A Comparative Study On The Early Bone Formation At The Adult Dogs Femur Peri-implant Defect Of CGF Graft And PRF Graft.

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INTRODUCTION

As modern medicine develops, human life expectancy has been prolonged resulting in increase of geriatric population and requirement for prosthetic restoration for tooth loss. Since many of geriatric patients want fixed partial prosthetic, implant restoration has been widely used for restoration. In case of patients who lost their teeth due to periodontal disease, most of cases are not suitable for implant placement because of alveolar bone destruction.

To perform a bone graft, a donor area is required, and the ramus and chin are suitable. Nonetheless, for other donor areas, surgical treatment might be required, potentially causing discomfort and complications.[3,4] Therefore, recent efforts have been made to solve these problems by using concentrated growth factors obtained from autologous blood.

This study evaluated whether PRF and CGF could replace bone graft materials by examining early bone formation capacities of PRF and CGF at peri-implant defects. In addition, as representatives of the growth factors contained in PRF and CGF, TGF-ß and VEGF were analyzed quantitatively by ELISA, and the difference between CGF and PRF was evaluated by electron microscopic examination.

MATERIAL AND METHOD

Four bony defects of 8 mm were formed, and 3.7*10 mm implants were placed at right femur. The PRF, CGF, and synthetic bone were grafted to the bony defect area. The total amount of new bone forming area was calculated according to the percentage of the total region between the threads. ELISA quantitative analysis and the microscopic analysis of the fibrinogen structure were performed.

RESULT

Table1.New bone formation area (NBFA) at 2 and 4 weeks after implant placement (Mean±SD%)

Time period	Control	CGF	PRF	Bone
2 weeks	11.17± 13.7	38.00± 11.4	19.75± 18.6	49.75± 25.2
4 weeks	11.33± 13.9	52.33± 19.7*	21.00± 17.5	69.00± 15.9*

Table2.Bone to implant contact (BIC) at 4 and 8 weeks after implant placement (Mean±SD%)

Time period	Control	CGF	PRF	Bone
2 weeks	11.83± 14.2	32.5± 14.7	22.75± 20.1	55.50± 26.2
4 weeks	12.50± 15.78	53.33± 14.7	30.60± 30.7	69.33± 20.6*

Table3.Quantity of released VEGF in PPP layer (Mean±SD)

	CGF	PRF
VEGF (pg/mL)	69.24±47.0	38.28±22.7

Fig 1. Histopathologic findings of control group at 4 weeks show little bone-implant contact (BIC) around the implant (asterisks) and new-bone formation in the defect area (a).

Fig 2. Histopathologic findings of CGF graft at 4 weeks show good bone-implant contact (BIC) around the implant (asterisks) and new-bone formation in the defect area (a).

Fig 3. Histopathologic findings of PRF graft at 4 weeks show relatively good bone-implant contact (BIC) around the implant (asterisks) and new-bone formation in the defect area (a).

Fig 4. Histopathologic findings of alloplastic bone graft at 4 weeks show better bone-implant contact (BIC) around the implant (asterisks) and new-bone formation in the defect area (a).

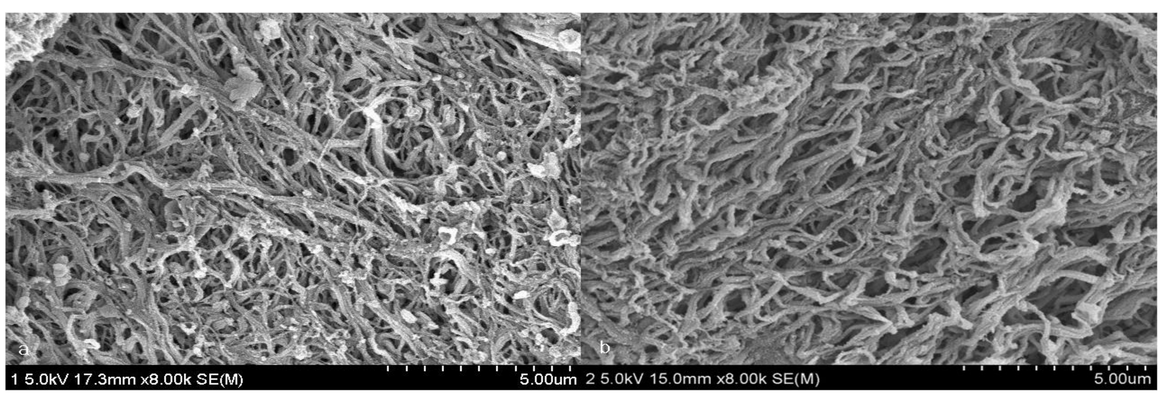

Fig 5. SEM analysis of PRF(a) and CGF(b).

DISCUSSION

The shortcoming of allogenic bone grafts or xenogenic bone grafts is their high cost. To overcome such shortcomings, recently, treatment methods that show good results by grafting platelets obtained from the blood of patient have been introduced. Among them, PRF showed good results and has thus been used widely in the dental field until recently.[15,16] However, after the method of concentrating platelets as CGF was introduced, it began to be used as a new material to replace bone grafts.

CONCLUSION

CGF showed better new bone formation rate in peri-implant bone defects than PRF. Although more new bone formation was observed histologically with CGF, it is difficult to consider difference between growth factor contents of each as main reason. Thus more research is needed. Because the volume of bone formation for CGF was smaller than that of the synthetic bone graft material, CGF could not completely replace the bone graft materials.