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Effect of Low-Intensity Pulsed Ultrasound (LIPUS) on Osteotomy

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Objective: LIPUS following osteotomy has been covered by national health insurance since April 2015. We investigated the effect of LIPUS on the time period for callus formation and bone union after osteotomy of the anterio-brachial bone.

Subjects and Methods: The subjects were 13 patients who underwent anterio-brachial bone osteotomy between 2010 and January 2017. Nine patients were not treated with LIPUS (L− group) and 4 patients were treated with LIPUS (L+ group). There were 8 male and 5 female patients. The mean age was 40.2-year-old in the L− group and 38.1-year-old in the L+ group. The L− group included 8 patients who were treated with radial shortening for Kienbock’s disease and one patient who was treated with deformity-corrective osteotomy for acute plastic bowing, and the L+ group included 3 and 1 patient treated with each of these approaches, respectively. In the L+ group, treatment with LIPUS was initiated on the day following surgery and continued until bone union was achieved.

Results: In the L− group, bone union could not be achieved in the patient with acute plastic bowing, and bone union was achieved by surgery for a false joint. In the L+ group, bone union was achieved in all patients. No complications, due to infection, CRPS, or tendon or nerve injury, occurred. The callus formation period was 88–422 days (mean: 255 days) in the L− group and 15–36 days (mean: 24 days) in the L+ group. The bone union period was 123–546 days (mean: 284.4 days) in the L− group and 77–141 days (mean: 107.5 days) in the L+ group. Both callus formation and bone union periods were significantly shorter in the L+ group compared with the L− group.

Discussion: The bone union-promoting effect of LIPUS after osteotomy was investigated since its coverage by the national health insurance in 2015. The callus formation and bone union periods were markedly shorter in the L+ group compared with those in the L− group. Since no false joint developed in the group treated with LIPUS, LIPUS should be applied after osteotomy.

Materials and Methods: Twenty-two knees of 20 patients, mean age of 64 years, were treated with LIPUS after OWHTO using artificial bone substitute. LIPUS treatment was performed in 7 knees with lateral cortical fracture, 11 knees with delayed union around artificial bone substitute, 3 knees with removal of plate and bone graft due to infection, and 1 knee with revision surgery due to breakage of plate. Duration of LIPUS treatment, standing femorotibial angle (FTA), and bone union were assessed.

Results: Duration of LIPUS treatment was 131 ± 50 days in fractures group, 293 ± 88 days in delayed union group (P < 0.05). Standing FTA at pre- and post-treatment was 168.3 ± 3.1 and 168.4 ± 2.8 degrees in fracture group, and 168.3 ± 3.0 and 169.0 ± 3.0 degrees in delayed union group. There was no case with over 3 degrees of correction loss. Bone union was confirmed in all cases and plate was removed.

Discussion: The findings suggested that LIPUS treatment was effective in patients after OWHTO. It should be elucidated whether LIPUS shortens the time to bone union around artificial bone substitute after OWHTO.

Effect of Low-Intensity Pulsed Ultrasound on Bone Healing at Osteotomy Sites After Open Wedge High Tibial Osteotomy

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Objective: The purpose of this study was to evaluate the effects of low-intensity pulsed ultrasound (LIPUS) on bone healing at osteotomy sites after open wedge high tibial osteotomy (OWHTO).

Materials and Methods: Fifty-four patients underwent OWHTO without bone grafting. Twenty-seven cases treated with LIPUS (group L) after surgery were compared with 27 cases without LIPUS treatment (group C). We divided the osteotomy gap into the lateral hinge and 4 zones on anteroposterior radiography, and the progression of gap filling was evaluated at 1, 3, and 6 months post-operatively in both groups.

Results: In group L, the lateral hinge formed a union at 3 months postoperatively in 23 knees (85.2%). At 6 months, gap filling in 17 knees (63%) reached to zone 2. In group C, while the lateral hinge formed a union at 3 months postoperatively in 24 knees (88.9%). At 6 months, gap filling in 14 knees (51.9%) reached to zone 2. The progression of gap filling were 6.5%, 15.7%, and 29.1% (at 1, 3, and 6 months after surgery, respectively) in group L, while the progression levels at the same time points were 6.9%, 16.4%, and 27.3% in group C. There were no significant differences between the 2 groups.

Discussion: LIPUS did not accelerate bone healing after OWHTO.

Outcomes of Treatment with Low-Intensity Pulsed Ultrasound After Opening Wedge High Tibial Osteotomy

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Objective: We have retrospectively reviewed the outcomes of treatment with low-intensity pulsed ultrasound (LIPUS) in patients who underwent opening wedge high tibial osteotomy (OWHTO).
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