Clinical Outcomes, Return to Sports, and Patient Satisfaction After Anterior Cruciate Ligament Reconstruction in Young and Middle-Aged Patients in an Asian Population—A 2-Year Follow-up Study

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Purpose: To compare the clinical outcomes of arthroscopic anterior cruciate ligament (ACL) reconstruction in young and middle-aged Asians. **Methods:** A retrospective study was performed using prospectively collected data from a tertiary institution ACL registry. All Asian patients with ACL tears who underwent primary arthroscopic ACL reconstruction by a single surgeon between 2008 and 2014, with minimum 2-year follow-up, were included. Patients with previous knee surgery or multiligamentous knee injuries were excluded. Two groups were formed: young patients (YP) (age <30) and middle-aged patients (MP) (age >40). They were compared preoperatively and 6 months, 1 year, and 2 years postoperatively for demographics, knee range of motion, anterior laxity, Tegner level, Lysholm and International Knee Documentation Committee grade, ability to return to preinjury level of activity, and patient satisfaction. **Results:** YP (n = 84) and MP (n = 22) had differences in mean age (YP = 23.1 years, range 18-29 years; MP = 46.4 years, range 41-59 years, $P < .001$), preinjury Tegner level (YP = 7.4, MP = 6.4, $P = .005$), and preoperative Lysholm scores (YP = 65.3, MP = 53.0, $P = .034$). The incidence of meniscal and chondral injuries was similar. Two years postoperatively, both groups had comparable knee range of motion and anterior laxity. The Tegner score was different (YP = 6.3, MP = 5.2, $P = .028$), but the proportion of patients returning to preinjury Tegner level (YP = 45.2%, MP = 46.9%, $P = .812$), Lysholm scores (YP = 92.5, MP = 93.8, $P = .794$), proportion of patients with knees rated International Knee Documentation Committee A/B (YP = 77.4%, MP = 81.8%, $P = .777$), and satisfaction levels (YP = 98.5%, MP = 94.1%, $P = .370$) were similar. There were no graft ruptures or reoperations. **Conclusions:** In an Asian, predominantly male population, the clinical outcomes of arthroscopic ACL reconstruction in YP and MP are equally good at 2-year follow-up. MP can benefit as much as younger patients from ACL reconstruction in terms of restoration of knee function and return to preinjury activity level, are equally satisfied with outcomes, and should not be excluded from surgery on the basis of age alone. **Level of Evidence:** Level III, retrospective comparative study.

Anterior cruciate ligament (ACL) reconstruction has traditionally been advocated for young active athletes.[1-3] In the past 2 decades, however, there have been multiple studies showing excellent outcomes for ACL reconstruction performed in patients above the age of 40.[4-16]

Nevertheless, some surgeons remain hesitant in offering surgery to this group of patients. Some reasons include a perceived higher risk of arthrofibrosis, the presence of pre-existing cartilage changes potentially affecting outcomes, poorer rehabilitation potential, and the lower physical demands of such patients.[5,17-20] Another reason is that conservative treatment for ACL tears in middle-aged population has previously been shown to have satisfactory outcomes.[21]

Many of the studies on ACL reconstruction in older patients have been case series[4,5,7-10,12-15]; there are relatively few studies directly comparing outcomes of ACL reconstruction in young patients (YP) and middle-aged patients (MP),[6,11,16,22] and even fewer in Asian populations.[23]

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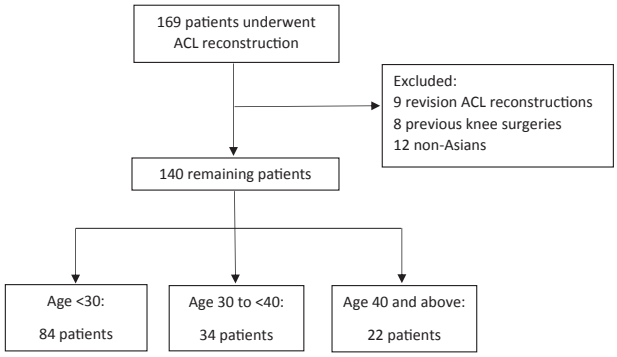

Fig 1. Flowchart showing patient enrolment and exclusion. (ACL, anterior cruciate ligament.)

In the Asian population, cultural differences may exist with regard to sports participation, as compared with the West.[24-27] This may affect the outcomes in ACL surgery, such as rate of return to sport. The rate of return to sport has also been linked with patient satisfaction, a key outcome in surgery.[28] In view of the potentially reduced participation in sports, Asian patients may have poorer patient satisfaction after ACL reconstruction.

The purpose of this study was to compare the clinical outcomes of arthroscopic ACL reconstruction in young and middle-aged Asians. We hypothesized that both groups of patients would have equally good outcomes at 2-year follow-up.

Methods

A retrospective study was performed using prospectively collected data from the ACL registry of a single tertiary institution. All data were collected by independent observers not participating in the care of the patients. Institutional review board approval was obtained before the commencement of the study.

All patients who underwent arthroscopic ACL reconstruction by a single surgeon between January 2008 and December 2014 were included in the study. The inclusion criteria were: (1) ACL injury; (2) confirmed on arthroscopic assessment; (3) underwent arthroscopic ACL reconstruction; (4) with minimum 2-year follow-up.

The exclusion criteria were: (1) previous knee surgery; (2) revision ACL reconstruction; (3) multiligamentous knee injuries; (4) age 30 to <40; (5) non-Asians.

All patients underwent arthroscopic transtibial single-bundle ACL reconstruction with hamstring autograft. The surgical technique and postoperative rehabilitation were standardized for all patients.

The patients were categorized into YP (<30 years old) and MP (40 years old and above). The cutoff age of 40 was based on previous comparative studies using the same criterion.[6,16,22,23] The 2 groups were compared for demographic variables, clinical outcomes, and patient satisfaction preoperatively, and at 6 months, 1 year, and 2 years postoperatively.

The demographic data recorded included age, race, gender, body mass index, and side of injury.

The clinical outcomes measured included the knee range of motion, anterior laxity using the KT-1000 arthrometer, International Knee Documentation Committee grade, Lysholm score, Tegner activity level, and the ability to return to the preinjury level of activity. These were assessed by qualified physiotherapists.

Patient satisfaction was assessed using a 6-point Likert scale with patients asked to rate the outcome of their surgery, ranging from "excellent" to "terrible." Patients were considered to be satisfied if they rated the outcome as "good," "very good," or "excellent."

Surgical Technique

The patient was placed supine with the affected lower extremity placed in an ACL leg holder with the knee flexed to 90° off the edge of the operating table. The other lower limb was flexed and abducted in a separate leg holder outside the operative field. After cleaning and draping, a tourniquet was inflated.

Table 1. Demographic and Baseline Patient Data

	YP (n = 84)	MP (n = 22)	*P* Value
Age (yr)	**23.1 (range 18-29)**	**46.4 (range 41-59)**	**<.001**
BMI	23.3 ± 3.8	25.9 ± 3.7	.090
Gender (% male)	78.6	90.9	.235
Race			.535
Chinese (%)	76.2	63.6	
Malay (%)	13.1	18.2	
Indian (%)	7.1	13.6	
Others (%)	3.6	4.5	
Side of injury (% left)	45.2	45.5	1.000
Time to surgery (wk)	32.1 ± 31.1	24.5 ± 30.7	.309
Knee extension (degrees)	1.3 ± 7.4	2.9 ± 5.8	.115
Knee flexion (degrees)	**134.1 ± 13.3**	**128.0 ± 17.1**	**.023**
Incidence of chondral lesions (%)	4.8	4.5	1.000
Incidence of meniscal tears			
Medial (%)	27.4	40.9	.296
Lateral (%)	15.5	22.7	.523
Any (%)	36.9	50.0	.329
Both (%)	6.0	13.6	.358
Anterior laxity (mm)	4.7 ± 3.6	3.5 ± 3.3	.124
Preinjury Tegner level	**7.4**	**6.4**	**.005**
Lysholm score	**65.3 ± 20.4**	**53.0 ± 23.7**	**.034**
IKDC A/B (%)	1.2	0	1.000

NOTE. Values given as mean ± standard deviation. Bold indicates statistical significance.

BMI, body mass index; IKDC, International Knee Documentation Committee (IKDC A/B indicates normal/nearly normal knees); MP, middle-aged patients; YP, young patients.