Research Journal of Biological Sciences 3 (11): 1317-1319, 2008
ISSN: 1815-8846

Histological Evaluation of Periodontal Regeneration Due to Using Collagen Membrane (Paroguide) in Surgical Defects of Sheep Teeth

F. Abbassi, H. Semyari and R. Haghgoo
Department of Periodontology, Dental School, Shahed University, Tehran, Iran

Abstract: This study evaluates the effect of paroguide membrane on periodontal regeneration process. The buccal surfaces of 2nd mandibular premolar of 4 sheep were selected. Then, a 5 mm deep defect was made from mesial to distal of tooth. Next, the shallow cementum of root was taken and the defect was covered with a sheet of paraguide membrane. After the flap was stitched, post operation and hygienic care were taken into consideration for 6 months. Finally, the sheep were slaughtered and the operated areas were examined histologically. The result indicated that APDL had occurred regularly and practically. No inflammation existed in the tested area. The mean bone regeneration was 60%. The generated bone was of Lamina type. Cementum formation was 4.01 mm consisting cellular and acellular cementum.

Key words: Regeneration, surgical defect, histological study, sheep

INTRODUCTION

Periodontal treatments are divided into Resection and regeneration therapy. The purpose of regenerative treatment is the regeneration of periodontal tissue which takes place in different procedures. Rehabilitation of periodontium is in peak of successfulness when new cementum, bone and periodontal ligament with functional orientation form after treatment. Attainment of this object is through preventation of accumulation of epithelial and connective cells in defect area and induction of undifferentiated cells of periodontal ligament to the defect (Gottlow *et al*., 1984). Using absorbent or non-absorbent membrane are among these procedures.

Collage membrane, which is the most comman substance in periodontal lesions, could be absorbed and metabolized physiologically. It has chemo tactic effect on fibroblasts (Polson and Proye, 1983) as well as haemostatic one.

Collagen is a weak immunogene therefore; it doesn't induce acute immunologic response. It works as a guide to undifferentiated cells which are taken from PDL courses, adhesion, orientation, migration and proliferation which leads to new attachment formation. The need for a membrane which spontaneously absorbs has increased applying mouse membrane, bovine membrane, cartilage membrane from bovine serum, polylactic acid, polyglaction 910, vycril, biobranle and Freeze dried duramatter have been examined (Chung *et al*., 1990).

Among the Collagen membranes is Paroguide which is derived from bovine collagen. Thus, this study attempts to evaluate its effect on peridontal regeneration.

The purpose of this study was histomorphometric evaluation of rate of regeneration of periodontium due to using of collagen membrane.

MATERIALS AND METHODS

Design of this study was clinical trial. This study was conducted at Shahed university in Jnne 2005. This research was carried out on four sheep. On the buccal site of the left mandibular premolar, one sulcular and two vertical flaps were made From mesital to distal line to remove 5 mm of buccal bone from teeth root, so that the root was exposed. After taking the cementun layer by a hardpiece, a 5 mm dept notch was made on the root surface by a bur.

The surface was irrigated with physiologic serum, then peroguide membrane was placed on the exposed areas.

Next, the flap was sutured using a catcut 4/0 thread. Moreover, cheek muscles and skin along with the mucus were sutured with the same threat. On the right side which was the control site, the process, was carried out without using paroguid membrane.

Antibiotic therapy was started through injecting 6.3.3 penicilline and stereptomicine 1g day^{-1}. Inaddition, The area was irrigated by 0.2% chlorhexidine solution

Corresponding Author: H. Semyari, Department of Periodontology, Dental School, Shahed University, Tehran, Iran

twice a day. After 6 months, the sheep were slaughtered and the experimemtal areas were removed using Enblock technique. Ten percent formalin solution was put on the area fixation for 2 weeks.

The samples were dipped into Acid formic for 3 weeks for decalcification. Then, they were irrigated and were put first in chohol with ascending concentration.

Next, in methyl salicilat for brightness. Third, they were put in parafine, so that a block section with 5 μ thickness was obtained by using microtome. The sections were dyed with hematoxiline and were studied by photomicroscope. Thus, the following parameters were evaluated:

- The regenerated bone.
- The regenerated cementun.
- PDL.

RESULTS

Four samples in the experimental group, 3 samples in the control group and 2 unoperated samples were evaluated on the whole.

From a histological aspect, in the unoperated samples, the root was covered by acellular cementum which had become thick on the apex.

PDL was unconjugated with regular collagen fibers and scattered fibroblasts. Further more, the alveolar bone included lamellar matured bone, with osteocytes and osteoblastic layer (Fig. 1).

In the experimental groups, formation of new bone in the defected area was obvious. The bone had lamellar with osteocytes and osteoblastic layer. moreover, fibrosed bone marrow space could be seen in the bone. Regular periodontal ligament with certain collagen bundles and giant fibroblast cells were formed between bone and tooth. Fibros tissue was slightly conjugated; however, no foriegn body reaction was observed. In all samples, formation of cellular and acellular cementum with certain cementoblasts were found (Fig. 2 and 3).

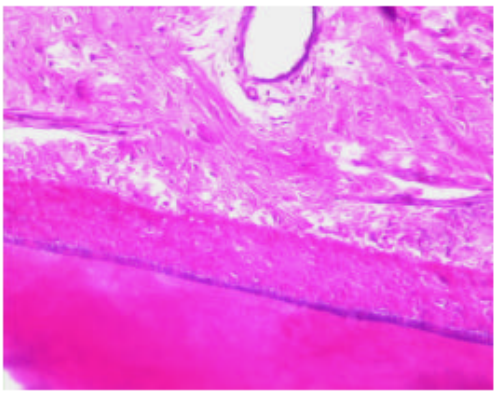

Fig. 1: Normal periodontium

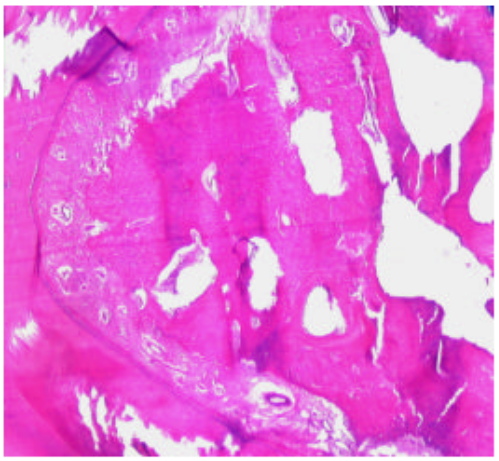

Fig. 2: Experimental group (H&E: 40)

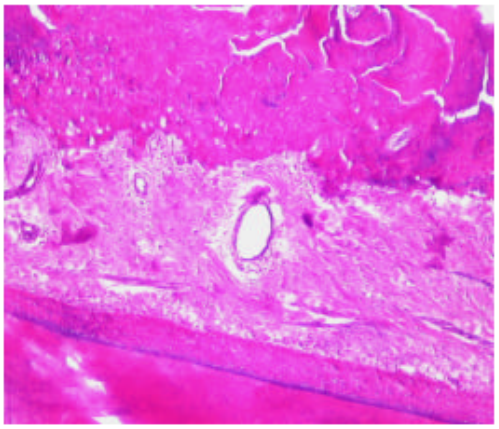

Fig. 3: Experimental group (H&E: 200)

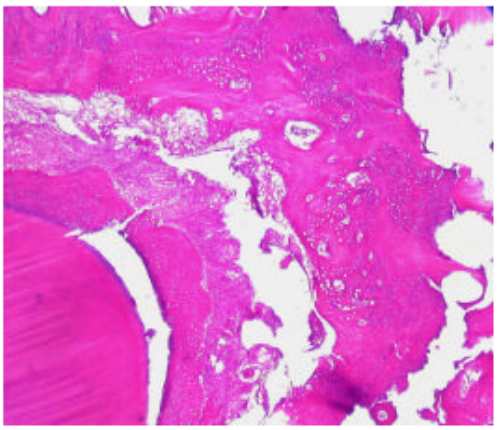

Fig. 4: Control group

In the control group, bone formation occured but less than experimental groups, However the bone was matured lamellar with osteocytes and osteoblasts.

In addition, Acellular and cellular cementum were formed. PDL was more conjugated and fibrosed with less regular collagen Fibers (Fig. 4).

DISCUSSION

In recent years, healing and regeneration are viewed as 2 separate stages. Healing is a biologic process in which continuity and consistancy of tissues will be regained.

On the other hand, Regeneration is also a biologic process in which the lost structure and function will be generated. One of the main limitations of periodontal regeneration is immigration of epithelium along the roots. Preventing this is considered the main aims of guided healing of tissues (Nyman, 1982).

Today, using membranes prevents the immigration of junctional epithelium along the root.

Undifferentiated cells in bone and PDL will cover the bare root surface and cause tissue regeneration. Actually, the undifferentiated cells near the cementum will convert into cementoblast by accepting stimulation of previous dentinal and cementum glygoproteins and they begin to generate new cementum.

While, undifferentiated cells next to gingival surface and mucusal tissue will convert into fibroblasts by accepting stimulation of regional fibroblasts and collagen. Then, they generate collagen fibers of the PDL. Thus, the undifferenciated bone cells will complete the periodontal regeneration.

Finally, in the new attachment area cementum, bone and PDL fiber Regeneration occurs. Peroguid membrane placed on the defected area, prevents the imigration of junctional epithelium. Active existence of PDL undiffrentiated cells leads to regeneration of the defected area.

Paroguide member has two surfaces, one is smooth and the other is rough. The rough side is placed on the defect. Thus, a space is created under which coronally migration of PDL cell is prevented. It also facilitates periodontal regeneration. In this study, for both experimental and unoperated groups, regular and functional PDL fibers were formed. In 25% of the control group fiber formation was regular, whereas 75% was irregular and nonfunctional. in the experimental group slight conjugation existed, however, no conjugation was observed for the unoperated group. A 25% of the control group showed acute, scattered conjugation; while, 75% revealed mild scattered conjugation. Nevertheless No foreign body reaction was detected in both groups. Moreover, the mean of bone regeneration was 3.01mm in the experimental group.

This indicates 60.2% Regeneration of the defected area was regenerated.

On the other hand, the mean of control group was 2.12 mm which indicated 42.4% of the defected area.

It can be concluded that 17.8% improvement of the bone regeneration can be attributed to using paroguide membrane.

In addition it was observed that the mean of control group for the cellular and acellular cementum regenaratin was 2.78 mm, which reveals an improvement of 1.23 mm. This can also be attributed to the application of paroguide membrance. The result are compatible with (Miremadi, 1994, 1995) study, in which the mean of bone defect regeneration was 52%. They were (Beker's, 1987) also similar to Mr. beker's research in which the obtained mean was 30% as mentioned before, an improvement of 60.2% was achieved in our study.

CONCLUSION

PDL was occurred regularly and functionally and no inflammation was existed in tested in tested a row the mean bone generation in the tested area, was 60.2% of the defeat, the generated bore was lamina bone type. The nesemnt formation was 4.01% mL and consisted of cellular and aceluller segment conclusion.

REFERENCES

Becker, W., B.E. Becker and J. Prichard, 1987. Root islation for new attachment procedures: A surgical and suturing method (3 case Reports). J. Periodontal., 58: 819.

Chung, K.M., L.M. Sakin and M.D. Stein, 1990. Clinical evaluation of a biodegradable collagen membrane in guided tissue regeneration. J. Periodontal., 61: 732.

Gottlow, J., S. Nyman and J. Lindhe, 1984. New attatchment formation as a result of contolled tissue regeneration. J. Clin. Periontal., 11: 494.

Miremadi, 1994. Khoshkhoonnejad, tahery sabet: Clinical evaluation of use of collagen membran, thesis no. 181, Tehran University, pp: 124.

Miremadi, 1995. Khosh khoshkhoonnejad, taleghani: Clinical Evaluation of use of membran, thesis no 192, Tehran University. Chap, 2: 30-35.

Nyman, S., J. Gottlow and T. Karring, 1982. Regenerative potential of the periodontal ligament. An experimental study in the monkey. J. Clin. Periodontol., 9: 257.

Polson, A.M. and M.P. Proye, 1983. Fibrin linkage: A precursor for new attachment. J. Periodontal., 54: 141.