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RELATIONSHIP BETWEEN KNEE MALALIGNMENT AND Q ANGLE WITH AGE AT ONSET OF DISEASE IN 260 CHONDROMALACIA PATELLA PATIENTS

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ABSTRACT

Background: Chondromalacia patella is the most common cause of mechanical knee pain in young women. Q angle and knee alignment are important clinical parameters for biomechanics of the patellofemoral joint.

Objective: To identify the prevalence of knee malalignment and to find out if there is a correlation between knee malalignment and Q angle with age at onset of disease.

Methods: All patients under 40 years old complaining of mechanical knee pain with positive shrug sign and normal knee radiography who were referred to Amir A'lam Rheumatology Clinic during the period of September 2000 to September 2002 were included in this study. The patients were examined by a rheumatologist for measuring Q angle and detection of knee malalignment. Age at onset of disease was defined as initiation of knee pain according to the patient's history.

Results: The cases were 260 with 189 females. Prevalence of knee malalignment was 32.4%. The mean age at onset of disease was 22.8 ± 7.08 years. The mean age at onset in patients with knee malalignment (21.41 ± 5.66 years) was significantly lower than the mean age at onset in those without knee malalignment (23.6 ± 7.43 years) (p= 0.002). There was a positive correlation between Q angle and age at onset of disease (r=0.17, p= 0.006).

Conclusion: It seems reasonable to identify knee malalignment in chondromalacia patella patients and perform proper management to postpone progression of disease. There are many other factors that influence age at onset of disease, so further investigation is recommended.

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Keywords: Q angle, Knee malalignment, Chondromalacia patella.

INTRODUCTION

Chondromalacia patella appears as anterior knee pain. Chondromalacia is attributed to a decrease in sulfated mucopolysaccharides in the ground substance, which leads to softening of the articular cartilage. The softened cartilage is mechanically inadequate to support the collagen framework. Continuing the stress, the collagen complex begins to break up and the next phase of degeneration, fibrillation, occurs.[1]

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The patella and its chondral coat are subject to recurrent trauma because of subcutaneous location and its placement in a shallow groove in the femur. Its path within that groove is influenced by the quadriceps mechanism, the alignment of the knee and the shape of patella and femur.[2,3,4,5,6] The Q angle is the angle between lines connecting the center of the patella to the anterior superior iliac spine and the center of the patella to the anterior tuberosity of the tibia.[2] In chondromalacia patella the Q angle is greater than 15 degrees.[2,6] The cause of chondromalacia lies in imbalances, displacements, dysplasias of the patella and in femoro – tibial axial deviations.[7] Overload is the constant intermediary between the different starting causes and the same final results.

The precocity of clinical diagnosis is essential for the timely carrying out of a corrective surgery, directed to remove the starting causes before the reversible chondromalacia develops to irreversible arthrosis.[7]

Considering the importance of Q angle and knee malalignment in chondromalacia patella patients, we decided to identify the prevalence and their relation with age at onset of disease in this study.

PATIENTS AND METHODS

This was a cross sectional study carried out by the Department of Rheumatology, Amir A`lam Hospital, Tehran from September 2000 to September 2002. This study included all patients under 40, complaining of mechanical anterior knee pain with positive Shrug test. After obtaining AP and lateral knee radiographies, the patients with knee osteoarthritis were excluded. Diagnosis of chondromalacia was based on the clinical judgment of a rheumatologist, and not only on the above diagnostic criteria. In this study we have used the Q angle as an indicator of alignment of the knee and quadriceps mechanism. The patients had physical examination for measuring Q angle and identifying genu varus, genu valgus and genu flessum as knee malalignments. Age at onset of disease was defined as the age of initial mechanical anterior knee pain according to the patient's history. All findings were recorded in a specially designed questionnaire. Age at onset of the disease was compared in patients with knee malalignment and without knee malalignment by t-test. The correlation between age at onset of disease and Q angle was calculated by "Pearson correlation".

RESULTS

The cases were 260 with 189 females (F/M ratio= 2.6/1). The mean age at onset of disease was 22.8±7.08 years. The mean age at onset in females (23.53±7.13) was significantly higher than males (21.21±6.27) (p= 0.017). The prevalence of knee malalignment was 32.4% (Table I). There was no significant difference in frequency of knee malalignment between sexes (p= 0.65) (Table II).

The mean age at onset in patients with knee malalignment (21.41±5.66 years) was significantly lower than patients without knee malalignment (23.6±7.43 years) (p= 0.017).

The mean Q angle was 21.99 ± 4.12 years. The mean Q angle in females (22.39 ± 4.42) was significantly higher than males (20.93± 2.97) (p= 0.01).

There was a positive correlation between age at onset of disease and Q angle (r= 0.17, p= 0.006, n= 260) (Fig. 1).

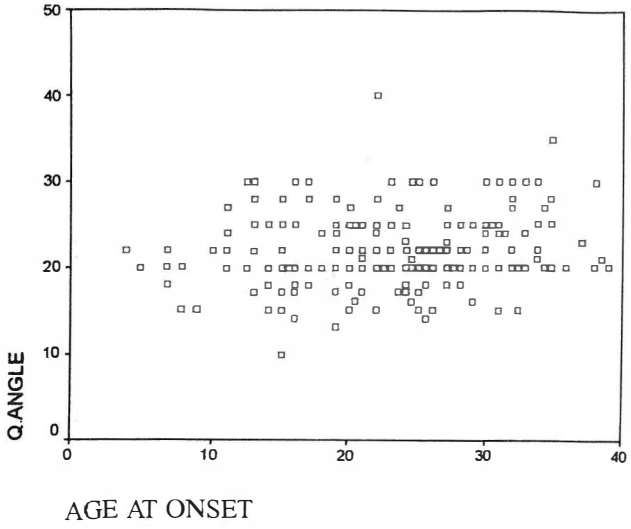

Fig. 1. Correlation between mean age at onset of disease and Q angle. The positive correlation between age at onset of disease and Q angle is shown by scatter plot. (r= 0.17, p= 0.006, n= 260).

DISCUSSION

As this study shows, the frequency of knee malalignment was 32.4% in chondromalacia patients. Considering lower mean age at onset of disease in patients with knee malalignment, to prevent the progression of disease, diagnosis of knee malalignment and proper management could be recommended. In the literature many intrinsic and extrinsic risk factors have been linked to Patellofemoral Pain Syndrome (PFPS), but the role of these risk factors is controversial.[8] Although the Q-angle is routinely measured, the relationship between the Q-angle and the lateral component of the quadriceps

Table I. Malalignment of the knee.

Malalignment of knee	Frequency	Percent
None	176	67.6%
Genu varus	60	23.1%
Genu valgus	17	6.55%
Genu flessum	2	0.85%
Genu varus & flessum	5	1.9%

Table II. Relationship between knee malalignment and sex.

Malalignment of knee	Female	Male
Positive	43	41
Negative	146	30
Total	189	71

force acting on the patella is unknown. An abnormally large initial Q-angle can be an indicator of an abnormally large lateral force acting on the patella during flexion.[9] In the study which was done by Elias et al, the maximum patellofemoral lateral contact pressure increased with the Q-angle for three knees. For the other knee, increasing the Q-angle decreased the maximum lateral pressure. The maximum medial contact pressure decreased as the Q-angle increased.[10] In one study patellofemoral treatments (by reducing Q angle) did not consistently decrease patellofemoral pressures because of variations in the moments acting on the patella.[11] In the study of Hand and Spalding, Q angle measurement was a poor predictor of knee pain.[12] Although our study showed a positive correlation between Q angle and age at onset of disease, there must be many other predisposing factors for initiation of the disease. According to previous studies,[2,3,4,6] body weight, recurrent knee dislocation, Patella Alta and other structural abnormalities of the knee seem to have correlation with age at onset of disease, so further investigation is recommended. The limitation of this research was the restricted population of patients that were studied in a referral center, so the results cannot be generalized to all Iranian chondromalacia patella patients.

CONCLUSION

It seems reasonable to identify knee malalignment in chondromalacia patella patients and perform proper management to postpone progression of disease.

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