

### Clinical Experience With the Use of Low-Intensity Pulsed Ultrasound (LIPUS) in the Treatment of Atypical Femoral Fractures

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**Objective:** The aim of this study was to report the clinical results of atypical femoral fractures (AFFs) treated with low-intensity pulsed ultrasound (LIPUS).

**Materials and Methods:** The data on AFFs that were surgically treated in our hospital from 2010 to 2016 was retrospectively analyzed. AFF was diagnosed based on the criteria defined by the second report of an ASBMR task force.

**Results:** Seven fractures in 6 cases were included in this study. Two fractures were referred to us as being nonunion. Five fractures were subtrochanteric fractures and 2 fractures were shaft fractures. Five fresh AFFs were fixed with an intramedullary nail and 2 nonunion fractures were fixed with plates. LIPUS was used in 6 fractures. Bone union was achieved in 5 fractures with the average time to union being 17 months (5–29). In 4 out of the 6 fractures treated with LIPUS, bone union was achieved after 14 months on average. In the other 2 LIPUS-treated fractures, bone union was not achieved even at 1 year after surgery.

**Discussion:** It is known that AFF healing tends to be very slow. Some case reports indicate that AFF healing might be accelerated by LIPUS. In the current series, the subtrochanteric fracture that was not treated with LIPUS healed at 29 months after surgery, which was much longer than the average time to union in the 5 fractures that were treated with LIPUS. Although our number of cases is small, LIPUS may be a potentially useful tool for accelerating AFF repair.

### Efficacy and Limitations of Conservative Treatment for Painful Patella Partita: Positioning of an Ultrasound-Accelerated Fracture Healing Apparatus

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**Objective:** Generally, painful patella partita is conservatively treated, but the usefulness of a low-intensity pulsed ultrasound (LIPUS) healing apparatus is unclear. The objective of this study was to investigate the usefulness of LIPUS for conservative treatment of painful patella partita.

**Subjects and Methods:** The subjects included 17 patients diagnosed with painful patella partita. The subjects were divided into 2 groups: those without pain at 6 months (responsive group) and those with pain that persisted for 6 months or longer (non-responsive group).

The reasons for the different responses between the 2 groups were investigated. We evaluated various factors, including age, gender, presence or absence of epiphyseal closure on plain xps at the first examination, Saupe classification, presence or absence of bone union, and type of conservative treatment. The grade of limitation of movement, the presence or absence of instruction on quadriceps femoris muscle stretch, and use of an orthosis and LIPUS were also investigated.

**Results:** The responsive and non-responsive groups consisted of 12 and 5 patients, respectively, and included only male patients. The average age was 13 and 16 years old in the responsive and non-responsive groups, respectively. Epiphyseal closure was present in 1 of the 12 patients in the responsive group and 3 of the 5 patients in the non-responsive group. The Saupe classifications in the responsive and in the non-responsive groups, respectively, were type I in 1 and 2 patients (3 total), type II in 6 and 1 patients (7 total), and type III in 4 and 3 patients (7 total). Bone union was achieved in 10 patients in the responsive group, whereas no patient achieved bone union and 3 patients underwent excision in the non-responsive group. Conservative treatment in the responsive and non-responsive groups, respectively, included prohibition of exercise for 7 and 2 patients (9 total) and instruction on quadriceps femoris muscle stretch for 5 and 2 patients (7 total). In addition, all of the 8 patients wearing an orthosis and 2 patients treated with LIPUS were in the responsive group.

**Discussion:** The findings suggest that painful Saupe type II patella partita can be improved by appropriate conservative treatment before epiphyseal closure. LIPUS may be advantageous for bone union and pain relief.

### Treatment of Incomplete Jones Fractures With Low-Intensity Pulsed Ultrasound (LIPUS)

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**Objective:** Stress fractures of the proximal epiphysis of the fifth metatarsal bone (termed Jones fracture) frequently occur in both senior high-school-age and older contestant-level soccer players, and its incidence in Japanese soccer players is higher than that in European players. Surgery is most commonly indicated for a complete fracture, and about 3 months are required before the patient is able to return to the sport. We have performed a “Jones fracture screening” to reduce the incidence of these fractures. While surveying its frequency and promoting education on its prevalence and symptoms, we tried to discover incomplete fractures early and treat them using LIPUS without limiting their soccer practice.

**Subjects and Methods:** The subjects were 341 students (682 feet) from 3 senior high schools and university soccer clubs. Primary