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## Vertical ridge augmentation using bone graft and dental pulp stem cells with simultaneous dental implant placement: A histologic study in a sheep model

Halis Ali Çolpak  
Erciyes University, Turkey

Dental implants are widely used for prosthetic rehabilitation of edentulous jaws. Since there are no sufficient bone height in extremely atrophic jaws, especially in posterior regions, vertical augmentation methods such as interpositional or onlay placement of autogenous bone grafts, guided bone regeneration with allografts or xenografts, alveolar distraction osteogenesis are recently being used. While practicing these methods, dental implants can be placed simultaneously or after bone formation in some cases. Simultaneous dental implant placement with augmentation methods reduces treatment time for prosthetic rehabilitation and increases patient's satisfactory. However, it was revealed in literature that vertical augmentation methods with simultaneous dental implant placement in edentulous and severe atrophic jaws have concerned results for obtaining vertical regeneration. Many researchers aim to rehabilitate vertical defects with stem cell applications in light of developments in tissue engineering. In this study, bone grafts to heighten alveolar bone vertically and dental originated stem cell application with simultaneous implant placement and expected vertical height and bone tissue around implants was evaluated histologically and histomorphometrically. Iliac bone obtained from sheep was found to be similar histologically with human mandible in previous studies. Two-sided bone regeneration was applied in six sheep ileuses. Implants were placed in ileus 7mm inside the bone and 3mm out of bone level. Only collagen membrane in Group 1(control), deproteinized bovine bone graft and collagen membrane in Group 2 (graft), deproteinized bovine bone graft and collagen membrane and dental pulp originated mesenchymal stem cell in Group 3 (stem cell) were placed on exposed surfaces. After 3 and 6 weeks of healing periods, sheeps were sacrificed. Histological samples were prepared and evaluated histologically and histomorphometrically. New vertically bone formation around the implants in third week was similar in Group 2 and Group 3 and it was more than Group 1. In Group 3, newly bone formation around implants less than Group 2 although similar bone formation as host bone in Group 3. As a result, guided bone regeneration with a combination of particles DP-MSCs and collagen membrane is a promising method for vertical augmentation of alveolar bone with simultaneous dental implant placement. Application of DP-MSCs may not provide a significant however may be useful for early bone formation and maturation.

halisalicolpak@gmail.com