KNEE OBJECTIVE STABILITY AND ISOKINETIC THIGH MUSCLE STRENGTH AFTER ANTERIOR CRUCIATE LIGAMENT (ACL) RECONSTRUCTION:

A Randomized Six-Month Follow-Up Study

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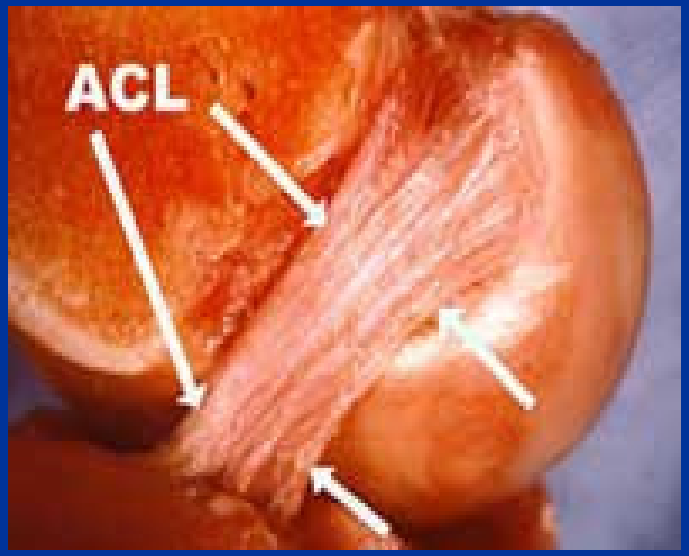
Anterior cruciate ligament (ACL) rupture is the most common serious injury of the knee. In the general population, an estimated 1 in 3000 individuals sustains an ACL injury per year in the United States, corresponding to an overall injury rate of approximately 100,000 injuries annually.

Several risk factors for tearing the ACL have been evaluated in literature. The highest incidence is in individuals 15 to 25 years old who participate in pivoting sports. 70 % of ACL injuries occur in noncontact situations. The risk factors for non-contact ACL injuries fall into four distinct categories: environmental, anatomic, hormonal, and biomechanical.

The goals of ACL reconstructions are to decrease symptoms, improve function, and return patients to their preinjury level of activity.

The surgeon has to choose :

- graft
- fixation



The most frequently used grafts for intra-articular anterior cruciate ligament (ACL) reconstruction are the autologous patellar tendon (PT) or doubled semitendinosus and gracilis tendons (STG) autografts. There are still controversies about graft selection for primary ACL reconstruction.

ACL reconstruction

Semitendinosus and gracilis tendon autograft (STG)

versus

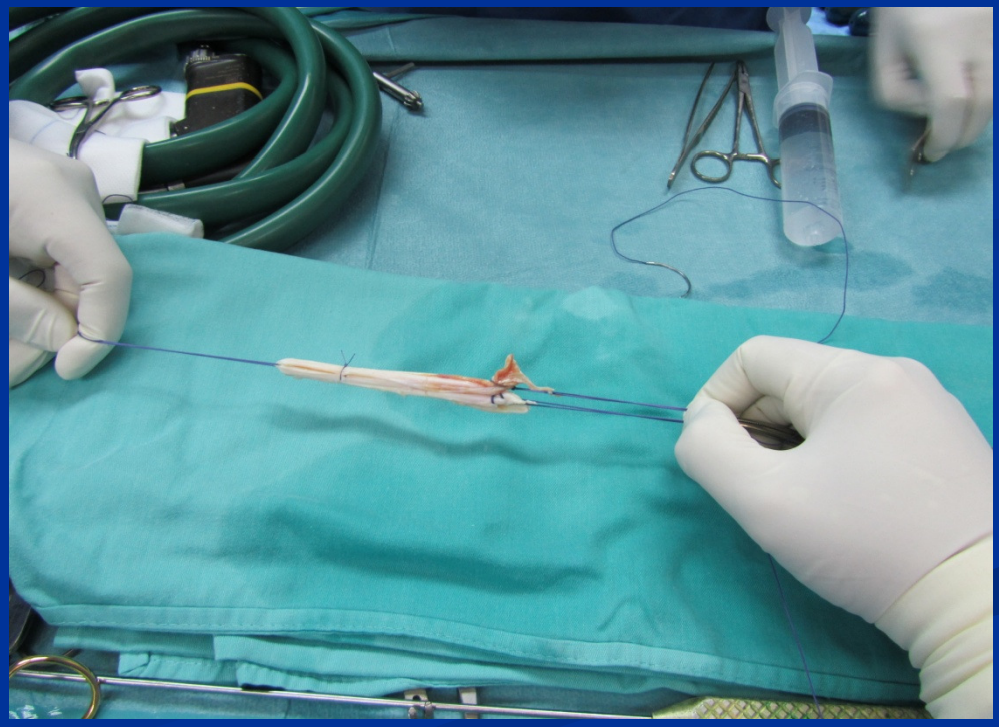
Patellar tendon autograft (PT)

Operative data

single technique, different transplant

PT transplant

STG transplant



RESEARCH

ISOKINETIC EVALUATION AND OBJECTIVE STABILITY OF THE KNEE AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

The purpose of this study was to analyze objective stability and isokinetic strength of knee extensor and flexor muscles at 6 months after ACL reconstruction using two different autografts (PT versus STG) with identical fixation (interference screws) in consecutive patients undergoing the same accelerated rehabilitation program.

From January 2010 to February 2011 57 patients were randomly assigned:

- Group I (29 patients)
  STG autograft

- Group II (28 patients)
  PT autograft

INCLUSION CRITERIA

- Time from ACL injury to surgery less than 12 months
- No previous ligamentous injury and surgery of either knee
- No previous meniscal pathology treated with resection or repair
- No chondral lesions diagnosed by arthroscopy or MR investigation

SURGICAL TECHNIQUE AND REHABILITATION

- Apart from the graft harvesting the surgical technique was identical
- All procedures were performed by the first author (M.S.)
- Meniscal surgery were performed in 51% of patients in STG group and in 62% of patients in PT group ($P = .408$).
- All the patients were rehabilitated according to the same accelerated protocol with immediate full weight-bearing and full range of motion without use of rehabilitation brace.
- The rehabilitation program has been completed in the Unitur Spa and Rehabilitation Center Zreče

METHODS

- All postoperative measurements were performed in the Unitur Spa and Rehabilitation Center Zreče by the same senior physical therapist
- Isokinetic strength and endurance of the extensor and flexor muscle groups was measured with the isokinetic dynamometer En – Knee (Enraf – Nonius).
- Objective AP knee laxity measurements were performed by using the KT-1000 arthrometer (MEDmetric, San Diego, CA)

ISOKINETIC TESTING OF THE KNEE

- Isokinetic measurements of extensor and flexor knee muscles is performed in an open kinetic chain
- Testing is always performed on both sides (first healthy then the injured extremity)
- Measurements are safe and have a high repeatability

KT-2000 arthrometer (MEDmetric, San Diego, CA)

METHODS
ISOKINETIC AND KNEE LAXITY EVALUATIONS

ENDURANCE TEST	POWER TEST	KT-1000 AP LAXITY
3 months postoperatively	6 months postoperatively	6 months postoperatively
angular velocity of 180°/s	angular velocity of 60°/s	KT- 1000 arthrometer
ROM 20°- 90°	ROM 10°- 90°	•134 N •manual maximum force
25 repetitions	6 repetitions	average of three measurements

ISOKINETIC RESULTS

		Group STG		Group PT		*P* (STG/PT)
		Average deficit (%)	SD	Average deficit (%)	SD	
Endurance test 180⁰/s	Extensor muscles	**18.8**	**14.6**	21.5	17.6	.527
	Flexor muscles	**5.2**	**13.2**	3.9	8.6	.667
Power test 60⁰/s	Extensor muscles	**14.0**	**9.7**	26.7	10.3	**.00015**
	Flexor muscles	**3.9**	**16.8**	1.4	10.1	.497

	KT-1000 measurements at 6 months postoperatively				
	Group STG		Group PT		*P*
	Average (mm)	SD	Average (mm)	SD	(STG/PT)
134 N	1.6	1.5	1.4	1.6	. 509
Manual maximum	1.9	1.6	1.7	1.7	. 558

DISCUSSION

- Average deficit in flexor muscle strength between the involved and the uninvolved leg was less than 6 % in both groups. This is a very good result, particularly in the STG group, because previous research has found that the hamstring tendons harvest significantly reduces the flexor strength for approximately 1 to 2 years after surgery
- Excellent results resulted from good surgery technique of an experienced surgeon as well as rehabilitation program focusing on due and proper stretching and strengthening of flexor muscles

CONCLUSION

- At 6 months after surgery, we found significantly lower isokinetic quadriceps peak torque in the PT group compared with the STG group at angular velocity of 60°/s
- We did not find significant difference in flexor muscle power comparing both groups
- We did not find significant differences in knee laxity measurements between the two study groups
- No significant correlation was found between the knee objective stability and the isokinetic thigh muscle strength.

THANK YOU FOR YOUR ATTENTION