

PP-067

Histological and radiological evaluation of low intensity pulsatile ultrasound on osteointegration of fresh frozen massive allografts in rabbits

S. Kilic, M.A. Deveci, O.S. Bicer, M. Tekin, C. Ozkan, G. Gonlusen, I. Tan

Department of Orthopaedics and Traumatology, Faculty of Medicine, Cukurova University, Adana, Turkey

Introduction: The fresh frozen massive allografts are used in the treatment of musculoskeletal tumors frequently. The most important problem in these kind of massive grafts is the union of the graft to host bone. This osteointegration is a long and complicated process. The investigation of the factors that helps in union of these massive grafts will lower the complication rates and helps to improve patient satisfaction. The aim of this study is to show the effects of low-intensity pulsed ultrasound (LIPUS) to allograft osteointegration on fresh-frozen massive femoral allografts applied rabbit model.

Material and Methods: In our study, twenty four skeletally-mature New Zealand rabbits were used that the weights were among 2750 to 3250 g. They divided three groups equally. The first group are the source of rabbit femoral allografts group and the second group of LIPUS study group that will be applied, and group 3 was planned as a control group. Totally, sixteen femoral allografts were taken from both limbs of the first group of eight rabbits. Taken femoral allografts were stored in sterile packs for 4 weeks at a temperature of -80 degrees. After 4 weeks allografts were placed instead of the defects that created on femur of rabbits in both study and control groups. The allografts were fixed with two kirschner wires as intramedullary. LIPUS was applied 20 minutes per day, 6 days a week, during 8 weeks to the study group. After 8 weeks, study and rabbits were sacrificed in both study and control group, and than femurs were excised. Taira scoring was utilized for radiological examination. Statistical significance levels were 0.05.

Results: On histological examination, the study group in terms of cortical bridging callus size and type of callus achieved a statistically significant difference compared to control group ($p < 0.05$). Osteoblast / osteoclast continuum, graft vasculature and presence of live cells on the graft for the both groups was not statistically significant difference ($p > 0.05$). Radiological examination of the study group, showed statistically significant difference compared to control group ($p < 0.05$)

Conclusion: In the literature, activity on fracture healing of LIPUS has been shown in many studies. The number of studies of effectiveness for allograft (especially fresh frozen allografts that used in solid tumors surgery frequently) is less in the literature. In our study concluded that LIPUS increase the osteointegration of fresh-frozen massive allograft on rabbit femur model. With LIPUS that may be obtained successful for clinical use to patient who applied massive fresh-frozen allograft results delayed union or nonunion. However, to find the effectiveness of allograft osteointegration and this effect provides by which the mechanism that is needed more. in vitro and animal studies.

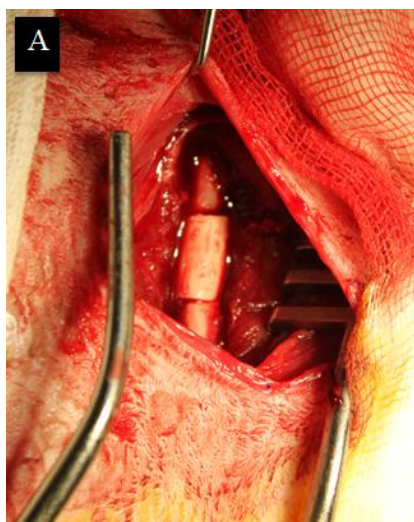


Figure 1. Massive allograft of the femur of the rabbit



Figure 2. Low intensity pulsatile ultrasound application

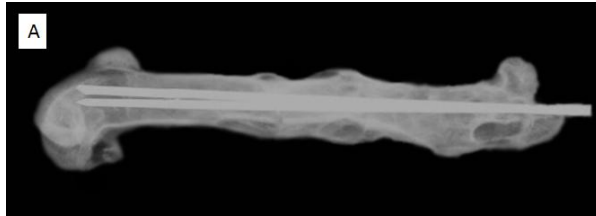


Figure 3. Union of the allograft



Figure 4. Pathological examination of the union of the allograft in ultrasound group

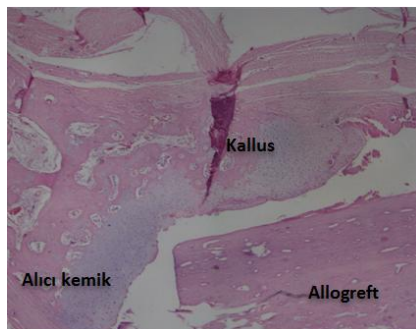


Figure 5. Pathological examination of the union of the allograft in control group