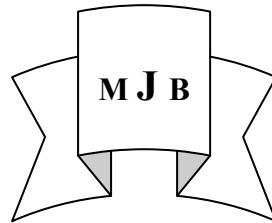


Patellofemoral Joint and Contact Characteristic

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Abstract

The patella form patellofemoral joint . this joint is a complex articulations with high functional and biomechanical requirements. Multiple clinical problems of the knee joint may caused by anatomical and physiological abnormalities of this joint. So exact knowledge about the anatomy , the biomechanical and function of patellofemoral joint is there fore required to understand its wide rang of pathology. so 10 patella of adult human where measured the surface area of medial and lateral articular surfaces. The result indicated that lateral articular surface area of patella is larger than medial one. This lead to conclusion that there is increase pathological regions on the lateral side of the knee joint, beside increasing contact area in human weight bearing and cause pain on the lateral side with increasing contact area during flexion exercise of the knee joint.

خصائص تمفصل عظم الفخذ مع عظم الرضفة

الخلاصة

عظم الرضفة يكون تمفصل عظم الفخذ مع الرضفة في مفصل الركبة الذي يعتبر من المفاصل المعقدة وظيفيا واحيائيا وميكانيكيا .معظم الحالات المرضية لمفصل الركبة تكون بسبب المشاكل التشريحية والوظيفية للمفصل لذلك تكون المعرفة الحقيقية للتشريح الوظيفي والاحيائي والميكانيكي لمفصل الركبة ضرورية لفهم معظم الحالات المرضية . ومن اجل ذلك تم قياس مساحة الجزئين الجانبي والوسطي من السطح التامفصلي لعشرة عظام من الرضفة وكانت النتيجة ان السطح التامفصلي الجانبي من عظم الرضفة هو اكبر من السطح التامفصلي الوسطي .وهذا بدوره يقودنا الى استنتاج مفاده ان زيادة الحالات المرضية على الجهة الجانبية من مفصل الركبة تكون مع زيادة مساحة التامفصل في ثقل جسم الانسان مما يسبب الما على الجهة الجانبية من مفصل الركبة وكذلك زيادة التامفصل اثناء اجراء تمارين الثني لمفصل الركبة.

Introduction

This sesamoid bone in the quadriceps tendon play on the articular surface of the femur

The anterior surface is gently convex its edges form a rounded triangle the lower border is projected down as the apex to the triangle the posterior surface has a cartilage the articular surface has a vertical ridge dividing it into narrow medial and broader lateral

area the narrow surface is further subdivided into two vertical strips the most medial facet is in contact with medial femoral condyle only in flexion the larger lateral facet contact the lateral condyle through out all phases of knee joint movement the patella ossify in cartilage from several centers that appear at 3-6 years and coals quickly.[1]

The patella form the patellofemoral joint with patellar groove of the femur. this joint is a complex articulation with high functional and biomechanical requirement. several anatomical variant and of patella exist. knowledge about anatomy the biomechanics and function of patellofemoral joint is therefore required to understand its wide range of pathology[2].

There are many factors affect the patella femoral joint ,such as the extensor mechanism which contributed to the reaction forces and contact pressure and area at zero degree and at 90 degree of Knee flexion [3]. The effect of axial and multi plane loading of extensor mechanism on the patella femoral joint by the action of quadriceps tendon forces on medial and lateral contact point on the femur and patella ,it was found that patella it was found that patella move distally and posteriorly on femoral condyles as knee was flexed from full extension.[4]. This movement of patellofemoral joint was demonstrate by using three dimension anatomical model of human patellofemoral joint for determination of patellofemoral motion and contact characteristics.

There is significant increase in patellofemoral compression forces from 70 degree to 95 degree flexion with increase patellar bone and patellar implant thickness [5].and is increase patellar thickness on patella femoral forces after resurfacing .

The length of patellar tendon compared with length of patella affect the contact area of patellofemoral joint ,since the medial femoral condyle is larger than the lateral one[6].

Increase contact area are with increase flexion of knee joint especially on lateral side of knee joint. This explain pathological lesion on lateral side as well as the associated dislocation, subluxation and lateral pressure syndrome and patellofemoral arthrosis

, while extension exercise against resistance produce no physiological loading of patellar articular cartilage[7].

There are gender difference in the patellofemoral contact area and pressure these differences may help explain the increase incidence of patellofemoral disorder in women because the patella femoral contact area is increase in women[8].

One possible cause of patellofemoral pain syndrome is excessive lateral forces acting on patella which increase during flexion because increase lateral contact pressures. [9].by using MRI to measure the patellofemoral contact area in human during weight bearing to access the patellofemoral stress which may be increased in patient with patellofemoral pain syndrome[10].

The excision and reconstruction of anterior cruciate ligament affect on medial and lateral facet patellofemoral contact during different degree of flexion of knee joint, also failure after total knee arthroplasty often caused by problem of the patellofemoral articulation[11,12].

Material and method:

10 patella of adult human skeleton in department of human anatomy college of medicine in Al-Nahrain university measuring the surface contact area of medial and lateral articular surfaces of patella and by using Global Lab. Program and area measured with cubic millimeters {Fig. 1,2, table 1} .

Results

1.Measurement surface area of lateral articular surface of patella is larger than medial articular surface of patella.

2.Contact articular surface at lateral patellar surface is less in extension movement of knee joint, and increase contact area pressure at flexion of the knee joint [Fig.1,2,table 1].

Discussion

From anatomical point of view , the patella consider as large sesamoid bone in the quadriceps tendon. It has 2 articular surface medial and lateral. The articular surface is less than lateral articular surface [1] . the surface area of the lateral side of patella is larger than medial surface area [Fig.1,2].

The result of larger contact area of lateral surface of patella reveals that there is increase pathological lesions on the lateral side of knee joint, specially during flexion of the joint [6]. Beside increasing contact area in human weight bearing and causes pain on the lateral side of the joint.

Normally there is an effect of medial collateral ligament and anterior cruciate ligament and adductor movement and hamstring, quadriceps action on joint contact during full cycle of gate on walking [3]. The action of quadriceps tendons forces on medial and lateral contact point on the femur and patella due to large contact area on the lateral side of patella as the knee was flexed from full extensions and this explain pain during excessive movement of the knee joint especially during flexion, and also explaining pathological changes like : osteoarthritis or narrowing of the knee space joint on the lateral side .

Increase contact area with increase flexion of the knee joint specially on the lateral side explain either pathological lesion on the lateral side as well as the associated dislocation, subluxation and lateral pressure syndrome and patellofemoral arthrosis [6]. While extension exercise against resistance produce no physiological loading of patellar articular cartilage and these explain that small area of contact of patella on extension movement opposite flexion movement[7].

The result explain that contact area and pressures in patellofemoral joint increase in women [8].

So due to these differences between the lateral and the medial contact area of patellofemoral joint , MRI used to measures the patellofemoral contact area in human during weight bearing to access the patellofemoral stress which may be increased in patient with the patellofemoral pain syndrome [10].

Recommendation

1. from clinical point of view , I suggest in any pathological lesion of the knee joint, lateral x-ray view is more important than the medial view due to the increase contact area on lateral side of joint.

2. the extension exercise program of the knee joint is more comfortable than flexion exercise program.

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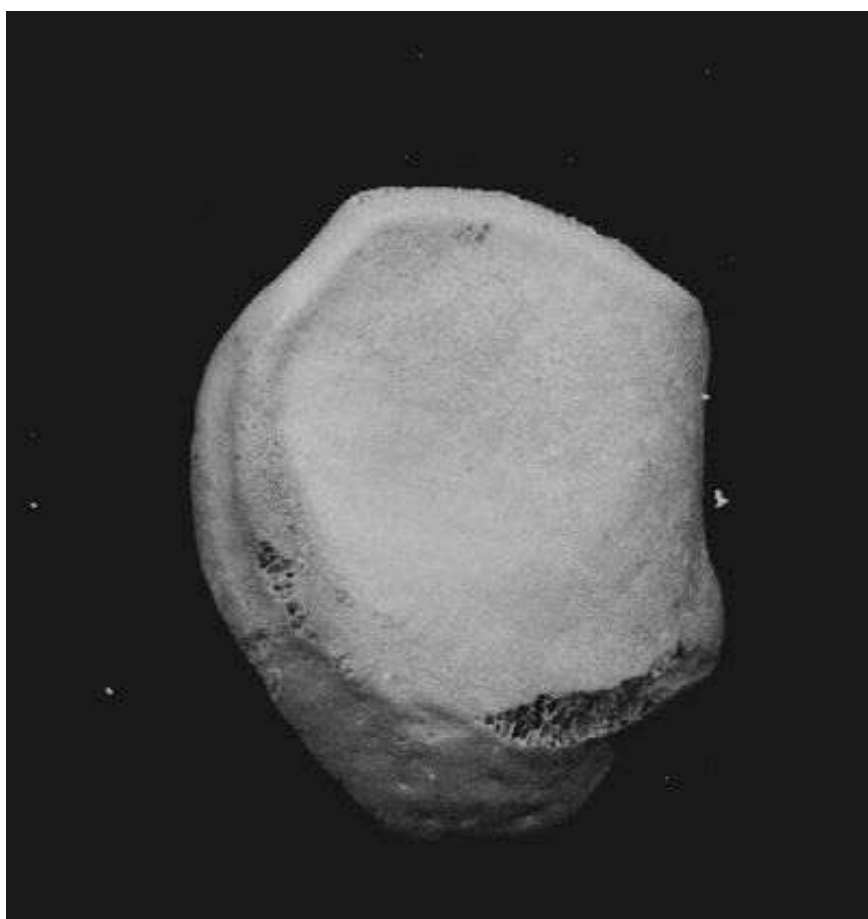


Figure1 Patella lateral articular surface.



Figure 2 Patella medial articular surface.

Table 1 Measurement of medial and lateral surface contact area of 10 patella in cubic millimeters.

Medial articular surface	Lateral articular surface
418.8073	422.1694
561.7382	812.8383
480.444	524.0681
403.7514	485.9775
712.7282	792.8259
779.5864	922.5133
291.3916	310.5413
404.9744	441.7005
538.6629	726.9191
405.6844	442.6005

