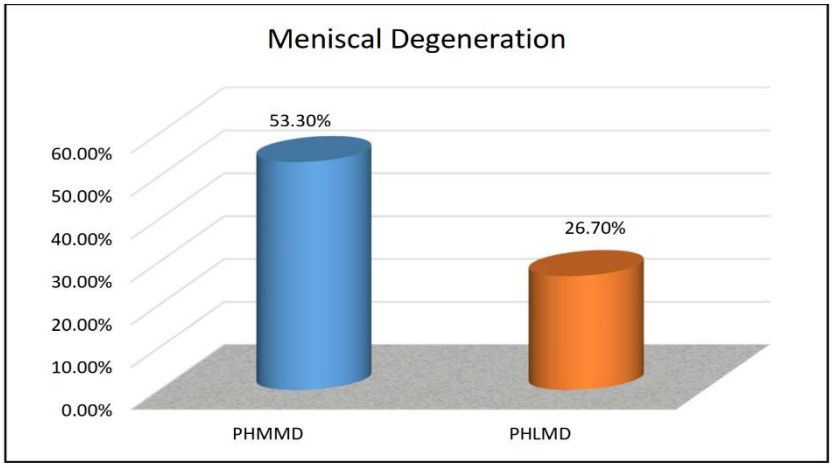


Figure (2): Distribution of the studied patients regarding meniscal degeneration

The posterior horn is one of the most common areas for degenerative meniscus. Posterior horn medial meniscus degeneration was found in more than half (53.3%) cases. while the Posterior horn lateral meniscus degeneration was found in eight (26.7%) cases.

Table (3): Distribution of meniscal tera among the patients investigated.

Meniscal tear		Studied patients (n=30)	
		N	%
PHMM tear	No	26	86.7%
	Yes	4	13.3%
PHLM tear	No	22	73.3%
	Yes	8	26.7%

This table shows: it was found that four cases (13.3%) had posterior horn medial meniscus tear while eight cases (26.7%) had posterior horn lateral meniscus tear. It was observed that degeneration in posterior horn was higher than anterior horn in both medial and lateral menisci.

Table (4): Distribution of the studied patients regarding osteoarthritic changes

Early and late osteoarthritic changes		Studied patients (n=30)	
		N	%
Osteoarthritic changes	No	18	60.0%
	Yes	12	40.0%

This table shows: Ultrasound is a useful method for seeing and measuring changes in cartilage, bone profile, synovial tissue, tendons, and ligaments at various stages of osteoarthritis (OA). The hyaline cartilage in the trochlea is normally identified as a continuous hypoechoic to anechoic band that is thickest in the middle and has a sharply defined surface. Its mean thickness varies from around 1.8mm to about 2.5mm, depending on the individuals' sexes and build. As the disease progresses, the articular cartilage in the affected joint deteriorates and degenerates at specific sites, a hallmark of osteoarthritis. Cartilage pathology, as seen on an ultrasound scan, manifests as a dulling of the cartilage's surface facing the joint cavity, a localised or systemic decrease in cartilage

thickness, and a generalised lack of homogeneity due to water loss. Inflammatory abnormalities were also illustrated by US, and they correspond strongly with more Symptomatic radiographic progression on the Kellgren- Lawrence scale, indicating an inflammatory mechanism for OA.

In our study, 12 cases (40%) showed osteoarthritic changes while these changed were not found in 18 cases (60%).

Table (5): Distribution of the studied patients regarding ACL tear.

Meniscal tear		Studied patients (n=30)	
		N	%
ACL tear	No	28	93.3%
	Yes	2	6.7%

This table shows: One of the most crucial ligaments for keeping the knee stable is the anterior cruciate ligament (ACL). The femur (thighbone) and the tibia (shinbone) are joined by the (ACL) (tibia). Sports like basketball, tennis, and volleyball, which require quick starts, pauses, and changes of direction, are the most likely to cause a tear.

According to the results of our research, dynamic ultrasonography (US) imaging of the knee is a reliable method for identifying ACL injuries.

We found two instances of ACL tears in our sample.

Table (6): Distribution of the studied patients regarding thickened patellar tendon.

Thickened Patellar Tendon		Studied patients (n=30)	
		N	%
Thickened patellar tendon	No	28	93.3%
	Yes	2	6.7%

This table shows: Due to its size and proximity to the surface, the patellar tendon lends itself well to sonographic assessment. Knee flexion causes Pt to tighten, revealing itself as a hyperechoic, fibrillar, and homogeneous structure. It is typical for the proximal and distal ends to be thicker than the midsection, and this difference should not be interpreted as pathogenic.

In our study, two cases (6.7%) showed thickened patellar tendon with maximal thickness measures 9mm and internal small hematoma measuring 5x4mm

Table (7): Distribution of the studied patients regarding joint effusion & synovial effusion.

Joint Effusion		Studied patients (n=30)	
		N	%
Joint & synovial effusion	No	4	13.3%
	Mild	7	23.3%
	Minimal	16	53.3%
	Moderate	3	10.0%

This table shows: An effusion is a hypoechoic or anechoic, compressible and displacable intraarticular material without a PD signal, according to OMERACT 10. It is deemed pathogenic if the suprapatellar

recess (Sr) has a longitudinal diameter of more than 3mm.

In our study, most cases (86.7%) had effusion. More than half cases (53.3%) had minimal effusion, seven of them (23.3%) showed mild effusion and three cases (10%) had moderate effusion.

Table (8): Distribution of the studied patients regarding pre and infra patellar Bursitis

Pre and Infra Patellar Bursitis		Studied patients (n=30)	
		N	%
Pre and Infra Patellar Bursitis	No	27	90.0%
	Yes	3	10.0%

This table shows: in our study, three cases (10%) had pre and infra patellar bursitis.

Table (9): Distribution of the studied patients regarding other lesions

Other examined lesions		Studied patients (n=30)	
		N	%
Other lesions	No	27	90.0%
	Yes	3	10.0%

This table shows: it was observed that half cases (50%) had other lesions. Three cases had backer cyst their measurements were 7x3.5 mm, 80x46 mm and 15x9 mm respectively. Other one had patient with history of Fanconi anemia and effusion showing turbidity suspecting hematoarthrosis. In another case, patient with history of hemophilia and effusion showing turbidity suspecting hematoartherosis

There was one patients had quadriceps tendon showing few foci of calcification at its superficial part.no tendon tear, patellar tendon shows diffuse thickening and reduced echopattern denoting tendinosis, prepatellar subcutaneous edema.While two cases had ACL tear

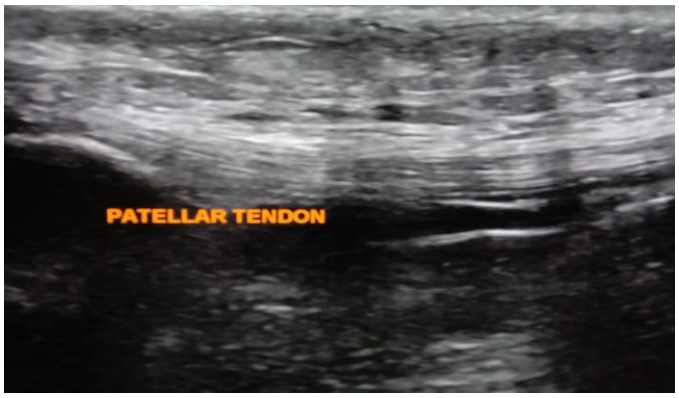
There was one case had subcutaneous edema with small localized collection measuring 14x6.5mm below site of amputation another collection overlying distal part of femur measuring 31 x5 mm suggesting postoperative inflammatory process. While another case had semimembranosus tenosynovitis and synovial thickening.

Intramuscular hematoma between gasteroconemus and solus suggesting solus edema with no tear or interruption (grade 1 tear). One case had patellar tendon partial thickness tear. One case had cleavage type injury to the subcutaneous fart in suprapatellar region. Finally, one case had well defined mixed echogenicity mainly hypoechoic subcutaneous soft tissue lesion at the back of the knee measures 25x10 mm with its inferior border shows hypoechoic area with partial loss of definition and central cystic changes reaching up to the skin suggesting subcutaneous lipoma with inflammatory changes surrounding its lower part.

Case Presentation:

Case 3: 35y old male having a background in trauma 3weeks ago complaining of sever right knee pain:

A



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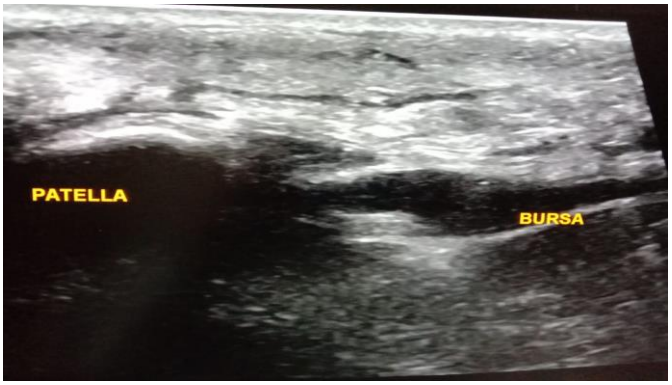
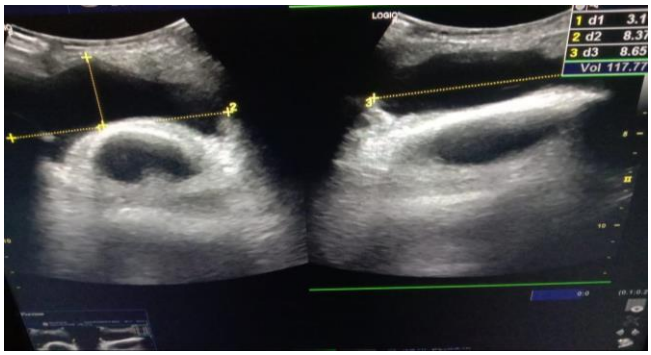


C

Examination reveals: cleavage type injury to the subcutaneous fat in suprapatellar region minimal localized fluid collection exhibiting slight turbidity seen at the deep infra patellar bursae denoting infra patellar bursitis. The patellar tendon Hoffa fat pad quadriceps are normal.

Case 4: 39 years old man with history of trauma complaining of left knee weakness:

A



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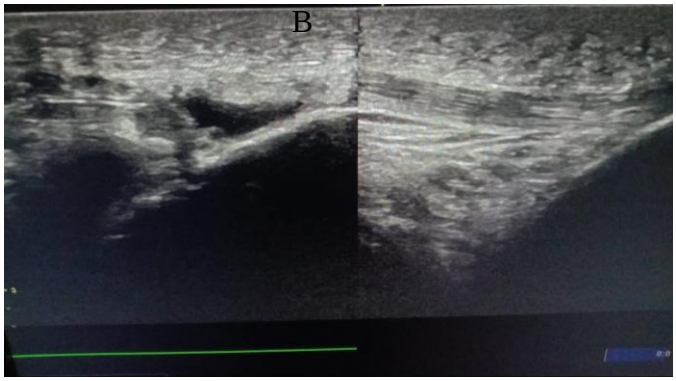
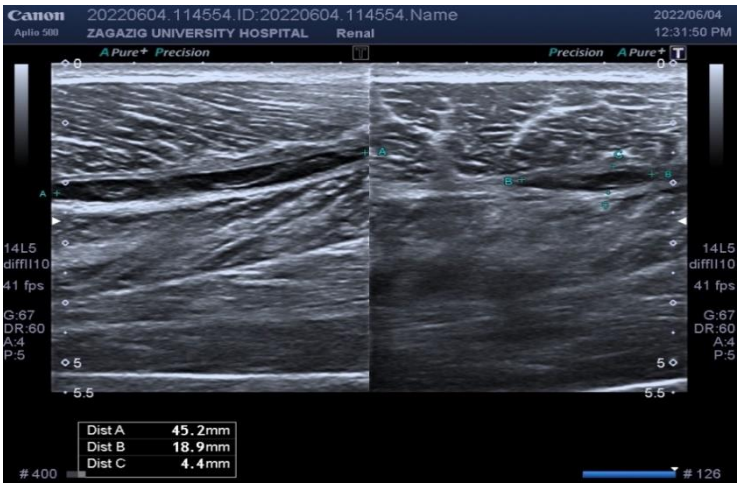


Examination reveals: Patellar tendon partial thickness tear. Infrapatellar bursa and suprapatellar mild fluid collection.

Case 7: Middle age male with history of trauma 1week ago during playing football with left knee weakness:



DISCUSSION:

Around a third of the musculoskeletal issues treated in primary care are associated with the knee. It's not uncommon in the elderly or athletes. People of all ages and both sexes are susceptible to experiencing medial compartment knee pain. Medial knee pain can be caused by a number of different things, including damage to the medial collateral ligament, degenerative joint

disease of the medial compartment, a rupture in the medial meniscus, inflammation of the pes anserine bursa, or medial plica syndrome. Because of the knee's complexity and the difficulty in clinically evaluating it, even the most experienced clinicians utilizing the most stringent clinical procedures do not always arrive at the correct diagnosis [(3).]

When it comes to diagnosing knee problems, even the most thorough clinical examination performed by a team of experts utilizing the most stringent clinical standards is often insufficient. Although arthroscopy has long been regarded as the best method for diagnosing knee problems, it is intrusive, costly, and necessitates admission to the hospital for the day. Nevertheless, MRI involves extensive examination times, is costly, and has become the noninvasive gold standard for diagnosing knee problems[(4).]

Because of its accessibility and low cost, high-resolution ultrasound (HRUS) is quickly replacing other imaging modalities in the assessment of the musculoskeletal system. Muscle, tendon, and ligament fibrillar anatomy are all assessed by USG. USG also allows for compression, dynamic assessment of structures, and straightforward comparison with the contralateral side. In the past, USG and MRI have both been studied for their ability to identify knee injuries, but only a small number of these studies have directly compared the two [(5).]

Soft-tissue rheumatism and other forms of regional pain can be identified with the use of musculoskeletal ultrasonography [(5).] The dynamic assessment and convenient accessibility of this tool make it an attractive addition to our regular physical examination [(6).] There is a dearth of research demonstrating the use of ultrasonography for compartment analysis of knee discomfort.

The primary objective of this research was to assess the efficacy of US in describing normal knee anatomy, to detail US techniques for performing a thorough examination of the knee, and to teach readers how to identify the US manifestations of prevalent pathologies and potential diagnostic traps or mimics.

Thirty people experiencing sudden knee discomfort participated in this investigation (less than three months duration). Research was performed in the ultrasonographic Imaging unit of the Department of Radiology of the Ain Shams University Hospitals' outpatient orthopedic clinic.

The main results of this study were as follows: In terms of the demographics of the patients that were studied, the ages of the patients varied from 18 to 70, with a mean±SD of 42.75± 13.1 years and a median ± SD of 43.5 years. There were 18 male cases (sixty percent) and twelve female patients (40%), for a male to female ratio of 1.5:1.

Mohanan and Unnikrishnan [(7)] included 60 patients with knee injuries, and our results were similar to theirs. The majority of participants in the research were male (73.3%) and middle-aged (mostly in their second and third decades).

As well, ***Basha et al.*** **[(8)]** individuals with anterior knee discomfort (eighty males and 63 females; mean age, 33.6 ± 13.9 years; range, 12-62 years) were included, and a total of 155 knees were examined. Those between the ages of 26 and 35 made up 30% of the population.

Also, ***Elshimy et al.*** **[(9)]** consisting of 60 adults 18 and above who, for various reasons, sought knee imaging (such as trauma, pain, swelling, and instability). Those between the ages of 24 and 34 made up the largest demographic, while men made up 75% of the total.

Moreover, ***Marwa et al.*** **[(10)]** examined Thirty individuals who had been diagnosed with a possible knee ligament or meniscal tear. Those between the ages of 18 and 57 made up the bulk of the patients, with men

being 70percent of the total and women making up 30%. (of a total of 30 patients).

However, ***Abicalaf et al.*** **(11)** enrolled 100 patients with primary symptomatic knee osteoarthritis, the mean age was 68.90±9.74 years and the majority were females (82%). The disagreement may be due to the disparity in sample sizes and inclusion criteria.

Regarding meniscal degeneration among the studied group, we found that the posterior horn is one of the most common areas for degenerative meniscus. Posterior horn medial meniscus degeneration was found in more than half (53.3%) cases while bone tenderness was found in 43 (95.6%) cases while the. Posterior horn lateral meniscus degeneration was found in eight (26.7%) cases.

Also, regarding meniscal tear among the studied groups, we found that four cases (13.3%) had posterior horn medial meniscus tear while eight cases (26.7%) had posterior horn lateral meniscus tear. It was observed that degeneration in posterior horn was higher than posterior horn in both medial and lateral menisci.

Consistent with our findings, **Elshimy et al.**[9] reported that meniscal disease was identified in forty-two individuals (seventy percent), 32 of which involved medial menisci and ten involved lateral menisci. There were many distinct types of meniscal tears, including radial, horizontal, and longitudinal tears. These rips often affected the back half of the medial meniscus or both horns of the lateral meniscus. US has a detection sensitivity of 83–97.2% and a specificity of 83–100% for meniscus tears. Furthermore, Cook et al.[12] showed that US and MRI of meniscus pathology had similar levels of sensitivity (91.2 % vs. 91.7 %), specificity (84.2% vs. 66.7%), positive predictive value (PPV) (94.5% vs. 84.6%), negative predictive value (NPV) (76.2% vs. 80%), and overall accuracy (89.5% vs. 81.1%).

Moreover, **Marwa et al.** **(10)** found that 15 instances (50%) were identified with U/S as having a posterior horn of medial meniscus damage, whereas 18 cases (60%) were diagnosed with MRI. In spite of this, posterior horn of lateral meniscus damage was identified in both Ultrasound and MRI in 5 patients (16.7%). The p-value for the correlation between MRI and US data was extremely low, <0.001.

Furthermore, **Singha et al.**[13] observed that Meniscal abnormalities via deterioration was detected in 21 (37.5%) patients, with 12(21.42%) patients experiencing medial meniscus involvement and 9(16.07%) patients experiencing lateral meniscus involvement. In their research, **Bruyère et al.** **(14)** observed that 27% of the sample population had some sort of meniscal irregularity.

In addition, research by **Reda et al.**[15] shown that US had a sensitivity of sixty percent and specificity of 100% for meniscal tears. And for meniscal degeneration, the sensitivity in the US is 16.7% and the specificity is one hundred percent.

Damage to the menisci, which play a crucial role in keeping the knee stable, can cause the cartilage to wear out prematurely in young individuals due to shear stresses. This is especially true if the person is overweight [16].

Regarding osteoarthritic changes among the studied cohort, we found that 12 cases (40%) showed osteoarthritic changes while these changed were not found in 18 cases (60%).

Osteoarthritis has traditionally been characterized as degenerative changes in bone, cartilage, and the soft tissues of the joints.

The sensitivity of US in diagnosing MCL damage was 75% and the specificity was 100%; however, Reda et al. (15) included 40 patients with knee discomfort and found that US exhibited 60% sensitivity and 100% specificity for meniscal extrusion. Both the sensitivity and specificity of US in

detecting Baker's cyst were found to be 100% in the research. Moreover, both the sensitivity and specificity of US in identifying joint effusion were shown to be 100% in the research. Ultrasound (US) and magnetic resonance imaging (MRI) both consistently found effusion in all of the arthritic knees. Ultrasound and magnetic resonance imaging scans show synovial thickening. Findings from this investigation corroborated the existence of a strong relationship between MRI and US methods for assessing cartilage and soft tissue alterations in individuals with knee OA. Data analysis of US's role in detecting knee joint osteoarthritis compared to MRI showed a sensitivity of 66.7% and specificity of 100%.

There were no cases of ACL tears among the participants in this analysis.

High sensitivity of ultrasonography for identifying an ACL rupture was demonstrated by **Zaka et al. [17], Singh et al. [5],** and **Singh et al. [18].** However, the specificity and accuracy of ultrasound in diagnosing ACL tear were (i.e., 78.3%, 90.0%, and 86.6%, respectively).

However, **Grzelak et al. [19]** found that HRS had a higher sensitivity (91.99%) than MRI for detecting ACL tears. The detection rate of ACL tears in this group was also 95.6%, although the specificity was lower.

Joint effusions and fluid collections around the knee are best assessed with ultrasound, as are tears in the medial and lateral collateral ligaments, the quadriceps and patellar tendons, and the menisci [15]. There were two cases (6.7% of the total) of thickened patellar tendon in the current investigation, with a maximal thickness of 9mm and an interior minor hematoma of 5x4mm.

According to a research by **Singh et al. [20],** the quadriceps and patellar tendons are the most often examined in cases of knee damage. The tendons in the anterior compartment become overworked and more vulnerable to damage as a result of repeated usage. One of the most prevalent reasons for sudden knee discomfort is tendinopathy. Ultrasound demonstrated a sensitivity of 75% and 66.6% in diagnosing patellar and quadriceps tendinopathy in the research by **Singh et al. [20],** whereas Basha et al. (84) found 84% and 87.5%. [8].

With a coefficient of agreement of κ = 0.85, ultrasound and magnetic resonance imaging (MRI) were shown to have a high degree of concordance in the identification of knee patellar tendinopathy in the cohort studied by Singh et al. In the same vein, when comparing US and MRI for the diagnosis of knee quadriceps tendinopathy, a significant degree of agreement (coefficient κ = 0.79) was seen. All of these contrasts were found to be statistically significant (P <.001). This suggests that US is as reliable as is required for assessing patellar and quadriceps tendinopathy.

Effusion is a typical indicator of knee pathology, whether it be traumatic or non-traumatic, thus it's important to catch it early. The sensitivity of knee effusion in detecting internal derangement was 80.0% in a study by Wang et al. [21] and the specificity was 60%. Hence, sonography is a valuable imaging method for diagnosing knee effusion.

Regarding the distribution of the studied patients regarding joint effusion & synovial effusion, it was fond that most cases (86.7%) had effusion. More than half cases (53.3%) had minimal effusion, seven of them (23.3%) showed mild effusion and three cases (10%) had moderate effusion.

Also, ***Singha et al.*** **[13]** revealed that 78.57% and 85.71%, respectively, of the study group had knee effusions visible on US and MRI. According to this study, synovial thickening was found in 66.07% of instances on USG and 78.57% of cases on MRI, respectively. MRI was used more

frequently to identify synovial thickening than USG.

Regarding the distribution of the studied patients regarding pre and infra patellar Bursitis, it was found that there were three cases (10%) had pre and infra patellar bursitis.

However, ***Abicalaf et al.*** [(11)] found a higher frequency of pes anserinus bursitis (43.30%) compared with Baker's cysts (29.38%)

Furthermore, ***Draghi et al.*** [(22)] It has been noted that when contrasted with MRI, US has a sensitivity of 86.67%, a specificity of 100%, and a k-value of 0.91 for bursitis and 71.4percent, a k-value of 100percent, and a k-value of 0.82 for suprapatellar bursitis.

Also, ***Reda et al.*** [(15)] revealed that there were high sensitivity and specificity of US in detecting prepatellar bursitis of 100% compared to MRI,

While, ***Basha et al.*** [(8)] revealed that US shows a sensitivity of 66.7%, specificity of 100% for Infrapatellar bursitis.

It was observed that half cases (50%) had other lesions. Three cases had backer cyst their measurements were 7x3.5 mm, 80x46 mm and 15x9 mm respectively. other one had patient with history of Fanconi anemia and effusion showing turbidity suspecting hematoarthrosis. In another case, patient with history of hemophilia and effusion showing turbidity suspecting hematoartherosis.

There was one patients had quadriceps tendon showing few foci of calcification at its superficial part.no tendon tear, patellar tendon shows diffuse thickening and reduced echopattern denoting tendinosis, prepatellar subcutaneous edema.

There was one case had subcutaneous edema with small localized collection measuring 14x6.5mm below site of amputation another collection overlying distal part of femur measuring 31 x5 mm suggesting postoperative inflammatory process. While another 3cases had semimembranosus tenosynovitis and synovial thickening.

Intramuscular hematoma between gasteroconemus and solus suggesting solus edema with no tear or interruption (grade 1 tear). One case had patellar tendon partial thickness tear. One case had cleavage type injury to the subcutaneous fart in suprapatellar region. Finally, one case had well defined mixed echogenicity mainly hypoechoic subcutaneous soft tissue lesion at the back of the knee measures 25x10 mm with its inferior border shows hypoechoic area with partial loss of definition and central cystic changes reaching up to the skin suggesting subcutaneous lipoma with inflammatory changes surrounding its lower part.

Ultrasonography is now a potential tool for diagnosing soft tissue abnormalities such as joint effusion, synovial hypertrophy, Baker cyst, and other structural alterations such as cartilage thickness loss, meniscus bulging, and osteophyte development. As an imaging biomarker, ultrasonography not only has diagnostic value in knee OA but also offers long-term prediction for disease progression. Ultrasonography has also been shown to be an excellent technique for directing therapeutic actions and assessing therapy efficacy[(23)].

Conclusion:

Ultrasonography is an effective screening method for the early detection of knee pathology. Joint effusion, posterior horn medial meniscus tear, posterior horn lateral meniscus tear, anserinus bursitis, osteoarthritic alterations, popliteal cysts, and patellar tendinitis were the most common findings in the United States.

Additional research with a bigger sample size and a longer follow-up period are required to corroborate our findings and

assess the diagnostic accuracy of US in knee pathology.

Confluence of interest:

No confluence of interest.

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دور الاشعه التلفزيونية في تقييم وتشخيص أمراض مفصل الركبه

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الخلفية: الألم واضطرابات الركبة الأخرى هي شكوى شائعة في وضع الإسعاف، الركبة. تشمل فوائد الولايات المتحدة إمكانية النقل، والتكلفة المنخفضة، والدقة المكانية العالية، والتصوير الديناميكي، والقدرة على توجيه التدخلات عن طريق الجلد عند الإشارة إليها. تسمح الولايات المتحدة أيضًا بالاتصال المباشر بالمريض، مما يسهل الارتباط السريري الفوري والقدرة على المقارنة مع الركبة المقابلة. ينقسم مفصل الركبة إلى مقصورات أمامية، وسطية، وجانبية، وخلفية للتقييم المنظم للأوتار والأربطة ومساحة المفصل والتركيبات العظمية وكذلك الأعصاب الطرفية والأوعية الدموية.

الهدف من العمل: تقييم قدرة الولايات المتحدة على وصف التشريح الطبيعي للركبة، ووصف التقنيات الأمريكية للتقييم الشامل للركبة والتعرف على ظهور الولايات المتحدة للحالات المرضية الشائعة، فضلاً عن المزالق الشائعة / تقليد المرض. .

المرضى والطرق: أجريت هذه الدراسة على ٣٠ مريضاً يعانون من آلام الركبة الحادة (أقل من ثلاثة أشهر). أجريت هذه الدراسة في عيادة العظام الخارجية بمستشفيات جامعة عين شمس إلى قسم التصوير بالموجات فوق الصوتية بقسم الأشعة بمستشفيات جامعة عين شمس.

النتائج: فيما يتعلق بالخصائص الديموغرافية للمرضى الخاضعين للدراسة، وجد أن عمر المرضى تراوحت بين ١٨ و ٧٠ سنة بمتوسط ± SD كان ٤٢,٧٥ ± ١٣,١ سنة ومتوسط ٤٣,٥ سنة. ١٨ (٦٠٪) من المرضى كانوا من الذكور و ١٢ (٤٠٪) منهم من الإناث بنسبة ذكور للإناث ١,٥: ١. فيما يتعلق بتنكس الغضروف المفصلي بين المجموعة المدروسة، وجدنا أن القرن الخلفي هو أحد أكثر المناطق شيوعًا للهلالة التنكسية. تم العثور على تنكس الغضروف المفصلي الخلفي للقرن الخلفي في أكثر من نصف الحالات (٥٣,٣٪) بينما تم العثور على حنان العظام في ٤٣ (٩٥,٦٪) حالة بينما تم العثور على. تم العثور على تنكس الغضروف المفصلي الخلفي القرن في ثماني حالات (٢٦,٧٪).

الخلاصة: الموجات فوق الصوتية هي أداة فحص مفيدة للتشخيص الأولي لأمراض الركبة. كانت النتائج الرئيسية في الولايات المتحدة هي الانصباب المشترك، وتمزق الغضروف المفصلي الخلفي للقرن الخلفي، وتمزق الغضروف المفصلي الجانبي للقرن الخلفي، والتهاب الجراب الجانبي، وتغيرات هشاشة العظام، والخراجات المأبضية، والتهاب الوتر الرضفي. هناك حاجة إلى مزيد من الدراسات مع حجم عينة أكبر ومتابعة أطول لتأكيد نتائجنا وتقييم الدقة التشخيصية للولايات المتحدة في أمراض الركبة.