

## Department of Orthopaedic Surgery

### Division of Sports Medicine

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#### General Summary

##### *Clinical Research*

The ongoing research in our department concentrates on competitive athletes (including professional athletes), amateur athletes who include sports activities in their daily lives and young athletes engaged in school sports clubs or dedicated to training within sports clubs. In 2015 we have been mostly focused on basic research.

#### Research Activities

##### *Arthroscopic surgery for posterior ankle impingement syndrome*

We investigated results of arthroscopic surgery for posterior ankle impingement syndrome in 9 patients (10 feet) and evaluated pathological features of the condition in regard to various sport activities. Among 6 female ballet dancers examined, all presented preoperatively with crepitus when moving their toes in a plantar position. Operative findings showed markedly thickened tendon sheath of the flexor hallucis longus. The mean time until a return to sport activities was 2 months; however, ballet dancers returned after a mean time of 5 months to recover the *en pointe* position. Arthroscopic surgery for posterior ankle impingement syndrome is less invasive and has advantages, such as direct intraoperative understanding of pathology dynamics, that are difficult to achieve from imaging data.

##### *Correlation between magnetic resonance imaging findings and time before a return to sport activities because of disabled throwing shoulders*

Magnetic resonance imaging (MRI) findings of 58 patients with disabled throwing shoulders were examined and evaluated for possible correlation with physical findings and the time before a return to play. Of the patients, 16 had normal MRI findings, 23 had bone lesions, 20 had labrum tears, 12 had tendon lesions, and 5 had subacromial manifestations on MRI scans. Separation of the epiphysis in the proximal humerus was observed in only junior high school students, and slant appearance was found in junior and high school students. We did not find any correlation between MRI findings and physical findings or the time before a return to play. We concluded that in patients with disabled throwing shoulders, MRI findings do not always reflect the underlying pathology.

##### *Comparison of 3 self-stretch techniques for tightness of the 2<sup>nd</sup> internal rotation in patients with disabled throwing shoulders*

We compared the effectiveness of 3 types of self-stretch exercises — the all-fours posterior stretch (APS), the cross-body stretch (CBS), and the internal rotation stretch (IRS) —

in 48 baseball pitchers with disabled throwing shoulders. The inability ratios due to pain were as follows: 4% with APS, 23% with CB, and 42% with IRS. The range of motion of the 2<sup>nd</sup> internal rotation before stretch exercises did not differ significantly among the groups. However, the ranges of motion obtained just after corrective stretching in the subjects who did APS and CB were significantly higher than that in subjects who did IRS. We concluded that APS is the most useful stretching technique for persons with disabled throwing shoulders; it can be performed painlessly and can effectively improve the 2<sup>nd</sup> rotational range of motion.

*Changes in nerve-muscle coordination caused by muscle fatigue: An analysis using the silent periods of the quadriceps and hamstrings*

We investigated changes in the silent periods of the quadriceps and hamstrings before and after inducing muscle fatigue in 12 healthy adults. Fatigue of the quadriceps and hamstrings was induced by using an isokinetic dynamometer (Cybex International, Medway, MA, USA). We did not find any significant differences in pre-movement time between loaded and nonloaded sides or before or after the muscle load on the same side. However, the switched silent period measured after the physical load application was significantly longer than that measured before load application on both sides. This study indicates that muscle fatigue delays nerve-muscle coordination on the sides to which loads have been or have not been applied.

*Difference in muscle strength of the quadriceps and hamstrings between contact and non-contact injuries: A comparison analysis before and after reconstruction of the anterior cruciate ligament*

Preoperative and postoperative muscle strength of quadriceps and hamstrings were measured in patients who underwent reconstruction surgery of the anterior cruciate ligament. The ratio of the affected to the nonaffected side, the ratio of quadriceps and hamstrings, and the weight-bearing index were compared between 14 patients with a contact injury and 13 patients with a noncontact injury. Hamstrings were lower on the affected side than on the nonaffected side, and the hamstrings-to-quadriceps strength ratio in patients with noncontact injuries was lower than that in patients with contact injuries. The results suggest that patients who have had noncontact injuries should begin hamstring strength exercises soon after undergoing reconstruction of the anterior cruciate ligament.

*A case of dislocated talar neck fracture after injury during a soccer game*

We reported the rare case of an 18-year-old male soccer player who had received injury leading to a dislocated fracture of the talar neck during a soccer game. The fracture was diagnosed as type II by the Hawkins classification and was manually reduced. Bone union was obtained by conservative treatment, and complications were not observed 1.5 years after the injury.

*A case of gluteus minor muscle strain developed in a female marathon runner*

We reported on the rare case of a 39-year-old female marathon runner who presented with strain of the gluteus minimus muscle following an injury. A high signal-intensity

region on short-tau inversion recovery MRI scans was found across the entire volume of the right gluteus minimus muscle. Overuse syndrome due to long-distance running was considered to be the underlying pathomechanism of this injury.

### Publications

**Funasaki H, Hayashi H, Sugiyama H, Marumo K.** Arthroscopic reduction and internal fixation for fracture of the lateral process of the talus. *Arthrosc Tech.* 2015; **4**: e81-6.

**Funasaki H, Hayashi H, Sakamoto K, Tsuruga R, Marumo K.** Arthroscopic release of flexor hallucis longus tendon sheath in female ballet dancers: dynamic pathology, surgical technique and return to dancing performance. *Arthrosc Tech.* 2015; **4**: e769-74.

**Yoshida M, Funasaki H, Kubota M, Marumo K.** Therapeutic effects of high molecular weight hyaluronan injections for tendinopathy in a rat model. *J Orthop Sci.* 2015; **20**: 186-95.

**Kato S, Saito M, Funasaki H, Marumo K.** Distinctive collagen maturation process in fibroblasts derived from rabbit anterior cruciate ligament, medial collateral ligament, and patellar tendon in vitro. *Knee Surg Sports Traumatol Arthrosc.* 2015; **23**: 1384-92.