

The effects of **biomechanical intervention**  
for a patient who has residual **knee pain**  
for 9 months after anterior cruciate ligament  
reconstruction (**ACLR**) with gracilis autograft



: a single case study.

**Yamagata Saisei Hospital**

**Suga K\*, PT, MS. Fukushima S, MD.**

# Introduction

## ❑ Anterior knee pain

One of the most frequent complications after ACLR

Especially bone–patellar tendon–bone (BTB) autografts

## ❑ Only BTB?

Patients who had sustained ACL tear have impaired motion

i.e. Posterior shift in the center of gravity (COG)

Low hip flexion angle with knee valgus during landing

These could be related to anterior knee pain

**Why?**

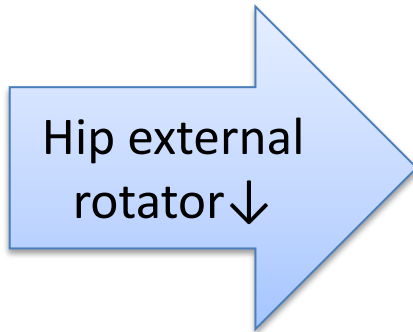
# Introduction

## □ Cause of anterior knee pain

Hip flexion ↓  
Posterior shift of COG



External knee  
flexion moment ↑



Hip external  
rotator ↓



Knee valgus ↑

Myer, GD, 2014

Purpose: to describe the effects of biomechanical intervention in a patient with knee pain after ACLR

# Case Description

## □ General data

27-year-old male amateur skier

## □ Cause of ACL tear

He fell down during landing from ski jump

## □ Procedure of knee surgery

Rt side ACLR with gracilis autograft

Posterolateral bundle reconstruction

## □ Symptom

**Bilateral knee pain** whenever he went skiing

At 9 months after ACLR

# Evaluation

## ☐ Muscles strength

Quadriceps: Rt/Lt = 95%    Hamstrings: Rt/Lt = 71%

Quadriceps %Body weight: Rt = 79%                      ✖ Isokinetic, 60 deg/sec

## ☐ Pain

His knee pain was evaluated by numerical rating scale (NRS)

After skiing was 4–5 on NRS (10 being the most intense)

## ☐ Landing comfort

It was measured 5 on NRS (10 being the most comfortable)

His knee pain was reevaluated by phone at  
13 days after the evaluation and intervention

# Evaluation

## □ Landing tasks

Single-leg and double-leg landing

From 30-cm-high box

The tasks were captured by a digital camera

examined by a physical therapist (PT)

## □ His landing features

low hip flexion with knee valgus and posterior shift of COG

They could increase external knee flexion moment

knee rotational stress

Show you his landing motion  
before the intervention

# Frontal Plane Motion



# Sagittal Plane Motion



# Intervention

## □ Instruction

The PT showed him his landing motion on the camera  
instructed him to increase hip flexion during landing

## □ Practice

He practiced the tasks for **15 minutes** by himself

Show you his landing motion  
after the intervention

# Frontal Plane Motion



# Sagittal Plane Motion



# Comparison before and after Frontal Plane Motion

before



after



# Comparison before and after Sagittal Plane Motion

**Before**



**After**



# Results

## ❑ His landing motion

Hip flexion was increased and knee valgus was modified

## ❑ The score of his landing comfort

It was improved from 5 to 10 on NRS after the intervention

## ❑ The score of his knee pain

It was improved from 4-5 to 0 on NRS when he went skiing

His landing motion and knee symptoms were improved, and continued even 13 days after the intervention

# Conclusions

- ❑ Biomechanical approach was successful
- ❑ Biomechanical factors were cause of his knee pain, because he had bilateral knee pain.
- ❑ Even if they never used BTB autograft, It can be important to observe the motion carefully as PT

**Thank you for your kind attention**