Chapter one

Introduction

:1-1Background

Anatomically the patella ligament origin from apex of knee and insertion to tibia tubersity , physiology machine of the knee is composed of the quadriceps muscles and patellar ligament , detailed morphological data of them are the fundament basis to understand the pathogenesis of disorder around knee. .((RISHARD S.SNEELL,et al,200

This study provides the patellar ligament of knee measure on magnetic resonate imaging , is best to visualize and have good tissue resolution and high spatial resolution which allows the clear imaging of bones including the patella, femur and tibia , as well as the ligament structure .(of the patellar ligament.(RADIOLOGY INFO.ORG,2014

The characterize of patellar ligament it black in T1w and T2w more accurate in sagital imaging , measurement include longitudinal length of the patellar ligament and Thicknes ,pus any change in .signal intensity

Anthropometry including weight, age, gender, BMI in addition we compared the data between male and female .subject

The morphometry of patellar ligament is becoming increasingly important in diagnosis tear.(RADIOLOGY (INFO.ORG,2014

:problem 1-2

Patellar ligament is well demonstrated by MRI as low density are with equal semantically thickens through it pass without any change in it signal and length , same times tearing my happen living the tendon to be wider without changing in the intensity , there for the measure should be know in order to avoid miss diagnosis , and compare normal measurement of patellae ligament with abnormal measurement as the tendon measure .may be larger than normal

: Objective 1-3

: General objective :1-3-1

. To characterize the patellar ligament using MRI

:Specific objectives :1-3-2

1- to measurement the thickens and length of patellar ligament .

2- to evaluate the signal intensity of patellar ligament .

3- to correlate the findings with age , gender, and weight ,BMI, height

4- to compare the measurement with what was found in the literature.

:Thesis over view 1-4

To make the aims of the project stated above true , thesis falls into five chapter: chapter one which is an introduction , deals with theoretical from work of the study, it present the statement of the study problem and objective of the study , and thesis outcome chapter two, deals with theoretical background of knee joint (anatomy, physiology and pathology), review of the instrumentations and techniques which include knee assessment by clinical examination , conventional X-ray ,CT computed tomography, MRI magnetic reasons imaging and literature review (previous study), while chapter three discuses the material and method and chapter four include presentation of the results and finally chapter five deals with the discussion , recommendation, conclusion .of the study perfumed as well as future work

Chapter two
Literature reviewer
Anatomy and physiology and pathology

:2-1Anatomy

The knee joint is one of the complex and strongest is the most important joint in the human body . movement out the knee joint are essential to many every day activities including walking , running , sitting and standing ,it allows the lower leg to move relative to the thigh while supporting the body's weight, the knee also as known as the tibiofemoral joint is a (synovial hinge joint .(INNER Body .1999-2014

:Bones -2-2

The knee joint formed between there bone , the femur , tibia and patella . tow rounded , convex processes,(known a condyles) on the distal end of the femur meet two rounded , concave condyles at the proximal end of the tibia, the patella lies in front of the femur on the anterior surface of the knee with it, smooth joint forming processes on it posterior on it . (posterior surface facing the femur.(PLATZER et al, 2004

: Capsule 2-3

The joint capsule surround , the bones of the knee to provide strength and lubrication the outer layer of the capsule is made from fibrous connective tissue continues with the ligaments of the knee to hold the joint in place , oil synovial fluid is produced by the synovial membrane, that lies joint capsule and fills the hollow space between the bone .(PLATZER et al, (2004

:Meniscus 2-4

Thin layer of hyaline cartilage , between the femur and tibia is figure – eight – shaped layer of tough ,rubber , prevent the

collision of the leg bone during strenuous activities such as (running and jumping. . .(PLATZER et al, 2004

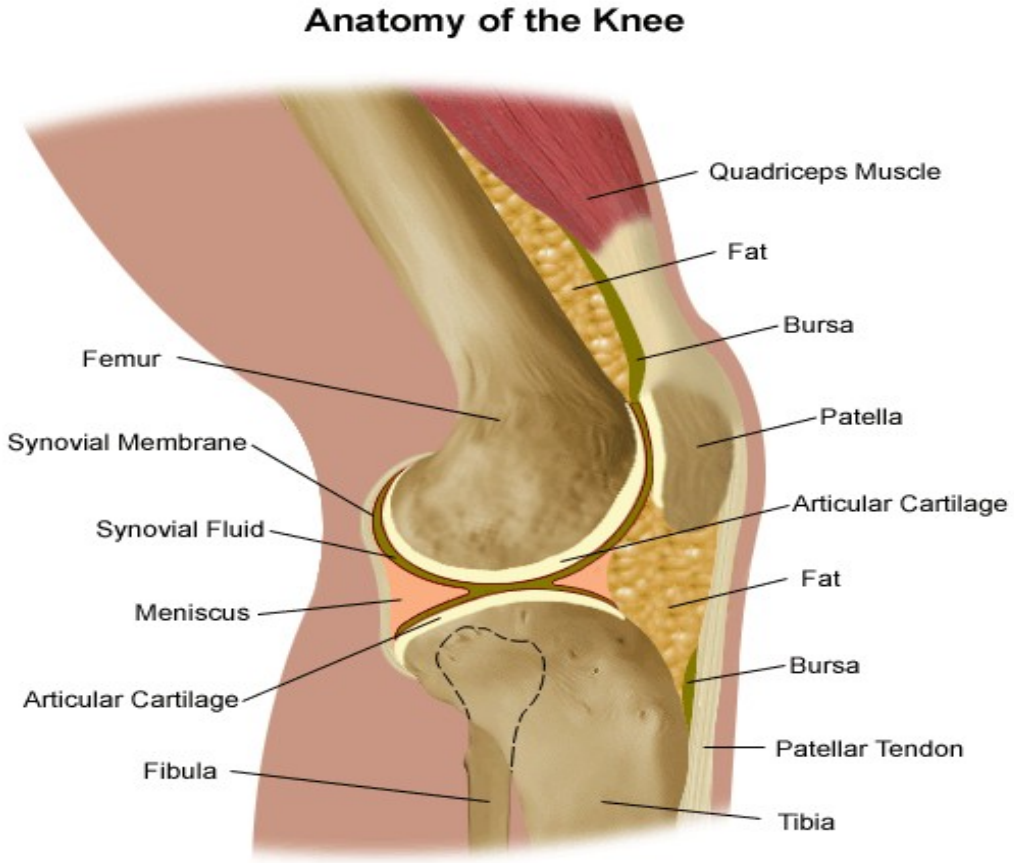


Figure (2-1) shows anatomy of knee joint label meniscuses &bursa on lateral aspect. (

(www.urmc.rochoster,ed

Figure(2-2) shows right knee joint label ligament& bon(proximal part of femur and distal part of tibia and fibula &patella)on anterior aspect .

((www.aclsolutions.com

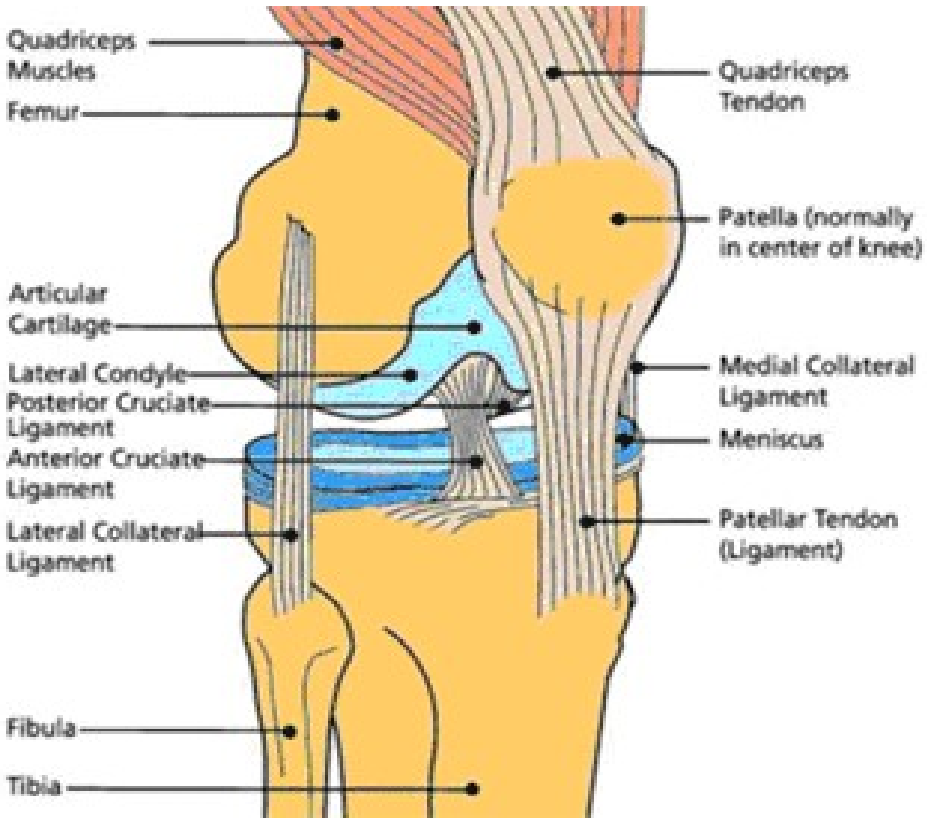
:Ligament 2-5

Many strong ligament surround the joint capsule of the knee to reinforce its structure and hold it bones in prober alignment.

On the anterior surface of the knee , the patellar is held in place by the patellar ligament . which extends from the inferior border of the patella to the tibia tubirsity of the tibia , posterior , the oblique popliteal ligament and acute popliteal ligament joint , the femur it to the tibia and fibula to the lower leg , along the medical side of the knee the medial collateral ligament (MCL) connect the medial side of the femur to the tibia and prevent forces applied to the lateral side of the knee from moving the knee medially, the lateral collateral ligament (LCL) binds the lateral side of the femur to the fibula and prevents forces applied to the medial side of the knee from moving the knee laterally ,the ACL and PCL also help to maintain the proper alignment of the knee ,the anterior cruciate ligament is the most anterior of these internal ligament and extends obliquely from the inner surface of the lateral condoyle of the femur

to the anterior intercondyl space of the tibia , the ACL prevent hyperextenation of the knee by limiting the .anterior movement of the tibia

behind the ACL is the posterior circuit ligament , which extend , obliquely from the inner surface of the medial condoyle of the femur to the posterior intercondylar space of the tibia . the PCL prevent the posterior movement of (the tibia relative to the femur.(PLATZER et al,2004



Figure(2-3) show ligament of knee joint on anterior aspect(anterior curciate ligament-posterior curciate ligament-medial curciate ligament-lateral curciate ligament-patellar &quadriceps ligament .

((www.epomedicine.com

:patellar ligament 2-5-1

The patellar ligament is a strong , flat , ligament about 5 cm in length which originate on the apex of the patellar distally and adjoining margin of the patella and the rough depression on its posterior surface below , it insert on the tuberoses of the tibia, its superficial fibers are continuous

over the front of the patellar with those of the tendon of .(the quadriceps.(GRASY ANATOMY ,2015

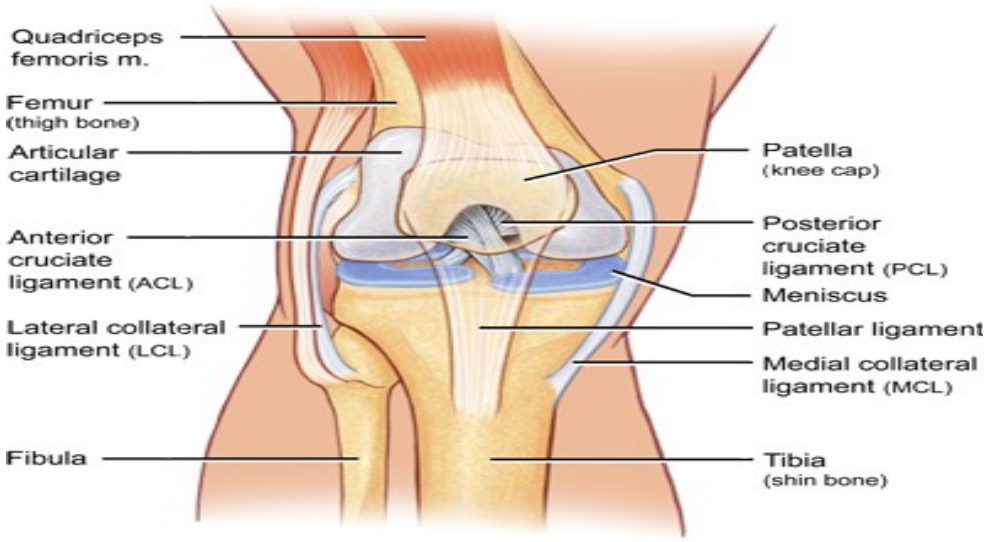


figure (2-4) label insertion of patellar ligament

((www.rdbanerjee.couk

figure(2-5)shows ligament &muscles of knee
(joint on lateral aspect(www.health.adisors.org

:2-6Bursa

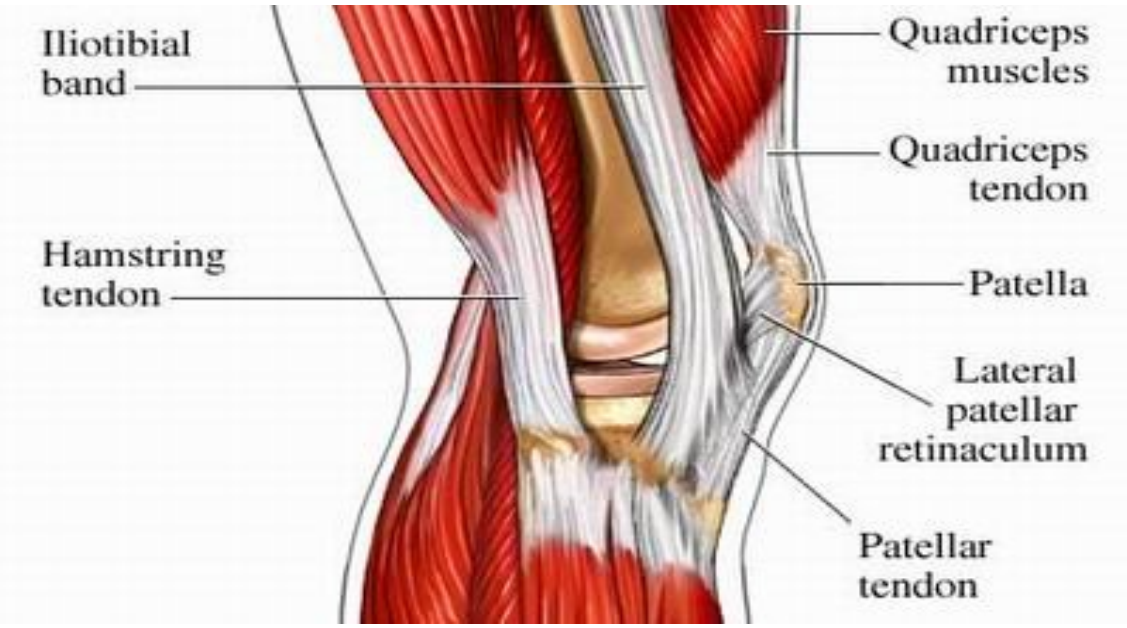
Small pockets of synovial fluid surround the knee , reduce the friction from movement of tendons across the surface . of the joint

Several of theses burse , including the suprapatellar bursa, are instrumental in the reduction of friction between the patella and femur Pockets of dispose tissue around the knee known as articulate fat pads, help to cushion the knee .from external stress

The largest of these pads, the infrapatellar fat pad , absorb shock to the anterior surface of the knee cushions the patellar ligament as it moves with the patella during flexion (and extension of the knee.(PLATZER et al,2004

:2-7Muscles

The knee muscles which go across the knee joint are quadriceps and the hamstring ,the quadriceps muscles are one the front of the knee and the Hamstring are one the back of the knee ,plus tendon connect the knee bones to the leg muscles that move the knee joint (PLATZER et al, .(2004



Figure(2-6) shows muscles of knee joint on lateral aspect(hamstring group& quadriceps (muscles(www.ohiodance.org

:Blood supply of the knee 2-8

Two major vascular structure, the popliteal artery and vein , are located with in the poplitea fosa as the posterior aspect of the knee , another prominent vessel is the great (sephanous vein) which ascends , the medial aspect of the leg and thigh , to drain into the femoral vein near the hip (joint(PLATZER et al,2004

:physiology 2-9

It is attached The primary functional role of the patella is knee extension. The patella increases the leverage that the tendon can exert on the femur .by increasing the angle at which it acts

to the tendon of the quadriceps femurs muscle, which contracts to extend/straighten the knee. The patella is stabilized by the insertion of the horizontal fibers of vast us medial's and by the prominence of the lateral femoral condyle, which discourages lateral dislocation during flexion. The retinacular fibers of the patella also stabilize it (during exercise.(PLTZOR,et al,2004

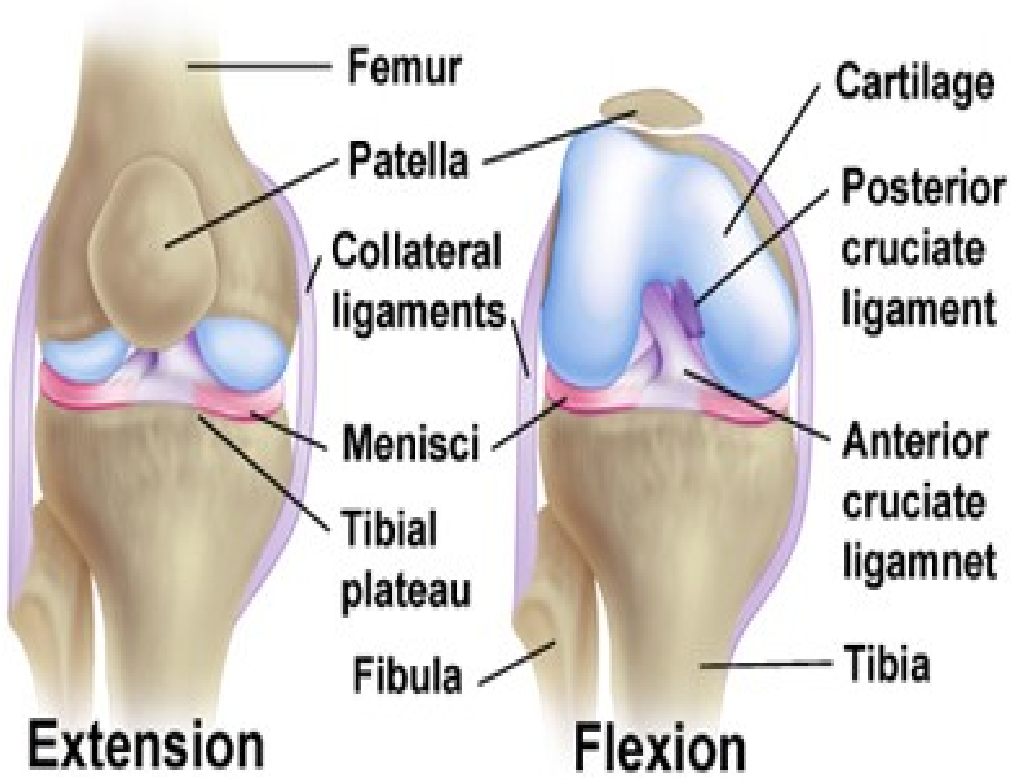


Figure (2-7) Shows function of knee joint

((www.yoursurgery.com

:pathology :2-10

Anatomically tendon attach muscles to bones , the patellar tendon attach the bottom of the knee cap (patella) to the top of the shine bone (tibia) , it is actually alignment that connect to two different bones ,pathological the patellar tendon works with the muscles in the front of your thigh. Tear are common among middle –aged people who play running or jumping ,patellar tendon tear can be either partial or complete. (AMERICAN ACADMY OF ORTHOPIDIC .(SURGN ,2014

:2-10-1Partial tear

This is similar to a rope stretch so far that some of the fibers are torn but the rope is still in one piece .(AMERICAN .(ACADMY OF ORTHOPIDIC SURGN ,2014

.

:2-10-2Complete tear

Break apiece of the bone as it tear the tendon is separated .from the kneecap

: 2-10-3Causes of tear

:Injury -

. Avery strong face is required to tear the patellar tendon

.Falls : direct impact to the front of the knee from a fall

:Jumping -

The patellar tendon usually terse when the knee is bent and the foot planted , like when landing from jump or .jumping up

:Tendon weakness-

Awakened patellar tendon is more likely to tear several things can lead to tendon weakness

(patellar tendonitis – corticosteroid injection)

: Chronic disease

Chronic disease which may weaken

:The tendon include

. chronic renal failure-

.hyper batealipoprotinemia-

.rheumatoid arthritis-

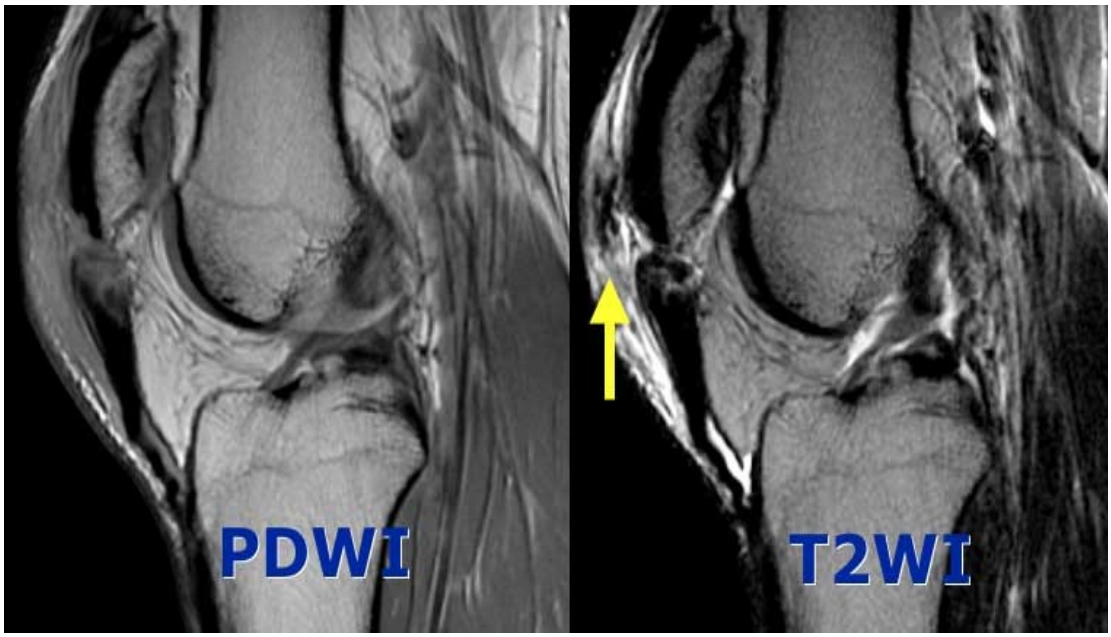
.systemic lupus erythmatosus-

.infection-

.metabolic disease-

:Steroid use -

Using medication like corticosteroid and anabolic steroids has been linked to increased muscles and tendon weakness. AMERICAN ACADMY OF ORTHOPIDIC SURGN , .(2014



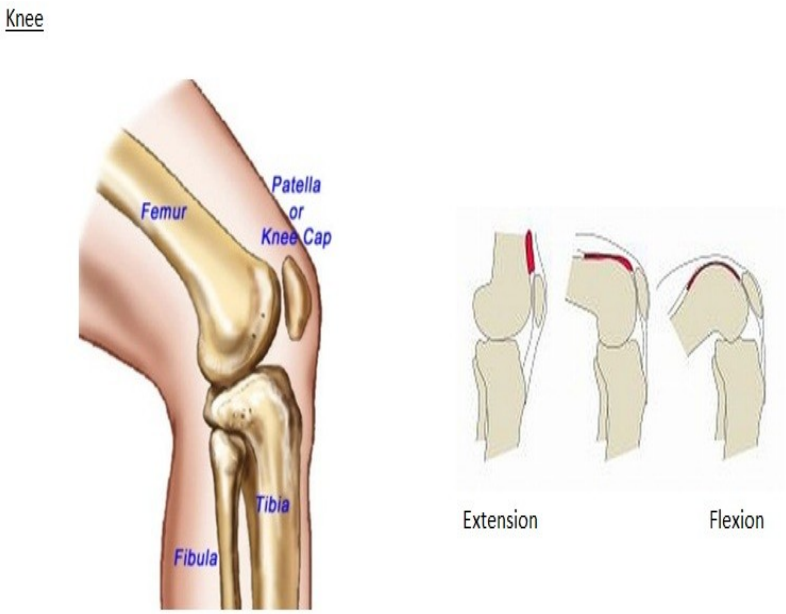
Figure(2-8) label shows MRI image(1)PDWI proton density weight image&(2)T2WIT2weieghtimage of patellar ligament ((tear. www.radiologyassistant.ul

: Diagnosis of patellar tendon :2-11

:knee extension test-2-11-1

It could be test how well you can extend or straighten , of knee joint . while this part of the examination can be painful , it is important to identify a patellar tendon tear. .((AMERICAN ACADMY OF ORTHOPIDIC SURGN ,2014

Figure(2-9)show doctor examine knee extension ((www.wikidoc.org



Figure(2-10) show extension & flexion of knee (joint(www.pixshark,com

:Imaging test 2-11-2

To confirm the diagnosis , by using conventional x-ray or magnetic reasons (MRI) scan .

-:11-2-1Conventional X-RAY -2

X-ray (radiograph) are the most common and widely available diagnostic imaging technique , this is often obvious on side ways X-RAY view the knee lateral image, ((AMERICAN ACADMY OF ORTHOPIDIC SURGN ,2014).

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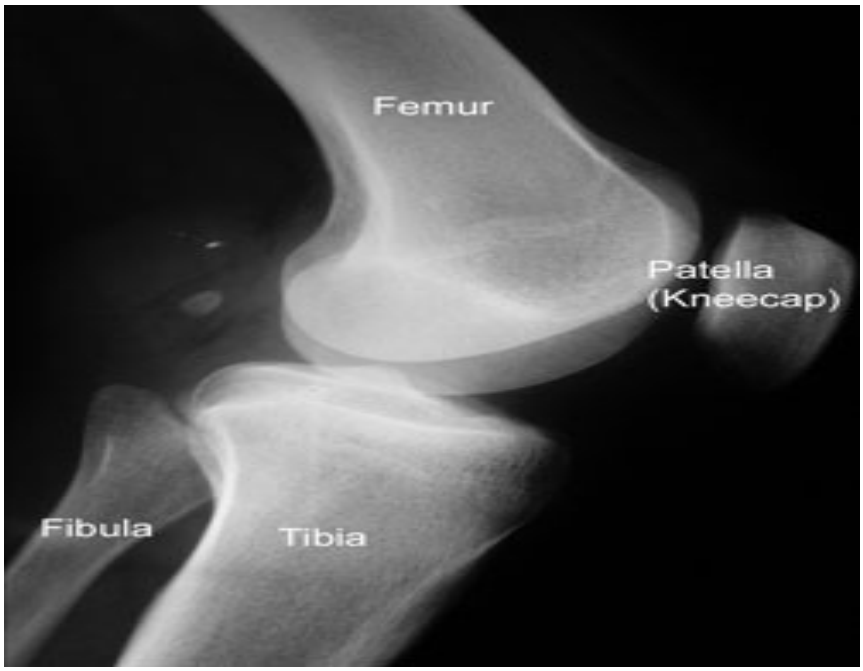


Figure(2-11A) x-ray show normal location of patella.

(Musculoskeletal imaging (2006

Figure(2-12B) x-ray showed knee cap moved out of place

.du to tear

(musculoskeletal imaging (2006

:2-11-2-2MRI test

Magnetic resonance imaging (MRI) is another modern diagnostic imaging technique that produce cross- sectional .images of your body

This scan create better images of soft tissue like the patellar tendon . the MRI can show the amount of tendon torn and the location of the tear. (AMERICAN ACADMY OF .(ORTHOPIDIC SURGN ,2014

.

Figure(2-13) showed sagitalT1WI weighted image MRI
green arrow indicated patellar tear.
((www.radiologyinfo.org

:Imaging of the knee 2-12

:2-12-1convenitional X-Ray

:indication 2-12-1-1

.Trauma, effusion arthritis

.Any degenerative change

:contraindication 2-12-1-2

.Non

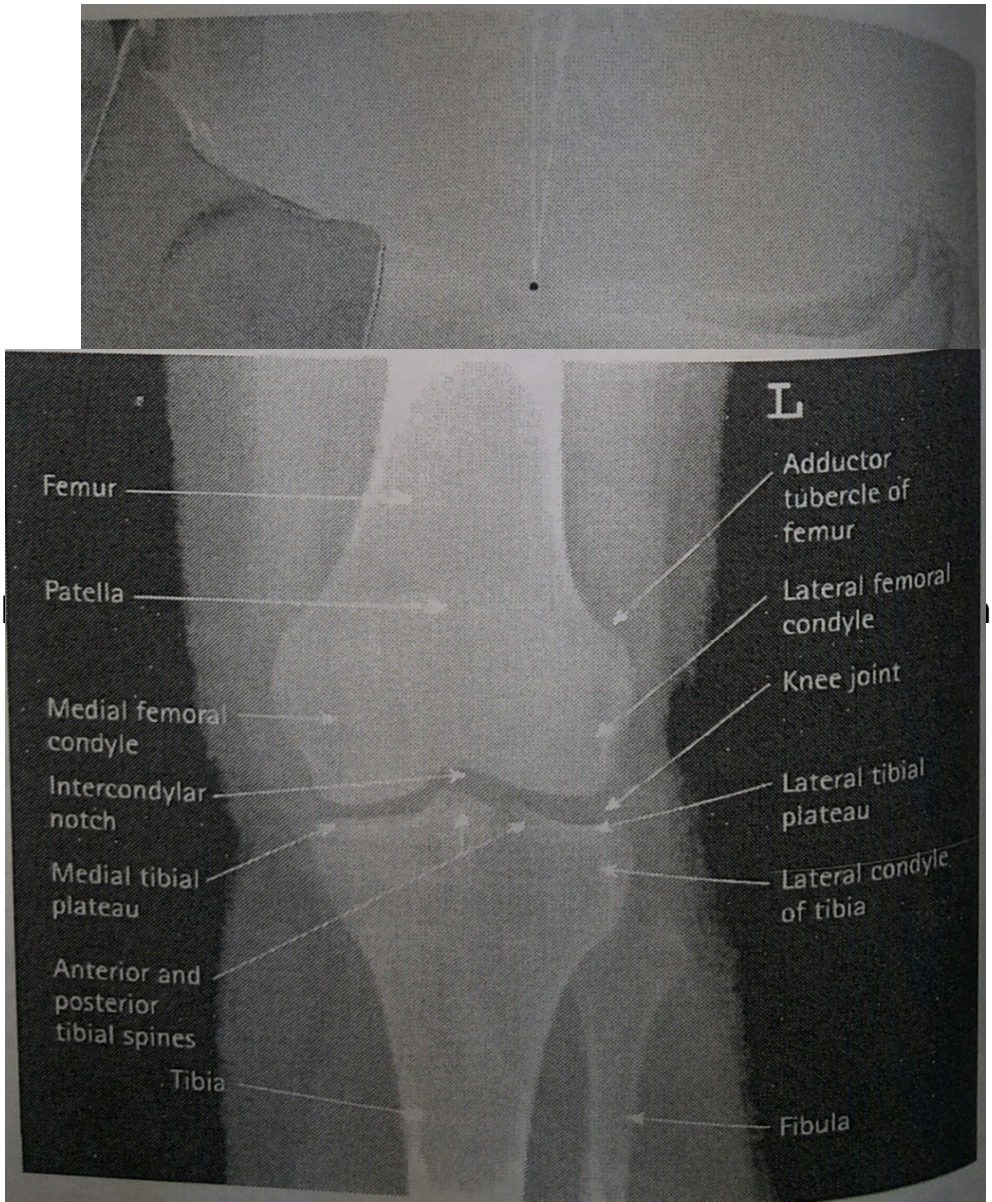
:technique 2-12-1-3

Two projection are taken routinely an , anterior – posterior .((AP) , and lateral (LAT

: 2-12-1-3-1AP position of patient

The patient is suited supine or seated on the x-ray table , .with both leg extended

The affected limb is rotated to centerline the patella between the femoral condyle ,and sandbag are placed against the ankle to help maintain this position. (CHRLES et (al,2005



e on

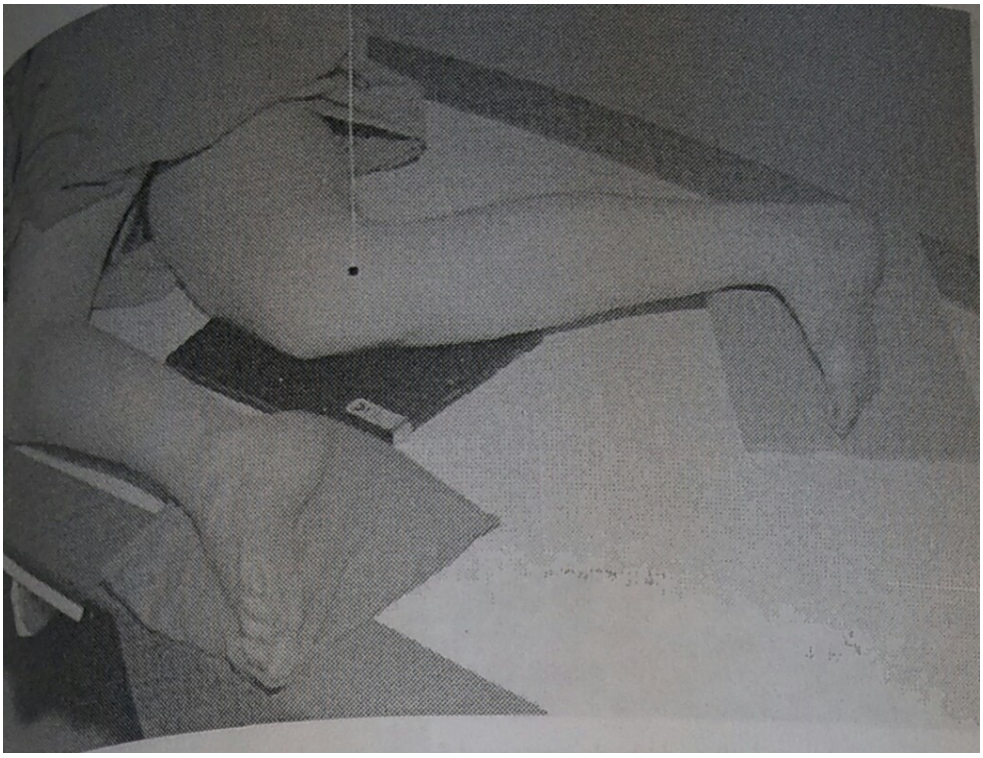
Figure(2-15) label show AP image of knee joint (anterior
(posterior
(CHRLES et al,2005) .

:Lateral position of patient 2-12-1-3-2

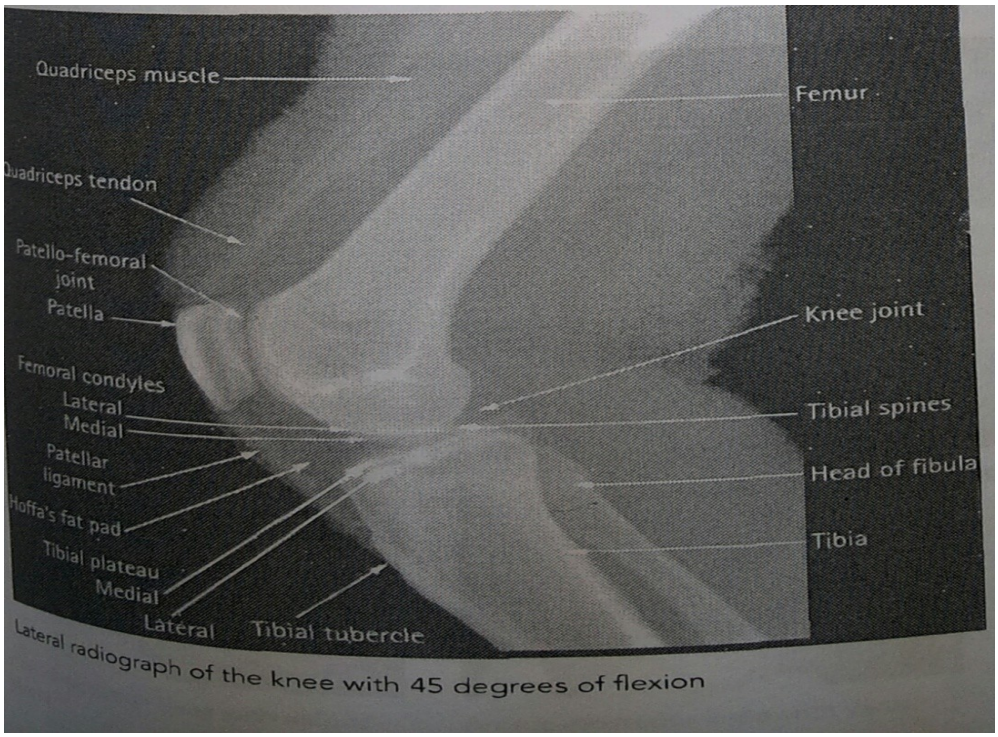
The patient lies on the side to be examined with the knee flexed at 45-90. the another limp is brought forward in front of the one being. sandbag is placed under the ankle of the affected side to bring the long axis of the tibia parallel to the cassette.(CHRLES et al,2005).

:2-12-1-3-2-1Parameter

kv(50-60)v MA(4-5)s



Figure(2-16)label show position of patient lying by (side on the couch(CHRLES SALAN,et al,2005



Figure(2-17) label show lateral image of knee joint(CHRLES et (al,2005

.CT computed tomography :2-12-2

:Indication 2-12-2-1

To assess the degree and alignment of fracture fragment- .articular surface of particle

.To assess the integrity of the bone around a prosthesis-

For patient who have an implant medical devices- .sensitive to MRI

To evaluate joint , especially after iodinated contrast- (media into the joint.(LOIS et al, ROMANSE,2011

: Contra indication 2-12-2-2

Non

:Protcol 2-12-2-3

:Position of patient

Patient lying supine on the scanner table with leg extend, .knee side by side feet first

.Scout: AP and LATERL, to localized area of inters it

.Start location : just above patella

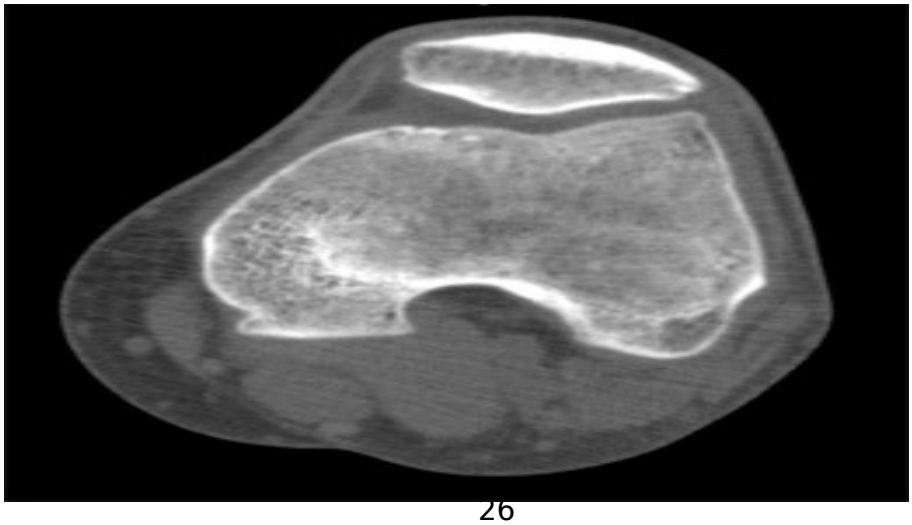
.End location: just below fibula head

MPR bones : slice thickness / interval 2mm/2mm

:Planes

.Axial-coronal-sagital

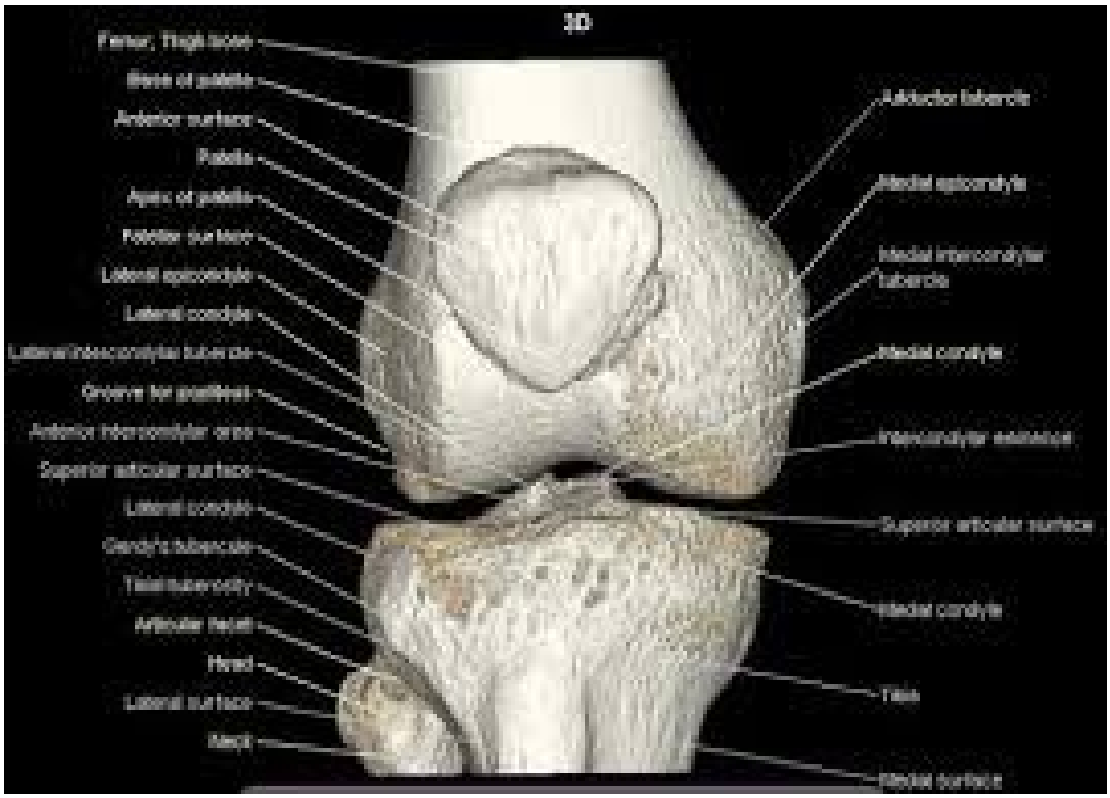
(Kv/ma: 140/300(LOIS et al,ROMANSE,2011



Figure(2-18) label show axial image reconstruction of knee joint show patella.(www.bolotonknee.com

Figure(2-19)label show coronal image reconstruction of knee joint show proximal part of femur &distal part of tibia . (www.radiology.misc.edu

Figure(2-20)label show sagital image reconstruction of knee joint appearance the patella &proximal part of femur &distal part of tibia
.(www.radiology.misc.edu



Figure(2-21) showed 3D reconstructed image of knee joint (&label anatomy of bone(www.imaios.com

:MRI of knee joint 2-12-3

The bones comprising the knee joint show normal configuration and position , the bone marrow signal is normal , with a normal trabecular pattern and normal epiphysis lines ,the cortex shows smooth contours and .normal thickness' with no sub –chondral signal change

The cartilage covering the patella , femoral condyle , and tibia plateau is of normal thickness' and has normal signal

characteristics , the cartilaginous surface is smooth , the medial and lateral meniscus of the knee joint present a normal triangular configuration on axial image and have a homogenous internal structure of low signal intensity , the anterior horn , mid portion and posterior horn each display a smooth , intact surface, the anterior and posterior curciate ligament are intact and are normal in their width and signal characteristics , the collateral ligament are intact and if normal width, the soft tissue surrounding the knee joint and image vascular structure are unremarkable , ((TORSTEN,1999,EMIlL REIF,200

:2-12-3-11indication for knee MRI

In conjunction with conventional x-ray, MRI is usually the best choice for examine the body's major joint like the :knee, the examination indicated to

knee pain , weakness , swelling or bleeding in the tissue - in and around the joint

sport related knee injuries -

.build up of fluid in the knee joint -

.complication related to implanted surgical device -

internal derangement of the joint (menisci tear , ligament - tears , post repair cruciate ligament tears burse

.chondromalaica patella and patella tracking -

. bone tumor and bony damage within the knee joint -

all most and another knee disorder can well be - .(visualized(RADIOLOGY INFO-ORG,2014

:contraindication 2-12-3-2

patient have claustrophobia (fear of enclosed space) or - anxiety.

- patient with the following implant cannot be scanned and - should not enter the MRI scanning such as (cochlear, aneurysm , pacemaker). (RADIOLOGY INFO-ORG,2014).

- any metal and electronic object such as (jewelry, watch).

2-12-3-3Protocol of knee

. The patient lying on table supine , feet first

:2-12-3-3-1Equipment

.(surface coil or body coli.(Knee coil

(Ear plague (CATHERIN WESTBOOK,1998

Figure(2-22) showed closed MRI machine semen's model

(Composed of gantry &couch(www.imgarcade.com

Figure(2-23) showed knee coil used in MRI scan

(www.quateinsta.com)

Figure(2-24) showed positing of patient lying supine on the couch by using closed magnet (MRI(www.durangoorhopedic.com

:2-12-3-3-2Protocol

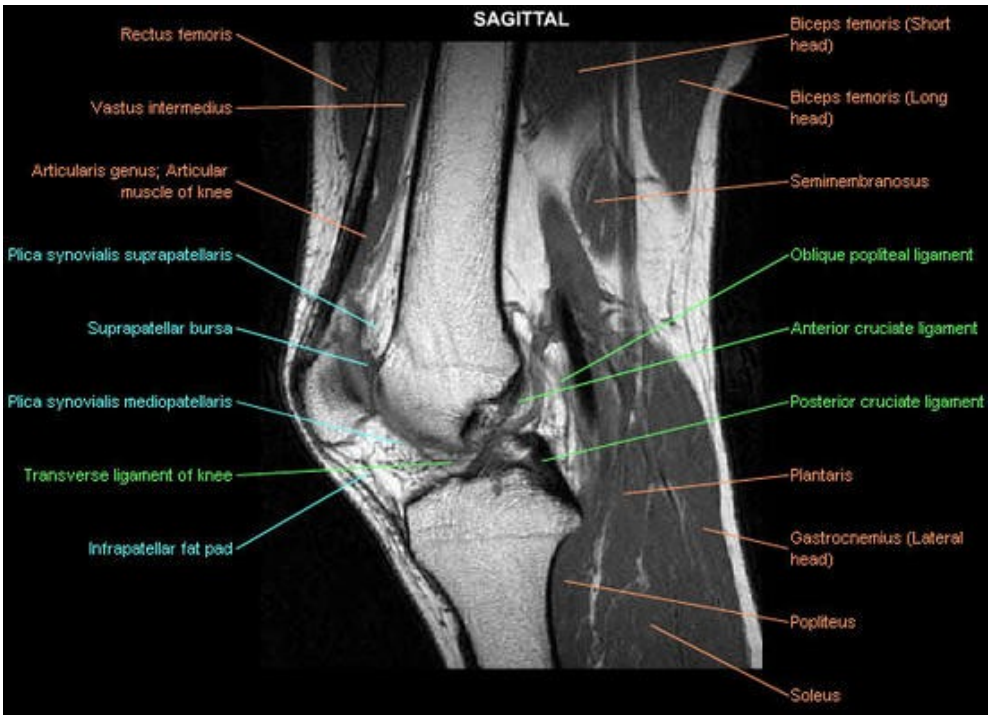
.Axial/ multiplanar coherent gradient echo t*2

.Sagital coherent GRE t*2

Coronal FSE pd/t2 +/- chemical / spectral presaturation / . stir

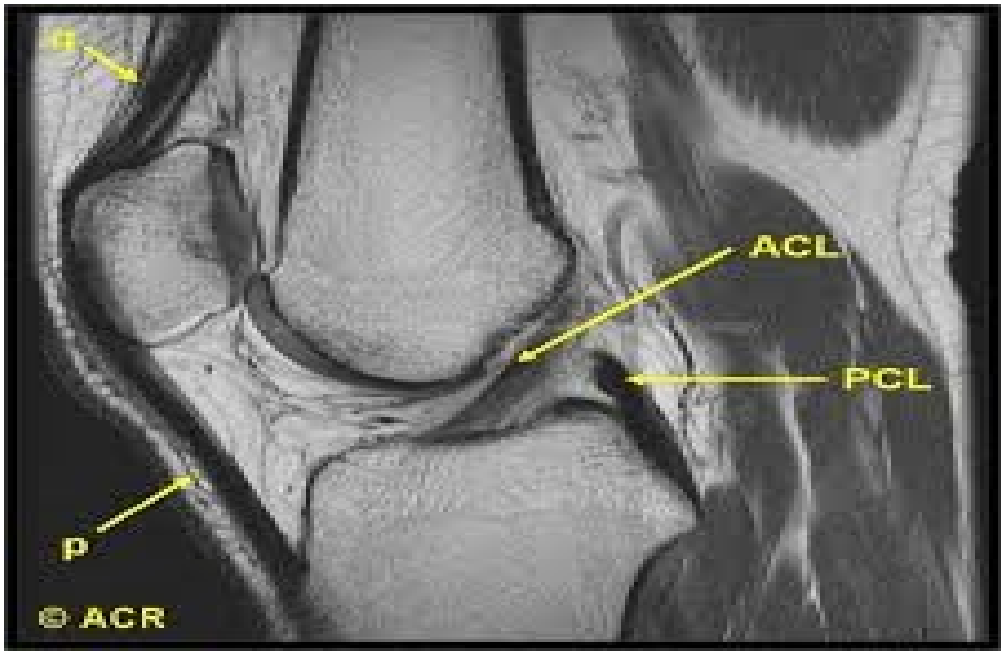
.Choronal SE/incoherent (spoiled) GRE t1

Axial FSE pd/t2 +/-chemical /spectral presaturtion. .((CATHERIN WESTBOOK,1998



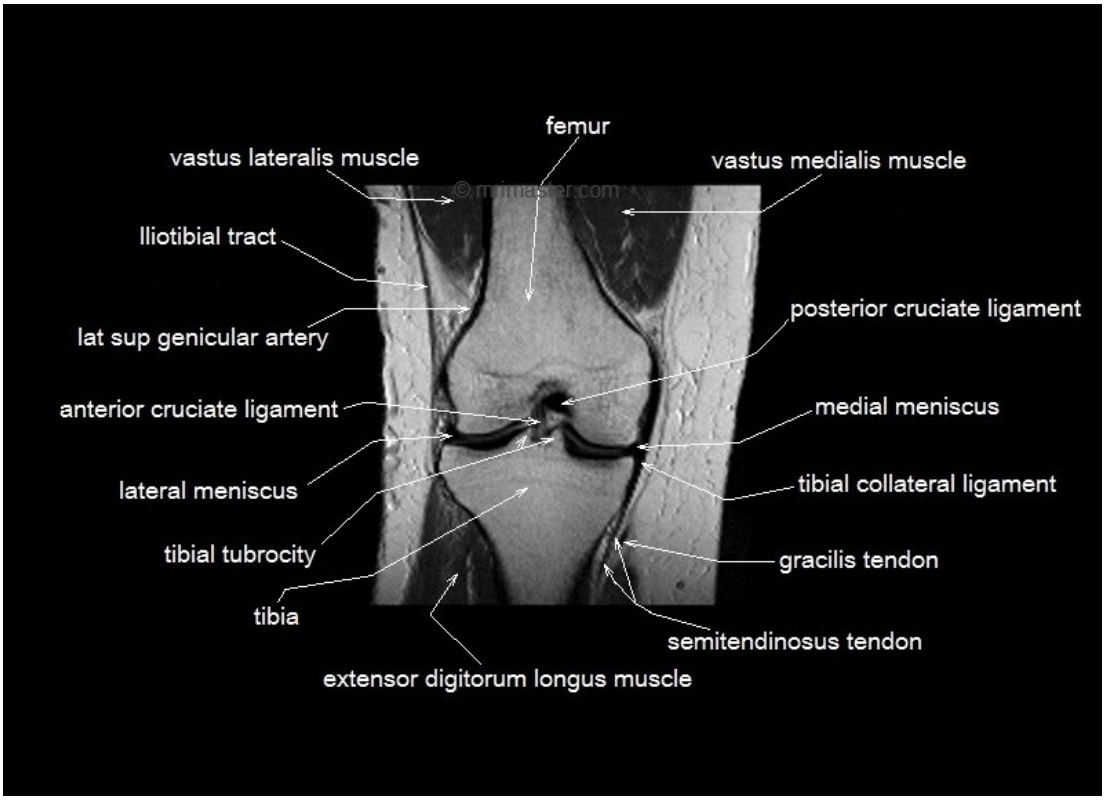
Figure(2-25) showed &label sagital T1Wimage of

(MRI(www.imaios.com



Figur(2-26)label show MRI image of sagitl proton density weight image(p)patellar ligament(q)quadriceps ligament,

(ACL)anterior curciat ligament(PCL)posterior curcuiate
(ligament.(www.reheumaatioigy.org



Figure(2-27)label show MRI image coronal proton density
((of knee joint. www.iage.fromp.com

:2-12-3-3-3Additional sequence

.Axial SE/FSE t1

.3D coherent GRE pd/t*2

(Dynamic imaging. (CATHERIN WESTBOOK,1998

:2-12-3-3-4Sequence and parameter used

Spain – echo sequence have been the workhorse in MRI evaluation of knee disorder,

fast scan imaging (T*2-stir-gradiant) generated higher signal than on T2 weight Spain echo , it replacement him, my be used in any situation in which it my be desirable.

T1weight image are satisfactory for the demonstrate of the most commonly in counted pathological , when selecting the parameter for T1WI sequence , the TR should be shorter because this speed up the examination and the signal – to noise ratio is satisfactory for resolution of any abnormality , if using very short TR is that the number of slice available for the sequence will decreased,

Another technique would be to plane gaps between the slice , there by allowing the limited number of slice variable to cover large region , the abnormality in the area between slice will be messed if the gaps are too large if used should be small and that the TR should be long enough to provide an adequate number of slice to cover the enter region , and thesis improved the signal to noise ratio.

another parameter used selection of coil , important to satisfactory image , if used body coil have found that smaller gaps , will produced more than satisfactory image , for clinical use with surface coli , also important to affect to the knee near the magnet is center because

signal intensity tend to drop off the further away the knee planed .

slice thickness is an important parameter to consider when very thick slice are utilized , details my be lose and lower signal- to noise ratio although this problem may be compensated for by using inter leaved sequence or by implying gaps , another way to improve the signal to noise ratio would be to increased the number of excitation however this my increased examination time, for this reasons very thin slice should not utilized with conventional spine – echo sequence .

Matrix size is yet another parameter that impinge in significant manor both signal to noise ratio and resolution .

The use of large matrix , however increase the amount of time required to complete on examination , with the use of smaller matrix , resolution is satisfied , the signal to noise ratio is improved .

T2 weight image spine-echo image are accusingly useful such as in the examination of partial tear , some center routinely use T2*-weight sequence situation in which fast scan image cannot be obtained T2weigth sequence. ((PETER et a1,999).

:2-13limitation of each modality

:2-13-1Conventional X-RAY

-invasive technique.

can doing to any patient have symptom except first- trimester pregnant women .

.highly quality in evaluation bone , especially fracture-
.shipper-

:2-13-2CT computed tomography

.ct is non invasive technique -
.ct more radiation -
ability to perform multiplaner and three- dimensional -
.reformate
.there is not take time -
.highly quality in evaluating bone -
Relatively expansive compared with conventional x- -
. (ray.(LOISE et al,ROMANS,2011

:2-13-3MRI magnetic reasons imaging

person who is very large may not fit into the opening -
.of conventional MRI machine
the person of an implant or other metallic object , -
sometimes make it difficult to obtain clear image and
.patient movement can have the same effect
-Safety devices
MRI typically coast more and may take more time to-
perform than a other modalities.(RADIOLOGY INFO-ORG
(-2014

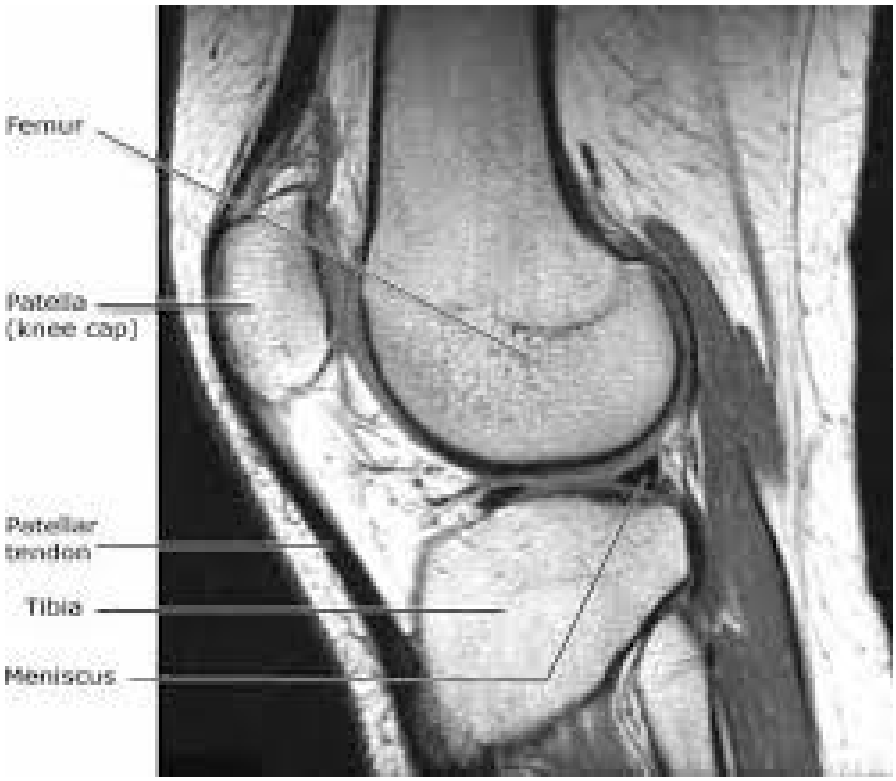
MRI appearance of the normal patellar:2-14 :ligament

The sagital and sagital oblique planes are the best-. planes to study the patellar ligament

Ligament is characterize is low signal with both Spain--.echo and fast scan images

Small amount of fast is sometimes seen as areas of-high signal (Hoffa's paned) within the posterior band near the patellar

The patellar ligament is readily identified as a-homogenously dark structure , extended from apex of .(patella to tibia tubersity.(PETER et al,1999



Figure(2-28)label showed sagital cross section of knee joint& normal patella ligament .(
(www.imasios.com

:2-15Previous study

Found some previous study related to patellar ligament -first study about patellar tendon length – and factor in . patellar instability

In this study used two group , group have history of patellar dislocation and group control knee and compare between these to measure the patellar tendon length and the factor in patellar instability material used lateral x-ray and a magnetic reasons image were e mean was 44mm in control taken of each knee .(PH.NERETK,A.H.ROBINSON,- (2007

The mean radiological patellar tendon length was 46mmin the control and 52mm in the dislocation from MRI image the mean was 44mm in control and 52 mm in dislocation group . this means that the patellar tendon is significantly (p`0.0001) longer in patient with history of patellar dislocation on both MRI and x-ray measuring the length of

the patellar tendon using MRI is more specific and more sensitive

Another study provides the geometer of patellar and-patellar tendon measurement on sagital and axial

As for patellar tendon the longitudinal length was 40,2mm the width of proximal and distal part were 30,3 m and 24,0m the thickness of proximal and distal part were 3.2m . and 5,0m

The geometry of the patellar tendon was larger in male .(than in female (p`0.001

These data can provide useful information in the field of (knee surgery and sport medicine(JAE -HOYOO et al, 2007

Another previous study about MRI criteria for patella Alta-whish definitional the patella rides higher in the direction of the hip above the knee joint line than normal, and Baja by using patellar length to patellar length ration on magnetic reasons imaging of the knee , in order to aid in the (establishment him.(JAE -HOYOO et al, 2007

Patellar length (pl) and patellar tendon (Tl) were measure by single musculoskeletal radiologist on sagitl image . the Tl/pl range between 0,56-1,71 mean (1,05) , and female . higher than male

Another study assessed the ultrasound chart artistic of-patellar tendon according to echo change , used two groups of volley ball pear , one without knee symptoms' and one group with symptom of jumper knee by clinical

examination diagnosis the jumper knee for group with symptom in the patellar and had normal ultrasound finding and u/s change observed in group without symptom observed change associated to (thickening – echo signal .(change , irregular patron appearance

This study suggest that the specificity and sensitivity of ultrasound is low in the evaluation of patient with mild symptoms of jumper knee. .(JOUERNAL OF MEDICINE& (SCIENCE IN SPORT ,1966

Chapter three

Material AND Method

This descriptive study , about the patellar ligament of knee joint , the main objective were to obtain measurements of patellar ligament , to know the normal measurement and use this information to diagnosis tear, the data were

collected from radiology department of MODREN MEDICAL CENTER ROAYL CARE INTERNATIONAL HOSPITAL, the study was carried out in the(Sudan Khartoum state) the study .duration from maye2014to may 2015

:Study sample -3-1

:Inclusion criteria 3-1-1

The patient population consist of 15 females and 43 males with age ranging from (20-70), normal patient, full history . taken from each patient

:3-1-2Exclution criteria

Exclusion were patients who have traumatic knee, and .(patient have metallic prosthesis (knee replacement

:Machine used 3-1-3

The machine used in this is study GE (general electrical) GE medical system 2004 1.3 Tesla –Toshiba medical 1.3 (Tesla.(both closed machine

:Method 3-2

The data were collected from the patients refer to the MRI scan , and before scan , weight of patients and height were measured using measuring devised firstly all the patients were prepared remove from any metallic object and enter the room for scan patients lying in supine on the couch, will feet first, with coil under , the center of knee w as with center of coil(surface coil or body coil) ear plugs were used to protect from noising of gradient change, door was closed to complete the scan , the ,protocol was used from the computer system, it differs according to hospital and radiographer worker, the technique used in

,modern medical system, sagital T1 SE , sagital PD fat sat SE , sagital T2 FSE, coronal PD fat sat SE,parameter usedTR:600ms.TE:15ms SLICETHICNES:3.5mn ,FOV:20m ,MATRIX:512*512 this will improve spatial resolution of image ,and from royal care international hospital ,TR:1710m s ,TE:10ms, SLICETHICKNES:5,0mm,MATRIX:256*256,FOV:20mm,technical used sagital T1SE,sagital stir FSE ,sagital PD SE coronal stair fat sat FSE, and parameter above if reduce this .improve spatial resolution, no contrast media was use the patella ligament was measured from sagital T1 length and thickens (upper -medial-lower) the technical used to measure length from lower knee pole to tibia tuboresity and the thickens divided to proximal, distal medial , this method is similar to the method done by (jae hoo et al,2007) on his study about geometry of patella and .patellar tendon measurement

:Variable 3-3

The data of patient obtained from work sheet is used to collect on 8 variables (appendix2) (age, gender, weight , BMI ,patient height ,patellar length ,patellar thickens on (three level(upper-medial –lower

:Data collection 3-4

Data collection according to work sheet (appendix2) include all above variable data, and (appendix1) include .figure to show way of measurement

:Data analysis 3-5

.(Descriptive statistic using statistic package(spss

Chapter Four

Results

Table 4.1 shows the gender distribution of the normal subjects, frequency and percentages

Gender			
%Percentages	Frequency		
73.68	42	Male	***Gender***
26.32	15	Female	
100.0	57	Total	

Figure 4.1 shows the gender distribution of the normal subjects, frequency and percentages

Table 4.2 shows the normal subjects demographic data, means and standard deviation

Demographic Data

Height/cm	Weight/ Kg	BMI	Age/Years	Variables
172.61	75.04	2.45	37.89	***Mean***
±10.52	±14.75	±0.57	±12.16	***Standard deviation***
192	118	4.37	70	***Maximum***
153	55	1.6	20	***Minimum***

Table 4.3 shows the normal subjects patellar measurements, means and standard deviation

Patellar Length/mm	Lower Patellar Thickens/ mm	Middle Patellar Thickens/ mm	Upper Patellar Thickens/ mm	
52.03	4.78	3.67	3.25	***Mean***
±6.44	±0.92	±0.74	±0.76	***Standard deviation***

Figure 4.2 A scatter plot diagram shows a linear relationship between the normal subjects age and upper patellar thickens, as the age increased the patellar thickens increased by 0.035 starting from 1.897mm

Figure 4.3 A scatter plot diagram shows a linear relationship between the normal subjects age and middle patellar Thickens, as the age increased the patellar Thickens increased by 0.017 starting from 2.996mm

Figure 4.4 A scatter plot diagram shows a linear relationship between the normal subjects age and lower patellar Thickens, as the age increased the patellar Thickens increased by 0.020 starting from 4.002mm

Figure 4.5 A scatter plot diagram shows a linear relationship between the normal subjects age and patellar length, as the age increased the patellar length decreases by 0.213starting from 60.12mm

Figure 4.6 A scatter plot diagram shows a linear relationship between the normal subjects BMI and upper patellar Thickens, as the BMI increased the patellar Thickens increased by 0.009starting from 3.223mm

Figure 4.7 A scatter plot diagram shows a linear relationship between the normal subjects BMI and middle patellar Thickens, as the BMI increases the patellar thickens increases by 0.042starting from 3.570mm

Figure 4.8 A scatter plot diagram shows a linear relationship between the normal subjects BMI and lower patellar Thickens, as the BMI increases the patellar Thickens decreases by 0.197 starting from 5.269mm

Figure 4.9 A scatter plot diagram shows a linear relationship between the normal subjects BMI and patellar length, as the BMI increases the patellar length decreases by 2.137 starting from 57.27mm

Figure 4.10 A scatter plot diagram shows a linear relationship between the normal subjects height and patellar length, as the height increases the patellar length decreases by 0.0.70 starting from 64.12mm

Table 4.4 shows the abnormal demographic data, means and standard deviation

Demographic Data				
Height/cm	Weight/ Kg	BMI	Age/Years	***Variables***
174.88	78.37	2.60	36.38	***Mean***
±5.88	±12.61	±0.53	±9.25	***Standard deviation***
186	105	3.6	55	***Maximum***
168	64	2.1	27	***Minimum***

Table 4.5 shows the abnormal patellar measurements, means and standard deviation

Patellar Length/mm	Lower Patellar Thickens/ mm	Middle Patellar Thickens/ mm	Upper Patellar Thickens/ mm	
46.58	4.87	3.35	2.87	***Mean***
±7.04	±1.37	±0.75	±0.84	***Standard deviation***

Table 4.6 shows the comparison between abnormal/normal patellar measurements, means and standard deviation and P -value

Patellar Length/mm	Lower Patellar Thickens/mm	Middle Patellar Thickens/mm	Upper Patellar Thickens/mm		
52.03 ±6.44	4.78 ±0.92	3.67 ±0.74	3.25 ±0.76	Mean SD	***Normal***
46.58 ±7.04	4.87 ±1.37	3.35 ±0.75	2.87 ±0.84	Mean SD	***Patients***
0.000	0.059	0.023	0.005		***P-value***

Chapter five

Discussion &conclusion& recommendation

:Discussion 5-1

This chapter discuses the result , table (4-1) about gender of the normal subject, the result found that the frequency of males is 73.68 will more than females is 26.32 , this is due to history of the patient , on this data some of the patient have historical relatively sport , this associated with what we found especial males and figure (4-1) .showed it gender distribution

On table (4-2) shows the mean measure of the variables for normal patient , mean of age 37.89±12.16,mean of BMI 2.45±0.57,and mean of weight/ kg 75.04±14.75,and mean .of height /km 172.61±10.52

And table(4-3) shows the mean measurer of normal subject to patellae ligament , mean of upper patellae thickness' 3.25mm±0.76, and mean of middle patellae thickens 3.67mm±0.74, lower patellae thickens 4.78mm±0.91, last .patellae length 52.03mm±6.40

And the figures show the correlation of normal subject of patellae measurement with the variables, figure (4-2)A there are relationships between age of patient and upper patellae thickens, increased by 0,035,and figure (4-3) A also relationship between the age of patient and middle patellae thickens as the age increased the patellar thickens increased by 0.017,figure (4-4)A correlation

between age and lower patellar thickens , as age increased .the lower patellae thickens increased by 0,20

All figures (4-2,3,4)A associated with our study , on journeial anatomically structure of patellar ligament connect with two bone from bottom of knee cap insertion to top of the tibia tuberose, physiologically the patella ligament works with the muscles ,so that the thickens more affected . according to age

Figure(4-5)A correlation between the normal subject age and patellar length , as age increased the patellae length decreased by 0.213,as mention on (platzer etal,2004) the patellae increased the leverage that tendon connect by .increasing the angle that affected on patellae length

and figure (4-6)A correlation between normal subject BMI and upper patellar thickens , as the BMI increased the patellae thickens increased by 0.00, as we know the BMI equal weight / length^2, thesis associated with (greasy anatomy .2015) the upper patellae thickens concerned started of origin of ligament its superficial fibers , and fibers band increased thickens with the increased weight of .paten it ,also the patient length

Figure(4-7)A there are correlation between the normal subject BMI and middle patellar thickens as the BMI increased the patellae increased by 0.042 , and the middle patellae thickens concerted as the fiber of which are continues over the front of patient with tendon , that

extend and pass down the side of the patellae , that means semantically according to

greasy anatomy,2015)then the middle increased by) . increased BMI some the upper patellae ligament thickens

Figure(4-8) A correlation between normal subject BMI and lower patellae thickens , as the BMI increased the patellae thickens decreased by 0.197, as well the weight is very important increased its lead to depression and change on knee joint that may lead to decreased the thickens of .lower patellae

Figure(4-9)A shows relationships between the normal subject BMI and length , as the BMI increased the patellae .length decreased by 2.137

Figure(4-10)A correlation between the normal subject height and length , as the height increased the patellae length .decreased by 0.070

Table (4-4) shows statically measurement demographic data abnormal patient , include mean of age 36.38±9.25 and mean of body mass index 2.60±0.53 , and patient height .174.88±5.88

Table(4-5) shows the statically measurement of abnormal patellae , mean of upper patellae thickens was 2.87mm±0.84, and middle patellae thickens was 3.35mm±0.75, and lower patellae thickens 4.8mm7±1.37 , .mean of patellae length 46.5mm8±7.04

On table (4-6) discussed the comparison between normal and abnormal patellae ligament , measurement of mean normal value upper patellae thickens 3.25mm±0.76, middle patellae thickens 3.67mm±0.74, and lower patellae thickens 4.78mm±0.92,mean of patellae length 52.03±6.44, and compared with mean of abnormal patellae measurement mean of upper patellae thickens 2.87mm±0.84, and mean f middle patellae thickens was 3,35 mm±0.75 , and mean of lower patellae thickens 4.87mm±1.37, and patellae length was 46.58mm, this table shows no significant different on patellae thickens, and compare normal patellae ligament length with abnormal and found there was significant different on mean of patellae ligament length measurement at p .vaule0.000

Discuses that the patellae length was more effected when .tear if happened

That means the patellae length is an impacted region which may be affected by extend variable , and the mean of .normal patellae length was larger than mean of abnormal

This study is not associated with (jae hoyoo et al ,2004) his maintained about the geometry of patellae tendon was larger in males than females concerted patellae length was larger in males than in females , as for patellae tendon the .longitudinal length was 40.2mm

:5-2Conclusion

This study about characterize of patellae ligament normal and abnormal to compare by using MRI the goals of this study to measure the patellae ligament length and thickens , and used this information to diagnosis the tear ,

the result founding there are relationship between normal patellae ligament length and abnormal patellae ligament .

The thickens of patellae ligament there is no relationship with our study as we found the study showed that the mean of patellae ligament length was 52.03mm and abnormal patellae ligament length was 46.58mm there are relationship between this variable .

Conclusion that characterize of patellae ligament length improve the diagnosis of tear if happened.

Recommendation 5-3:

- to study the measurement in large group of patients.

to find the ratio between the patellar length and patellar-
.thickens
for further situation quadriceps tendon should be-
.concerted to measure and affected knees

:Reference 5-4

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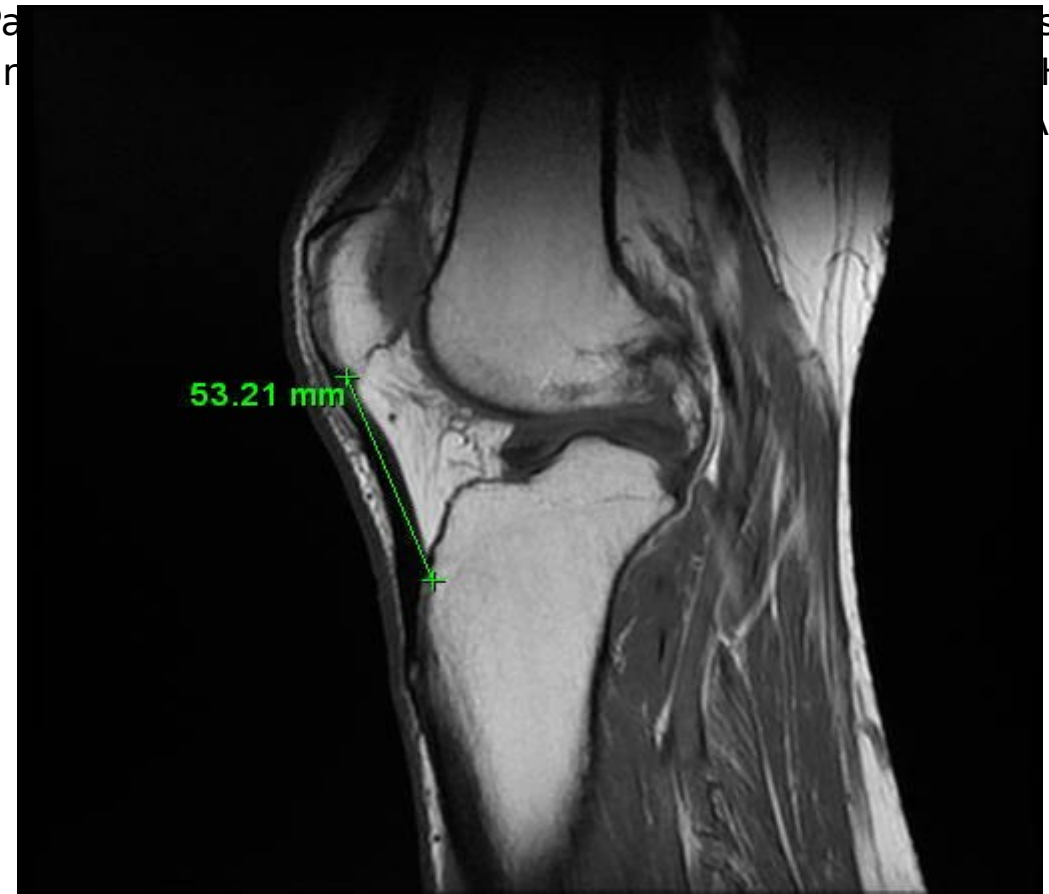
:APPENDIX 5-6

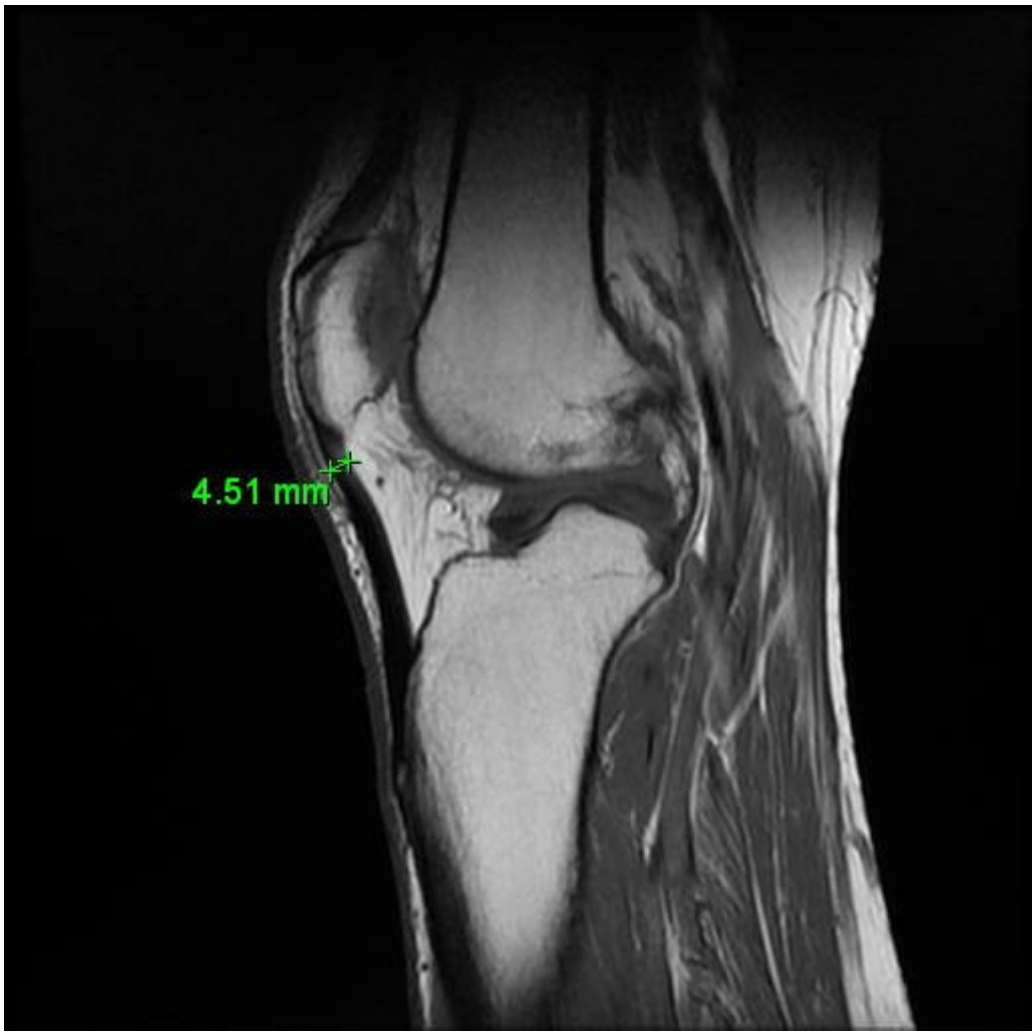
APPENDIX : showed the way of measurement 5-6-1

Patellae length= measurer from lower knee cap to tibia .tuberous

Pa surface
ar HOYOO
AL,2004



Figure(5-1) show sagital T1weight image FSE for patient30y male measure in mm of patellar ligament length=53.21mm green arrow indicated that **(**data (collected



Figure(5-2) show sagital T1weight image FSE for the same patient measure in mm patellar ligament thickens upper=4.51mm green arrow indicated that ((data collected

Figure(5-3) show sagital T1weigth image FSE for the same patient measure in mm patellar ligament thickens lower=6.06mm green arrow indicated(data (collected

Figure(5-4) show sagitalT1 weight image FSE for the same patient measure in mm patellar ligament thickens medial=5.06mm green arrow indicated that.(data .(collected

APPENDIX: work sheet 5-6-2