Patterns of Patellofemoral Arthritis in Degenerative Varus Knees

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ABSTRACT

There are previous studies about the tibiofemoral joint in osteoarthritis. However, the patellofemoral joint, where the most common complications occurred after surgical treatment, has been neglected. In this study, we examined 100 osteoarthritic varus knees to determine the correlation between severity and patterns of patellofemoral arthritis and factors, such as patellar tilt, patellar subluxation, tibiofemoral angle, and lateral subluxation of the tibia. To determine all factors and the severity of arthritis, radiographs of the knees were completed in standing antero-posterior, lateral, Laurin view, and Merchant view.

Patellar subluxation was found in 44% of the varus knees, (27% lateral subluxation and 17% medial subluxation). Patellar subluxation was correlated with radiographic scores in a quadratic pattern. The site of arthritis was correlated with the radiographic score in a linear pattern. Patellar tilt, tibiofemoral angle, and lateral subluxation of the tibia showed no correlation with the patellofemoral arthritis.

A high prevalence of patellar subluxation in degenerative varus knees implied that closed evaluation of the patellofemoral joint was necessary to avoid patellar complications, especially after surgical treatment.

INTRODUCTION

Osteoarthritis of the knee is a common disease in elderly patient in Thailand, especially obese females. The mainstay treatments of osteoarthritis of the knee are conservative treatments, such as medications and rehabilitation. The patients who fail to respond to conservative treatment are candidates for surgical treatment. The operative procedures include limited joint debridement, proximal tibial or distal femoral osteotomy, arthroplasty, and arthrodesis.[1] Most of the procedures are concentrated on the tibiofemoral joint.[1] The patellofemoral joint is often neglected, although the most common postoperative complications occur in this joint,[2] Cook et al[3] suggested that the patellofemoral joint was also involved when the tibiofemoral joint was degenerated. Moussa et al[4] found that the femoral torsion was decreased when the knee was changed to the varus position, but he did not study the effect on the patellofemoral joint.

The aims of this study are to find the prevalence of patellofemoral disorders and to correlate factors such as patellar tilt,[5] patellar subluxation,[5] tibiofemoral angle[5], and lateral subluxation of the tibia[6] with the severity and patterns of the patellofemoral joint.

METERIALS AND METHODS

This research is a prospective study of 50 patients (100 knees) who were diagnosed as osteoarthritic varus knees at the outpatient clinic in Songkhla-Nakarind University from 1995 to 1996.

Inclusion criteria in this study were :

1. duration of knee pain for more than 6 months
2. aged 50 years or over
3. tibiofemoral angle less than 0° (from radiographs)
4. no previous trauma, no underlying joint disease, and no previous surgery

The patients were evaluated by using 4 standard views (antero-posterior, lateral, Merchant,[7] and Laurin view[8]) . The tibiofemoral angle, lateral subluxation, total patellofemoral score[9] and patellofemoral difference score 10 from standing anterior-posterior and lateral views (Table 1) were examined. An evaluation was made of patellar subluxation and patellar tilt from the Merchant view and the Laurin view, respectively.

Total patellofemoral score[9] = medial joint + lateral joint + medial osteophyte + lateral osteophyte + medial bone + lateral bone.

Patellofemoral difference score[9] = (medial joint + medial bone + medial osteophyte) - (lateral joint + lateral bone + lateral osteophyte).

Table I. Scoring of patellofemoral joint from radiographs[9]

Osteophyte	0 no	
	1 mild	(< 2 mm.)
	2 moderate	(2 - 5 mm.)
	3 severe	(> 5 mm.)
Joint space loss	0 (no)	
	1 (mild)	(< 1.5 mm.)
	2 (moderate)	(1.5-3 mm.)
	3 (severe)	(> 3 mm.)
Bone cystic changes	0 (no)	
	1 (mild)	(< 2 mm.)
	2 (moderate)	(2-5 mm.)
	3 (severe)	(> 5 mm.)

All data was analysed by analysis of variance (ANOVA) . Stepwise multiple correlation was used to find correlation between parameters.

RESULTS

The prevalence of patella subluxation in osteoarthritis in this study was 44% ; 27% subluxated laterally and 17% subluxated medially. The group that had patellar subluxation had a higher score than the group that had a patella in neutral position ($p < 0.05$). There were no significant differences between patellar tilt, lateral subluxation of tibia, tibiofemoral angle , and patellar subluxation among these groups. (Table 2)

The severity of patellofemoral arthritis, which was measured by total patellofemoral score correlated with patellar subluxation in a quadratic pattern. (Fig. 1)

There were no correlations between lateral subluxation of tibia, patellar tilt, tibiofemoral angle, and the total patellofemoral score. (Fig. 2, 3, 4)

There was a linear correlation between the congruence angle and the patellofemoral difference score. (Fig. 5)

DISCUSSION

In this study, there was a high prevalence of patellar subluxation (44%) in degenerative varus knees, which no study had reported before. Patella subluxated laterally more frequently than medially. The pathogenesis of lateral subluxation of the patella could not be explained solely by decreasing Q angle.[10] Moussa et al.[4] found that femoral torsion in osteoarthritis patient was decreased compared to the normal population. Cook[3] et al. showed that the tibia was externally rotated in varus osteoarthritis ; however, no factor predicted the direction of patellar subluxation.

Patellar subluxation correlated with sites and severity of arthritis, so the patella that subluxated medially effected the medial facet of the patella more than the lateral facet. Arthritis might be a result of overloading. Patellar tilt, tibiofemoral angle, and lateral subluxation of the tibia showed no correlation to the severity and pattern of patellofemoral arthritis, so the severity of osteoarthritis did not predict the severity and pattern of patellar disorders. It is suggested that every patient with osteoarthritis of the knee should have a careful evaluation of this joint, together with the tibiofemoral joint.

CONCLUSION

Forty-four percent of the osteoarthritic varus knees had patellar subluxation. Patellar subluxation correlated with the pattern and severity of patellofemoral arthritis. Patellar tilt, tibiofemoral angle and lateral subluxation of the tibia had no correlation to the pattern and severity of patellofemoral arthritis.

Table II Results

	PATELLAR POSITION		
	MEDIAL	NEUTRAL	LATERAL
CONGRUENCE ANGLE	n = 17 -11.0° (1.3) MEAN (SD)	n = 56 -4.0° (2.3) MEAN (SD)	n = 27 +11.0° (3.2) MEAN (SD)
PATELLAR TILT	-1.2° (1.1)	-0.8° (1.0)	-1.6° (1.2)
TOTAL PATELLOFEMORAL SCORE	7.5 (1.7)	3.0 (1.4)	8.2 (2.2)
PATELLOFEMORAL DIFFERENCE SCORE	7.0 (1.7)	0.3 (1.4)	-7.2 (1.4)
VARUS	-7.7° (1.7)	-9.4° (2.1)	-7.7° (1.6)
LATERAL SUBLUXATION OF TIBIA (cm.)	1.0 (1.0)	0.9 (0.9)	1.5 (1.4)

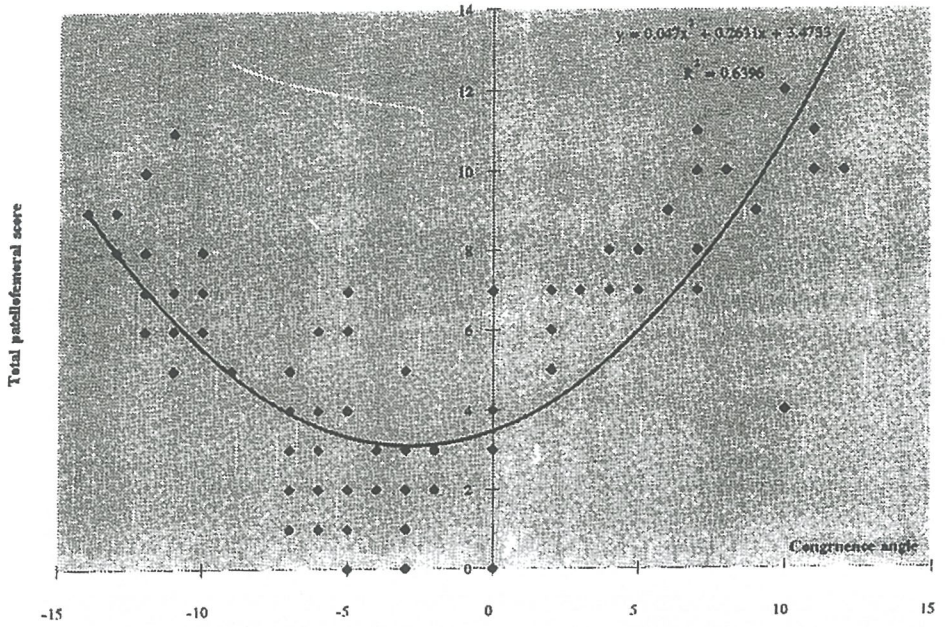

Fig. 1 Correlation between total patellofemoral score and congruence angle

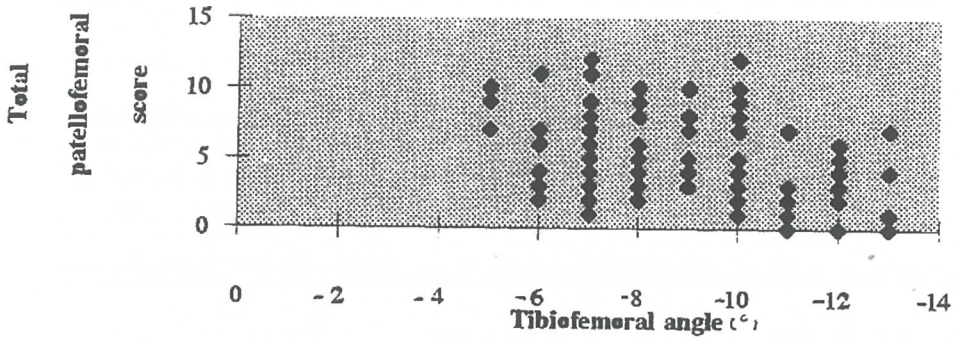

Fig. 2 Correlation between total patellofemoral score and tibiofemoral angle

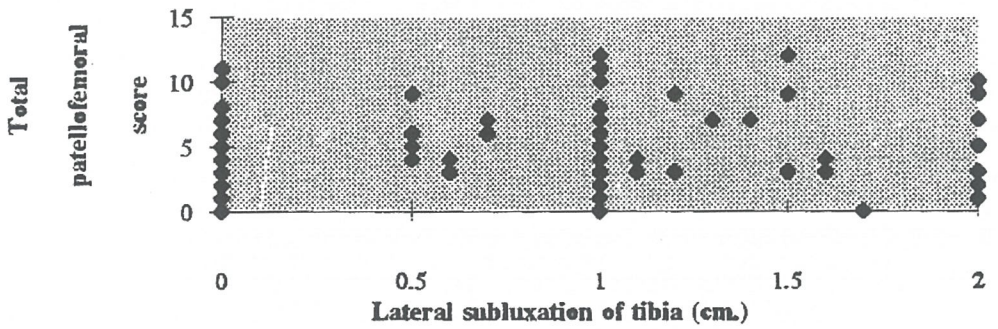

Fig. 3 Correlation between total patellofemoral score and lateral subluxation of tibia

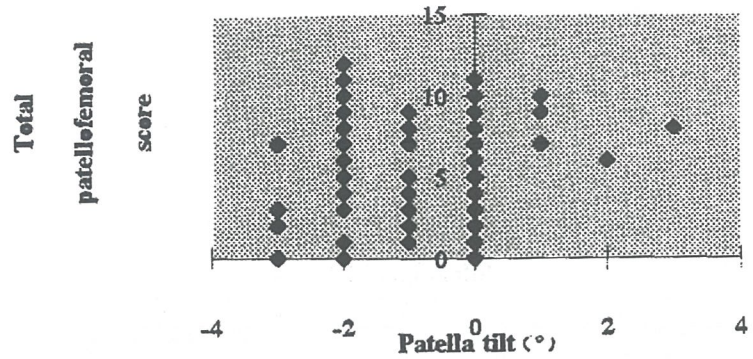

Fig. 4 Correlation between total patellofemoral score and patellar tilt

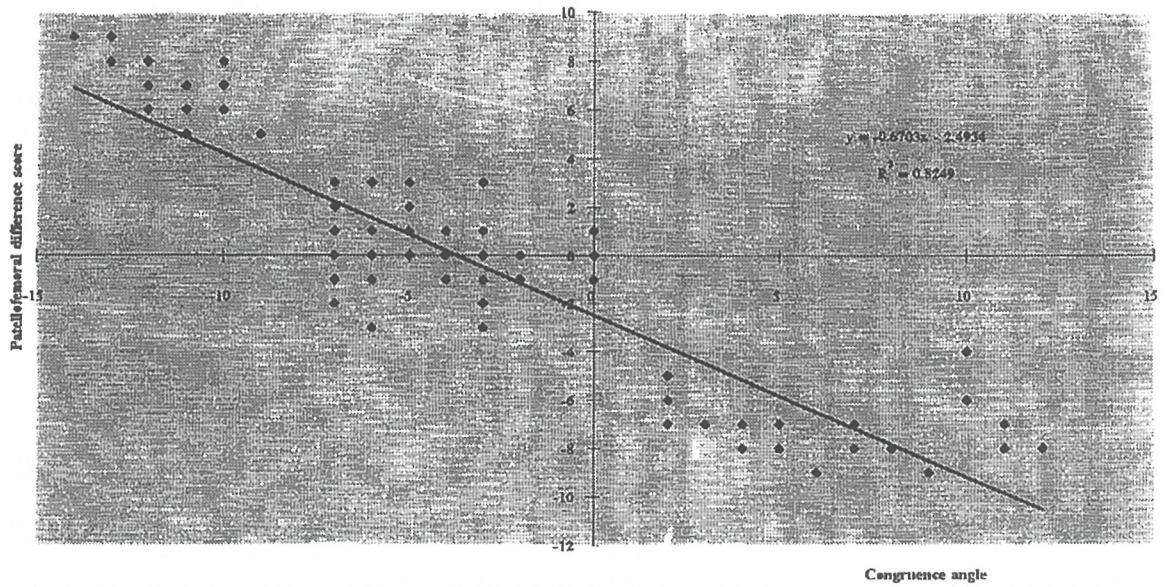

Fig. 5 Correlation between congruence angle and patellofemoral difference score

REFERENCE

1. Goldberg VM, Kettelkamp DB, Golger RA. Osteoarthritis of the knee. Osteoarthritis, diagnosis and medical/surgical management, 2nd ed. Philadelphia : WB Saunders 1992.
2. Johnson DP, Eastwood DM. Patella complications after knee arthroplasty. Acta Orthop Scand 1992 ; 63 : 74 - 82.
3. Cook TDV, Prince N. The inwardly pointing knee. An unrecognized problem of internal rotation malalignment. Clin Orthop 1990 ; 260 : 56 - 58.
4. Moussa M. Rotational malalignment and femoral torsion in osteoarthritis knees with patellofemoral joint involvement : A CT scan study. Clin Orthop 1994 ; 304 : 176 - 183.
5. Hoppenfeld S, Ziede MS. Orthopaedic dictionary. Philadelphia : Lippincott , 1994.
6. Hernigou PH, Debeyre J. Proximal tibial osteotomy for osteoarthritis with varus deformity : A 10-13 years follow up study. J Bone Joint Surg (Am) 1987 ; 69 : 332 - 353 .
7. Merchant A, Mercer R. Roentgenographic analysis of patellofemoral congruence. J Bone Joint Surg (Am) 1974 ; 56 : 1391 - 1395.
8. Laurin C, Levesgue H. The abnormal lateral patellofemoral angle : A diagnostic roentgenographic sign of recurrent patella subluxation. J Bone Joint Surg (Am) 1978 ; 60 : 56 - 61.
9. Mc Alindon TE, Show S. Radiographic patterns of osteoarthritis of knee joint in the community: The importance of the patellofemoral joint. Ann Rheum Dis 1992 ; 51 : 844 - 848.
10. Fulkerson J, Shea KG. Current concepts review : disorders of patellofemoral alignment. J Bone Joint Surg (Am) 1990 ; 72 : 1424 - 1430.