

CHAPTER 5



RESULTS

5.1 CHARACTERISTICS OF THE STUDY POPULATION

A total of 62 patients with unilateral knee injuries other than bony lesions who were admitted for knee surgery in Siriraj Hospital during June 2000 to June 2002 and met the eligible criteria were recruited consecutively to the study. The characteristics of these patients were shown in Table 1. Most of the patients were young adult male, mean age was 27.5 years. Causes of injury were shown in Table 2, most of these patients sustained sports injury. They all had chronic knee injuries.

Table 1 Zero state variables

No. of patients	62
Age (year)	
Mean, S.D.	27.5, 8.4
(Min-Max)	(18 – 53)
Sex	
Male	57
Female	5
Height (centimeter)	
Mean, S.D.	170.51, 5.73
(Min – Max)	(150 – 185)
Weight (kilogram)	
Mean, S.D.	68.12, 12.44
(Min – Max)	(48 – 125)
Duration of injury (months)	
Mean, S.D.	10.73, 10.41
(Min – Max)	(1 – 60)

Table 2 Causes of injury

Traffic accident	5
Sports injury	
- Football	42
- Basketball	5
- Volleyball	3
- Martial art	3
- Badminton	2
- Track & field	2
Total	62

5.2 CLINICAL OUTCOMES

A spectrum of severity of disease in term of anterior knee laxity were detected by the arthrometer and shown in table 3. An average of a difference in anterior knee laxity between both knees was 6.24 mm and 42% (26/62) were in a group that the difference was between 3 to 6 mm. According to the cut of point in diagnosis torn ACL in this study was 3 mm, the group with a difference of anterior laxity between 3 to 6 mm had more chance of false diagnostic result in comparison to other groups. Results of surgical findings were shown in table 4, there were 73% (38/52) of torn ACL with meniscal injuries. These two characters, amount of a difference in anterior knee laxity between both knees and meniscal injury associated with torn ACL, were common.

Diagnostic properties of simplified stress radiographic results in comparison to surgical findings were shown in table 5 and reliability study result was presented in table 6.

To detect a diagnostic properties of this technique in different severity of disease, a subgroup analysis was done and results were shown in table 7. The sensitivity of this stress radiograph was lower than we expected. In order to find the way to improve this diagnostic test, all false negative cases were explored in detail and shown in table 8 and

chart 1. No matter how difference in anterior knee laxity between both knees were, the false negative cases were still occurred.

Table 3 KT-1000 arthrometric results

Difference in anterior tibial translation between both knee (mm)	
Mean, S.D.	6.24, 4.09
(Min – Max)	(0-18)
No. of patient	
Difference between both knees < 3 mm.	10
Difference between both knees = 3- 6 mm.	26
Difference between both knees > 6-9 mm.	15
Difference between both knees > 9 mm.	11

Table 4 Results of surgical findings

Surgical findings	No. of patients
Torn ACL	52
Isolated torn ACL	14
Torn ACL with stable torn meniscus	11
Torn ACL with torn meniscus, needed surgery	27
Intact ACL	10
Torn meniscus, needed surgery	6
Torn posterior cruciate ligament	2
Subluxable patellofemoral joint	1
Articular cartilage detachment	1

Table 5 Relationship between a simplified stress radiographic result and surgical findings

		Surgical findings		
		Torn ACL	Intact ACL	
Stress radiographic findings	Torn ACL	36	0	36
	Intact ACL	16	10	26
		52	10	62

Prevalence of torn ACL = $52/62 = 83.87\%$

Diagnostic properties of simplified stress radiographic results

Accuracy = $46/62 = 74.19\%$

Sensitivity = $36/52 = 69.23\%$ (95% CI, 55.73- 80.09)

Specificity = $10/10 = 100\%$ (95 % CI, 72.25-100.00)

Positive predictive value = $36/36 = 100\%$ (95 % CI, 90.36 -100.00)

Negative predictive value = $10/26 = 38.46\%$ (95% CI, 22.43- 57.47)

Post. test likelihood if test negative = $16/26 = 61.53\%$ (95% CI, 42.53-77.57)

Table 6 Interobserver reliability study between 2 radiologists

		Radiologist 1		
		Torn ACL	Intact ACL	
Radiologist 2	Torn ACL	31	3	34
	Intact ACL	5	23	28
		36	26	62

Cohen's Kappa = 0.738 (95% CI , 0.5683 - 0.9074)

Table 7 Subgroup analysis of relationship between a simplified stress radiographic results and surgical findings.

Anterior tibial translation < 3 mm.

		Surgical findings		
		Torn ACL	Intact ACL	
Radiographic results	Torn ACL	0	0	0
	Intact ACL	0	10	10
		0	10	

Specificity = 100% (95% CI, 72.24-100.00)

Anterior tibial translation 3-6 mm.

		Surgical findings	
		Torn ACL	Intact ACL
Radiographic Findings	Torn ACL	15	0
	Intact ACL	11	0
		26	0

Sensitivity = 57.69% (95 % CI, 38.95-74.45)

Anterior tibial translation > 6-9 mm.

		Surgical findings	
		Torn ACL	Intact ACL
Radiographic Findings	Torn ACL	13	0
	Intact ACL	2	0
		15	0

Sensitivity = 86.67% (95 % CI, 62.11-96.26)

Anterior tibial translation > 9 mm.

		Surgical findings	
		Torn ACL	Intact ACL
Radiographic findings	Torn ACL	8	0
	Intact ACL	3	0
		11	0

Sensitivity = 72.73% (95 % CI, 43.43-90.25)

Table 8 Details of measurement in all false negative cases

Case No.	Result of Rad. 1	Result of Rad. 2	KT-1000
4	2	1.5	8
9	0	1.5	3.5
15	3.5	2.5	5
18	1	0	5
19	5	2	6
24	1	3	8.5
29	2	1	5
30	2	2.5	15
31	2.5	3	14
34	1.5	1.5	3
36	3	1	9
37	0.5	1	3
39	2.5	4	12
41	2	2	3
42	3	2.5	8.5
44	3.5	2	13.5
47	2	1	5
53	1.5	2.5	4
56	0.5	1	3
60	0.5	2	5
62	2	2	5

Distance in mm.

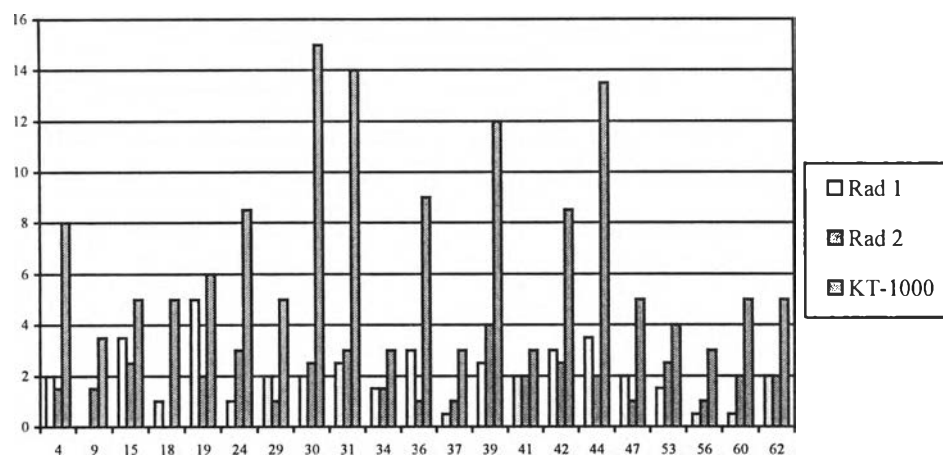


Chart 1 Histogram of the results in Table 8

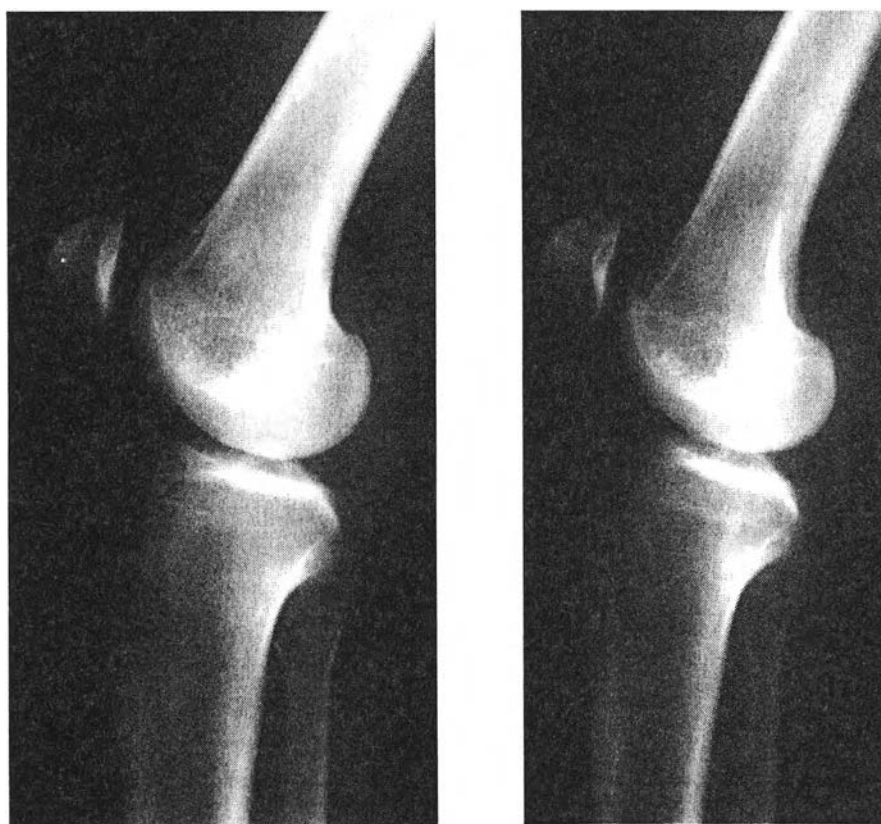


Figure 6 Simplified stress radiographs of both knees revealed a very good quality of positioning (both films were true lateral views). The diagnosis was a subluxable patellofemoral joint. Patient's height and weight were 162 cm and 52 kg. Arthrometric result was 1 mm. Radiographic measurement results were 0 and 1 mm



Figure 7 A positive radiographic measurement with a marked anterior displacement of tibia in relation to femur. The diagnosis was a torn ACL. Patient's height and weight were 178 cm and 55 kg. Arthrometric result was 18 mm. Radiographic measurement results were 18 and 17 mm



Figure 8 The difference of two radiographs in both sagittal and transverse plane. The diagnosis was a torn ACL. Patient's height and weight were 175 cm and 68 kg. Arthrometric result was 6 mm. Radiographic measurement results were 3 and 1 mm

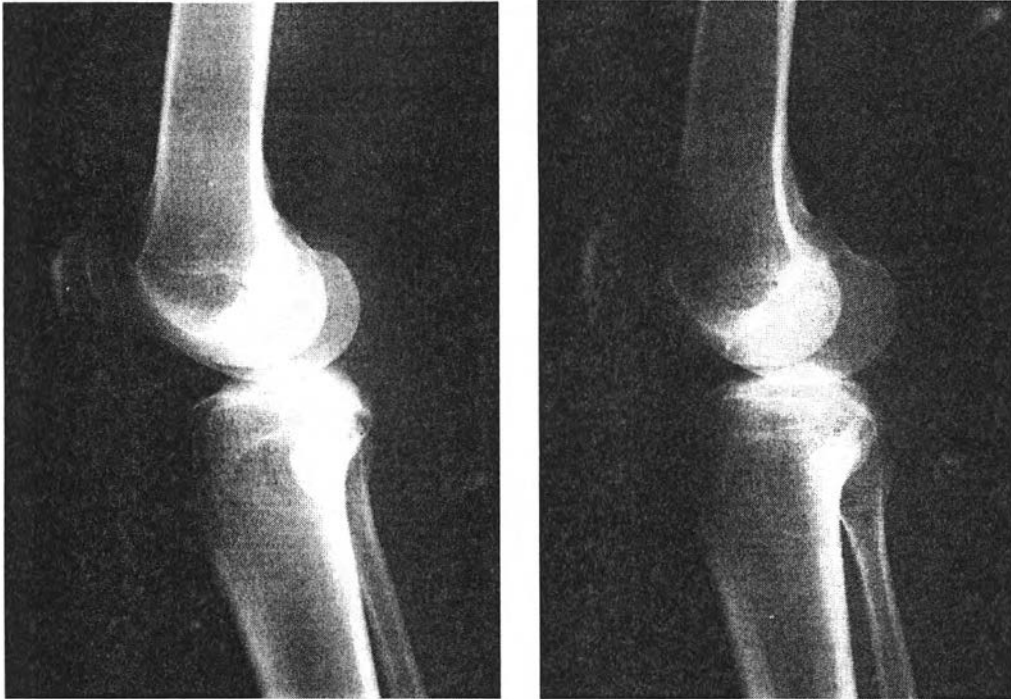


Figure 9 Two radiographs with a marked different degrees of knee rotation. The diagnosis was a torn PCL. Patient's height and weight were 162 cm and 52 kg. Arthrometric result was 0 mm. Radiographic measurements were both negative.