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Short-term clinical outcomes of remnant-preserving single-bundle augmentation in anterior cruciate ligament reconstruction: Comparison with single- and double-bundle reconstruction

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I have no financial conflicts to disclose.

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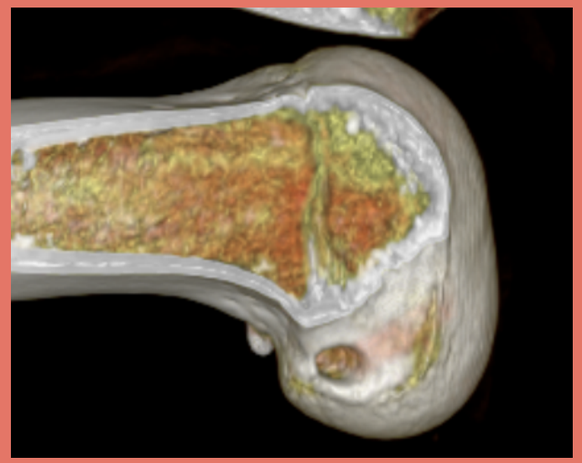
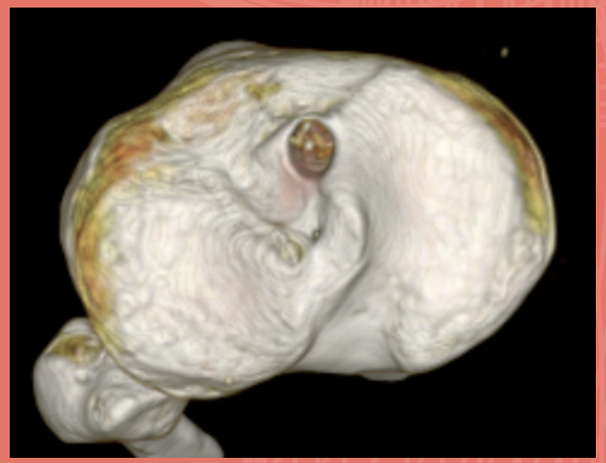
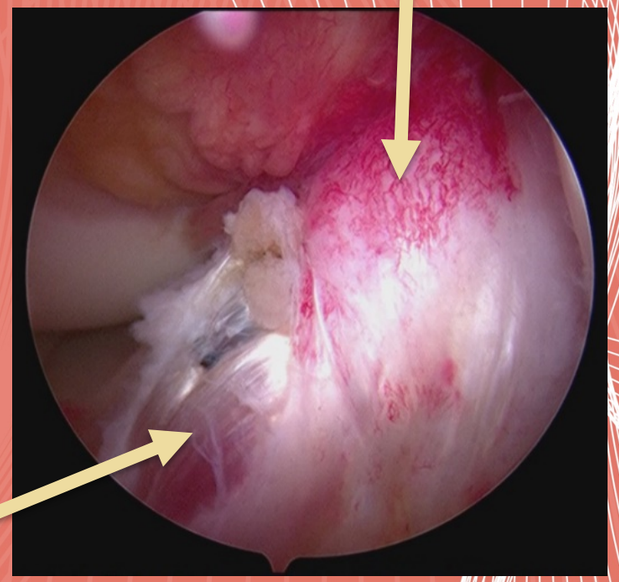
Background

- Anterior cruciate ligament (ACL) augmentation technique (remnant-preserving single-bundle ACL reconstruction) for treatment of the injured ACL has received attention as preservation of the ACL remnant has several potential advantages. These are said to include preservation of the mechanoreceptors within the ACL remnant,enhancement of revascularisation and ligamentisation of the grafted tendon, and contribution of the remnant to stability of the knee.

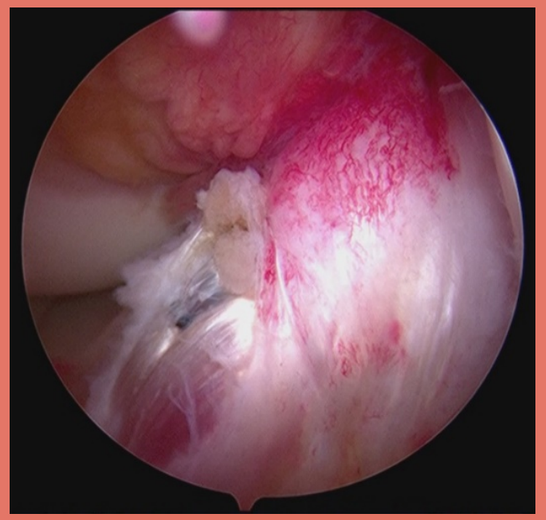


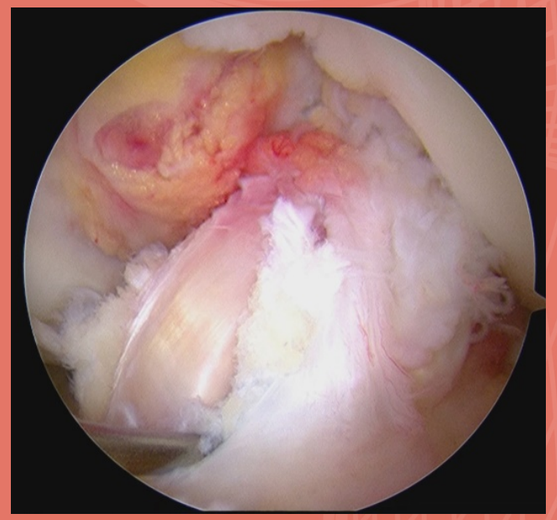


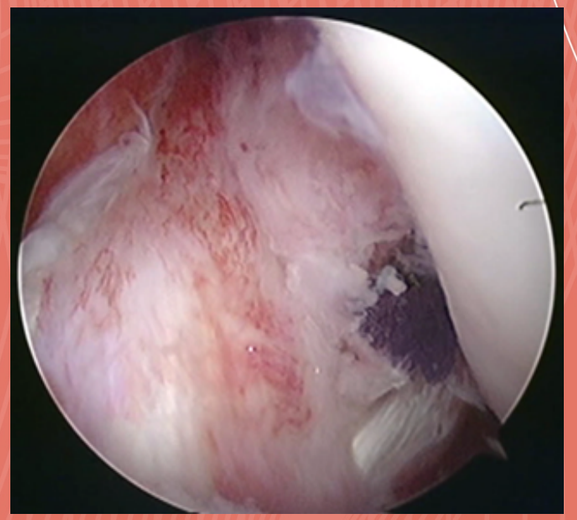


Purpose

- The purpose of this study is to evaluate the clinical outcomes of single-bundle ACL augmentation (remnant preserving ACL reconstruction) and to compare them with those of anatomic single- or double-bundle ACL reconstruction.







Methods

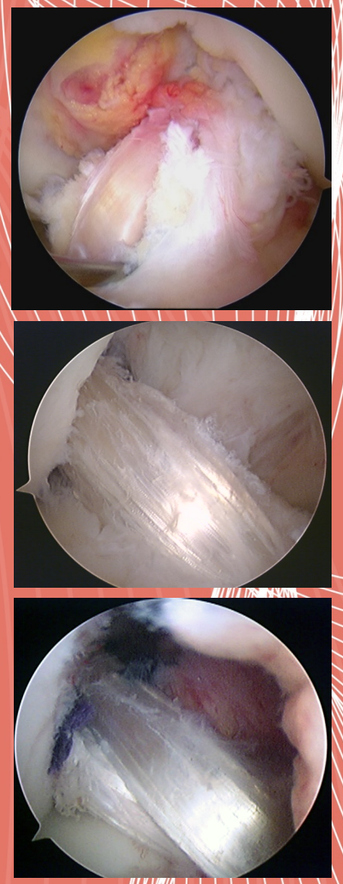
Patients

The Hiroshima Clinical ACL Research Project (**Hiroshima CARP**) is an ongoing, prospective, multicenter, cohort study of patients undergoing ACL reconstruction.

Patients who underwent ACL reconstruction surgery between 2017 and 2019 at any of the nine participating institutions were enrolled in this study.

- A total of **565** patients (288 males, 51%) were enrolled in this study.
- **Surgical procedures;**

- **Single-bundle ACL augmentation ; 206** (103 female, 103 male)
- **Single-bundle ACL reconstruction ; 238** (127 female, 111 male)
- **Double-bundle ACL reconstruction ; 121** (47 female, 74 male)



Patient characteristics

Surgical procedures	Single-bundle ACL reconstruction	Double-bundle ACL reconstruction	ACL augmentation	P-value
Number of patients	238	121	206	–
Age (years)	29.2 ± 12.1	29.1 ± 12.7	29.6 ± 12.7	.937
Sex (male : female)	111:127	74 : 47	103 : 103	.032
BMI at ACLR	24.1 ± 4.1	24.3 ± 4.0	23.7 ± 3.5	.318
Time between injury and surgery (months)	29.2 ± 12.1	29.1 ± 12.7	29.6 ± 13.5	.937
Side-to-side difference of anterior knee laxity before ACL reconstruction (mm)	3.9 ± 2.4	3.1 ± 2.5	3.2 ± 2.2	.001
Pivot-shift phenomena before surgery (IKDC grading) (Grade 0:1:2:3)	13% : 44% : 32% : 11%	16% : 53% : 25% : 7%	5% : 59% : 32% : 4%	.001
Extension angle of the knee joint before surgery (degree)	-0.5 ± 5.0	-2.9 ± 4.4	-0.8 ± 5.0	.000
Flexion disturbance of the knee joint before surgery (degree)	3.2 ± 5.9	5.0 ± 9.2	3.4 ± 6.0	.063

Methods

Postoperative clinical evaluation

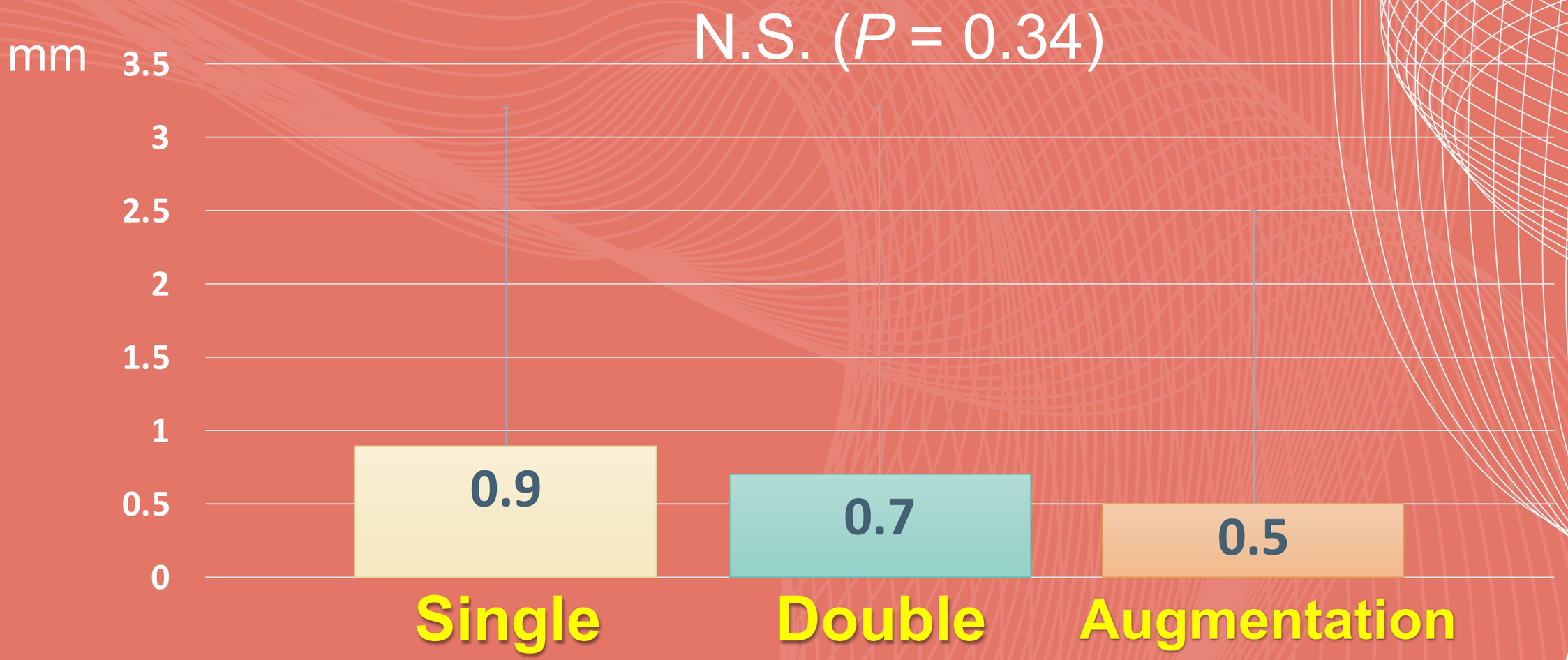
- Patients were assessed preoperatively and 1 year postoperatively with

- Measurement of anterior knee laxity using an arthrometer
- Pivot-shift test grade (IKDC grading) (Grade 0:1:2:3)
- Knee Injury and Osteoarthritis Outcome Score (KOOS) subscales (Pain, other Symptoms, ADL, Sport/Rec, QOL)
- Extension angle of the knee joint
- Flexion disturbance of the knee joint

Results

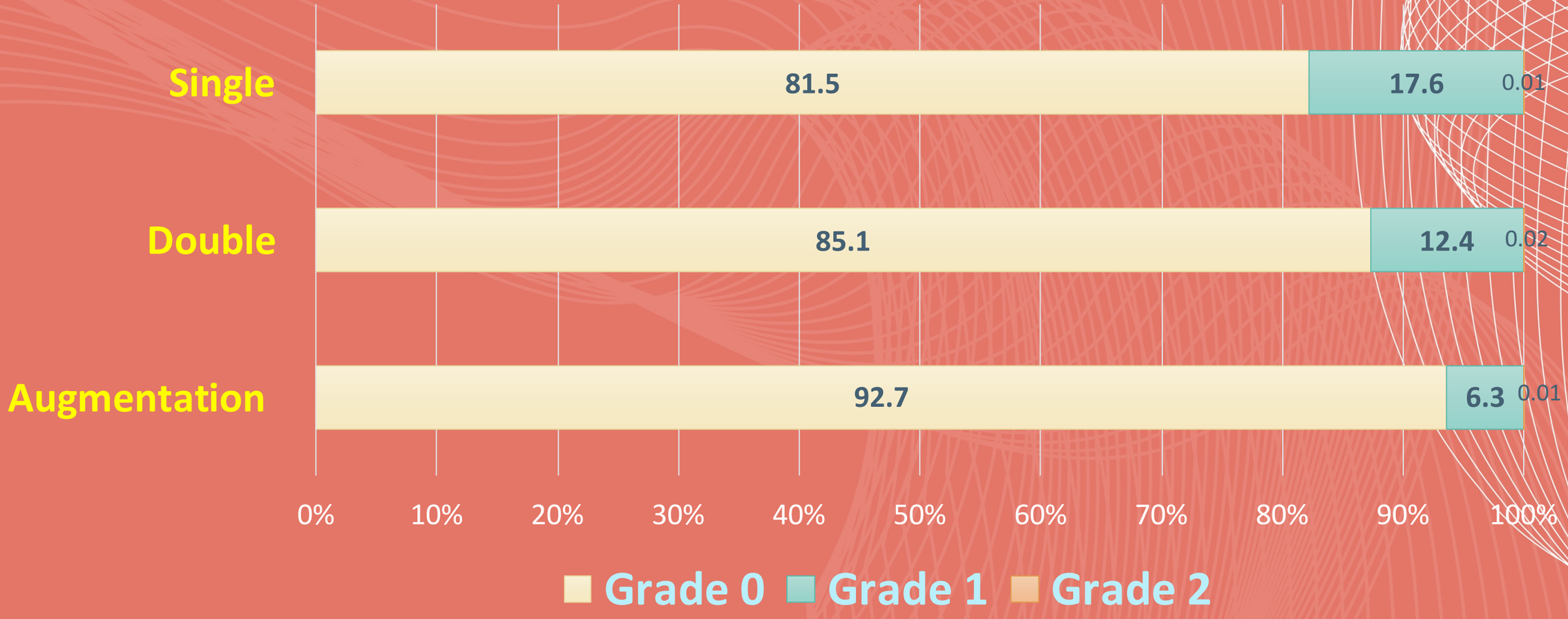
Postoperative anterior knee stability

The mean side-to-side differences measured with an arthrometer at one year after surgery



Results

Postoperative pivot shift test grade



Postoperative pivot shift test grade was significantly lower in ACL augmentation group than single-bundle reconstruction group (P=0.003).

Results

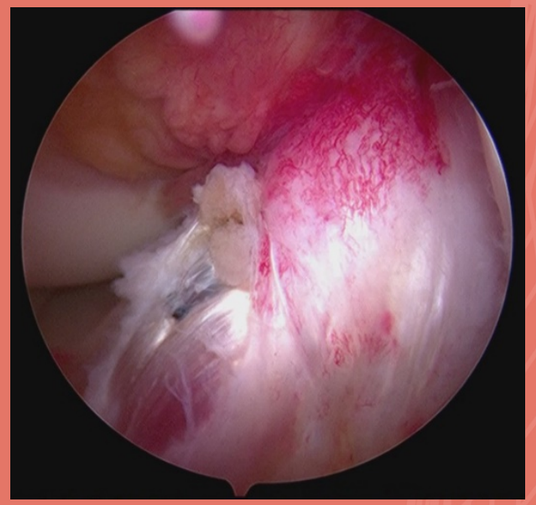
Postoperative KOOS and range of motion

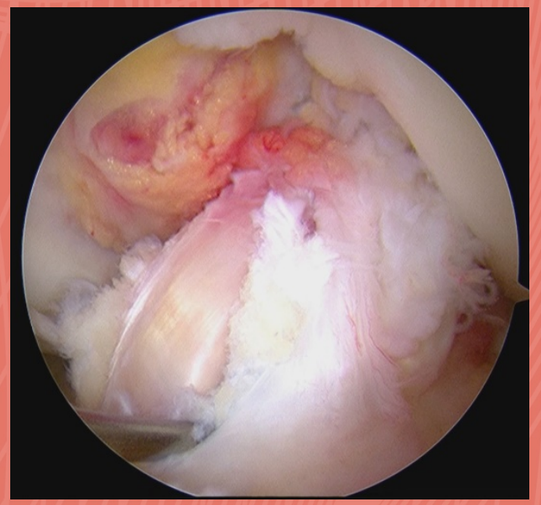
Surgical procedures		Single-bundle ACL reconstruction	Double-bundle ACL reconstruction	ACL augmentation	P-value
KOOS subscales	Pain	76.0 ± 20.3	74.6 ± 19.5	77.1 ± 16.7	.519
	other Symptoms	89.8 ± 12.4	88.3 ± 14.5	89.3 ± 13.8	.003
	ADL	98.3 ± 5.3	96.6 ± 10.6	97.6 ± 6.2	.164
	Sport/Rec	50.0 ± 29.6	46.8 ± 27.5	49.5 ± 27.4	.615
	QOL	48.9 ± 25.6	44.0 ± 24.9	47.3 ± 25.9	.289
Extension angle of the knee joint		-0.4 ± 2.7	-1.8 ± 3.4	-0.5 ± 3.0	.000
Flexion disturbance of the knee joint		1.2 ± 3.0	1.5 ± 3.2	1.2 ± 3.0	.000

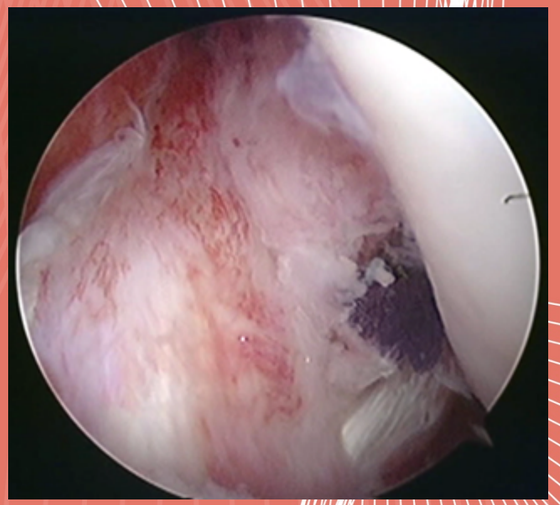
There were no significant differences in the postoperative KOOS subscales among the three groups. Although extension disturbance of the knee after ACL surgery was significantly worse in double-bundle reconstruction group, the difference had already been found before the surgery.

Conclusions

- Patients in the ACL augmentation group showed better pivot shift test results than those in the single-bundle reconstruction group at one year after surgery.
- Clinical outcomes of the patients with ACL augmentation were comparable, if not superior, with those of patients undergoing the double-bundle ACL reconstruction.







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