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2001 6



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가 1/3 - -

1990 1 1996 12

가 1/3 - -

47

, ,

,

, Lysholm knee score, IKDC 가 ,

KT-2000 arthrometer

, ,

47

가 31

31 , 16

28 (16-49 )

, ,

- 가

2 3

(5 -11 )

6 4

Lysholm knee score 93.7

IKDC 가



91% . Lachman 8 (17%) grade 1+, 1 (2%) grade  
 2+ , 5 (11%) grade  
 1+ . Pivot shift 4 (9%)가 grade 1+

. KT-2000 arthrometer

3mm 가 41 , 3mm

가 6 . 6

.

가 5-10%

가 9

.

1

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가

가

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가

1/3

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-

47

91%

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가

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< >

I.

- , .

가

1963 Jones가

<sup>1-5)</sup> . (arthrotomy)

1980 Dandy

<sup>6)</sup> .

(iliotibial band),

(semitendinosus tendon), (gracilis tendon),

(quadriceps tendon), (patellar tendon), (allograft

tendon), (artificial ligament) 가 -

- gold

standard

2.3)

가 1/3 - -  
 가 . ( 3 )  
 가 ,

Lachman

, pivot shift

가 .

가 - -

## II.

### 1.

1990 1 1996 12

가 1/3 - -

가 47 .

가 Lachman

, pivot shift ,

,

.

가 , 5mm  
 grade 1+, 5- 10mm grade 2+, 10mm grade 3+  
 , pivot shift 가 , sliding grade 1+, clunk  
 jumping grade 2+, locking grade 3+ . Lysholm  
 knee score<sup>7)</sup> IKDC(international knee documentation committee) 가  
<sup>8)</sup> Lachman, ,  
 pivot shift . KT -2000 arthrometer .  
 , %  
 .  
 , .  
 (sclerotic line) 가  
 , Fairbank <sup>9)</sup> .

2.

90 7-8cm  
 1/3 10mm 2.5cm,  
 3cm 가 - - .

Ethibond(Ethicon, Somerville, NJ)

2.5cm , (pes  
anserius) 1cm guide-pin  
7mm ,

guide-pin  
5-6mm  
1-2mm 11 ( )  
1 ( )

guide-pin Ethibond

Ethibond  
가 .

30

(multi-muscle isometric exercise)

6

가

<sup>10)</sup> .

### III.

47 Lachman pivot shift ,  
 31 .  
 가 4 ,  
 가 17 , 가 10  
 가 16 (Table 1).

Table 1. Associated injuries

Injury type	No. of patients	Fairbank sign
Only ACL <sup>1</sup>	16	4
ACL plus MM <sup>2</sup>	17	16
ACL plus LM <sup>3</sup>	10	10
ACL plus MM and LM <sup>4</sup>	4	4

<sup>1</sup>In cases that only ACL injury was taken.

<sup>2</sup>In cases that ACL injury was associated with medial meniscus injury concomitantly.

<sup>3</sup>In cases that ACL injury was associated with lateral meniscus injury concomitantly.

<sup>4</sup>In cases that ACL injury was associated with medial and lateral meniscus injury concomitantly.

47 28 (16 -49 )  
 가 31 , 가 16 . 28 ,  
 19 2 3

(5 - 11 ) . 4 43  
 (Table 2). 가 17 ,  
 - (valgus-external rotation) 가

Table 2. Sport causing injury

Sport	No. of patients
Basketball	17
Soccer	10
Skiing	8
Wrestling	2
Volleyball	2
Others	4

6 4 (4 3 - 10 7 ) Lysholm  
 knee score 93.7 (Table 3), IKDC 가 10  
 (21%), 33 (70%), 4 (9%)  
 . 가 10  
 15  
 , 28 81-90%, 3  
 71-80% 1 70%

KT-2000 arthrometer

41 (87%) 3mm , 6 (13%)  
 3mm

(Table 4).

Table 3. Lysholm knee scores at last follow-up

	Mean	Range
Limp(5)	4.8	3-5
Support(5)	4.9	2-5
Locking(15)	14.3	5-15
Instability(25)	23.7	10-25
Pain(25)	22.6	5-25
Swelling(10)	8.8	2-10
Stair-climbing(10)	9.8	6-10
Squatting(5)	4.8	2-5
Total(100)	93.7	55-100

Table 4. ACL examination with KT - 2000

Side-to-side difference	Only ACL <sup>1</sup>	ACL plus meniscectomy <sup>2</sup>
0-3mm	16	25
3.5-5mm	0	4
>5mm	0	2

<sup>1</sup>Number of patients who was done by only arthroscopic ACL reconstruction.

<sup>2</sup>Number of patients who was done by arthroscopic ACL reconstruction and partial meniscectomy concomitantly.



(generalized joint laxity) 가 11  
 , Lachman 38 8 grade 1+, 1 grade  
 2+ . 42 5 grade 1+ ,  
 pivot shift 43 4 grade 1+ (Table 5).

Table 5. Results of Lachman, anterior drawer and pivot shift test

Test	Result	No. of knee
Lachman	Negative	38(81%)
	1+(1-5mm)	8(17%)
	2+(5-10mm)	1(2%)
	3>(>10mm)	0
Anterior drawer	Negative	42(89%)
	1+(1-5mm)	5(11%)
	2+(5-10mm)	0
	3>(>10mm)	0
Pivot shift	Negative	43(91%)
	1+(sliding)	4(9%)
	2+(clunk or jump)	0
	3+(locking)	0

9 4  
 가 3mm  
 pivot shift grade 1+ 4 3  
 .  
 가 5-10% 가 7 , 5 ,  
 2 10% 가 2

11- 17mm,  
 10- 15mm  
 Fairbank sign 1

(Fig 1).

10 (21%), 33 (70%), 4  
 (9%) . 3  
 cyclops  
 가 1 -  
 7mm 가 .



Fig. 1-A,1-B, and 1-C. A nineteen-year-old woman who had a jumping injury underwent the arthroscopic ACL reconstruction and a partial medial meniscectomy simultaneously. She was followed for 7 years and had an excellent clinical result.

Fig. 1-A. Sagittal T2-weighted image reveals linear increased signal traversing posterior horn of medial meniscus.



Fig. 1-B. Anteroposterior radiograph of the left knee, taken six months postoperatively.



Fig. 1-C. Anteroposterior radiograph of the both knee, made seven years postoperatively, showing an osteoarthritic change of the operated side compared to the uninjured side.

IV.

47

1991 Marder <sup>11)</sup>

72

3

가

47

가 -

. 1997 Aglietti

<sup>12)</sup>

가 1/3 - -

89

7 . IKDC 가 8%

11%

grade 1+ pivot shift

. 1992 73

4

<sup>13)</sup> . Patel <sup>14)</sup> 32

70

25 가

Lysholm and Tegner Activity Score가

Lysholm knee score 93.7

, IKDC 가 가 91% . Patel <sup>14)</sup> 5

Lysholm knee score가 88.5 Otero Hutcheson<sup>15)</sup> 3  
 84 88 . Grontvedt<sup>16)</sup> 2  
 5 94.7 93.3  
 . Mitsou<sup>17)</sup> 1/3 5  
 9 89.5%가 78%  
 KT - 1000  
 가 3mm . 91%  
 9% . 15 (32%)

가

가

KT - 2000 arthrometer

87% (41 ) 3mm 13% (6 ) 3mm

. Bach<sup>2)</sup> 62 2 KT - 1000 arthrometer  
 92% 3mm , Buss<sup>18)</sup> 69 32  
 KT - 1000 arthrometer 84% 3mm  
 . Aglietti<sup>13)</sup> 4 56% 3mm  
 O'Brien<sup>19)</sup> 1/3 가 -

- 2  
 77% 3mm  
 , arthrometer ,  
 .  
 1  
 . 1 16  
 8  
 (bucket handle)  
 10  
 가 Lysholm score 95 ,  
 side to side difference가 (Fig 2).  
 16 4 (Table 1). Patel  
<sup>14)</sup> 32 5  
 11  
 1  
 .  
 가 - -  
 .  
 가



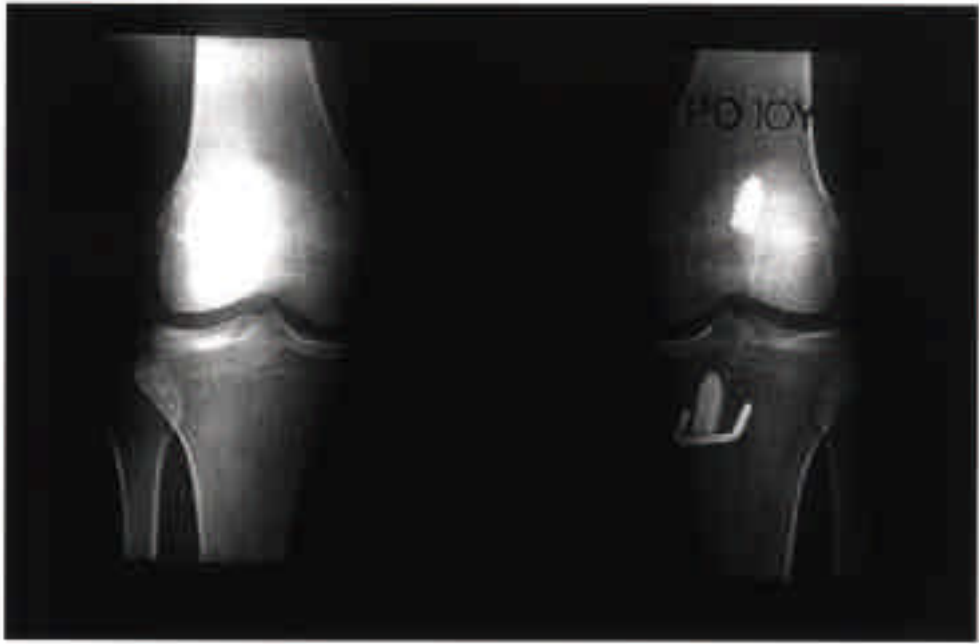


Fig. 2. Anteroposterior radiograph of the both knee, taken ten years postoperatively, showing a no arthritic changes of the both knee joints.

V.

1990 1 1996 12  
가 1/3 - -

1. 6 4  
2 3 , , , ,  
- 가 .

2. Lysholm knee score 93.7 , IKDC 가  
91% .

3. 가 3mm  
6

4. Fairbank sign  
1 .

5. 91% , 3

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## **Abstract**

### **The long-term results after arthroscopic ACL reconstruction using autogenous bone-patellar tendon-bone graft**

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(Directed by Professor Sung-Jae Kim)

Many surgical methods for ACL reconstruction have been introduced. Currently, arthroscopically assisted ACL reconstruction using the central third bone-patellar tendon-bone as a free autogenous graft is a popular and well-accepted form of treatment. However, there are few reports on the long-term result of arthroscopically assisted central third bone-patellar tendon-bone ACL reconstruction. In this retrospective study, we report the results of long-term clinical and radiographic features for the arthroscopic ACL reconstruction using autogenous bone-patellar tendon-bone graft.

Between 1990 and 1996, forty-seven patients who underwent arthroscopic central third bone-patellar tendon-bone ACL reconstruction were available for the long-term follow-up. Patients were examined clinically as well as radiologically. During arthroscopic assessment, 31

patients had concomitant meniscal tears. All meniscal lesions were treated with partial meniscectomy. There were sixteen female and thirty-one male. The mean age of these patients at reconstruction were 28 years (range, 16 to 49 years). The order of injuries were basketball, soccer and skiing respectively and the predominant mechanism of injury was valgus-external rotation force. The mean interval between the injury and the reconstruction was twenty-seven months. The average duration of follow-up was 76 months.

The mean Lysholm knee score in our series was 93.7. Using the IKDC evaluation system, 10(21%) patients were classified as normal, 33(70%) as nearly normal, and 4(9%) as abnormal. For forty-six(98%) of the knees, the result on the Lachman test was 1+ or less, and 2+ for only one. The result of the anterior drawer test was 1+ or negative for forty-seven(100%) of the knees. The result of the pivot-shift test was negative in forty-three(91%) of the knees. In our series, 67% of patients had side-to-side KT-2000 measurements of 3mm or less. 13% of patients was more than 3mm in difference between sides and all received partial meniscectomy.

Enlargement of tunnel width was variable but there was no associated clinical symptom. Difference in patellar length of 5 to 10% or more compared to the uninjured side were observed in 19% of cases and no association was found between either shortening or lengthening with anterior knee pain symptoms. Radiographic osteoarthritis of the femorotibial compartment was found more severely in treated knees compared with uninjured knees. All patients who had meniscal surgery



at reconstruction were noted to have radiographic evidence of osteoarthritis of the knee joint except in one case. There were few patients with isolated ACL ruptures who had radiographic osteoarthritis. These findings stress the importance of normal meniscal function.

At long-term follow-up, 91% of patients were subjectively satisfactory and clinically excellent results were noted. We conclude that this technique compares favorably with other methods in the long-term results.

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Key Words : ACL reconstruction, arthroscopy, autogenous bone-patellar tendon-bone graft