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Augmentation of alveolar part of mandible with CGF (concentrated growth factors) after multiple extractions – a case report

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Abstract

Concentrated growth factors are one of platelet-rich plasma preparations (PPP), specially prepared in medical centrifuges. Due to high concentration of blood platelets, which reveal different sorts of growth factors, CGF stimulates wound healing, reduces post-operative complications, such as pain and swelling. The article presents a case of a 21-year-old-patient who underwent the augmentation of alveolar part of mandible with CGF after extractions of teeth 36, 37 and 38. The post-operative period, with follow-ups after one week and one-month post surgery, showed positive influence of applied plasma preparation.

Keywords: CGF, concentrated growth factors, PPP, CD34+, centrifuge, implantology, oral surgery, extraction, multiple extractions, augmentation.

Introduction

Wound healing is a combined process leading to create a stable soft tissue or bone structure. Clinical trials focusing on new substances improving wound healing are important region of interest for physicians.

CGF is one of PPP (platelet plasma preparations). The main feature of CGF is high platelet concentration in small volume. Key factor in tissue regeneration is obtaining growth factors, released from platelets concentrated in CGF material, which decrease the risk of post-operative pain, inflammation or other complications [1].

Main growth factors stimulating wound healing are platelet- derived growth factor (PDGF), fibroblast growth factor (FGF), insulin- like growth factor (IGF), transforming growth factor- β1 (TGF- β1) and β2 (TGF- β2) and vascular endothelial growth factor (VEGF) [2].

CGF same as PRF do not require any tubes with anticoagulants. The main technical difference in obtaining CGF and PRF are centrifugation speeds. CGF consists of fibrin blocks, denser, larger and richer in growths factors compared to PRF. It leads to better regenerative potential of CGF material. CGF is described by four phases: 1) superior platelet poor fraction; 2) interim fibrin block; 3) liquid phase reach in growth factors; 4) lower red portion containing red blood cells.

After eliminating the lesion, the post-operative cavity is susceptible to potential infection. It is important to use methods, which stabilize the clot and thereby decrease the risk of wound contamination. One of these methods is exactly CGF material application [3].

Case report

21-year-old patient was referred to the Oral Surgery Department for the extraction of teeth 17, 16, 26, 38, 37, 36, 47 and 48 (Fig. 1, 2). Patient did not agree to endodontic treatment of teeth 17 and 37.

Patient had no relevant medical history, no drug allergies, and no history of significant surgery procedures in the past or drug treatment.

Extra oral examination showed no abnormalities, whereas the intra oral examination revealed few teeth with clinical crowns destroyed by carious process. Seven teeth were qualified for extraction. Taking into consideration the extensiveness of the surgery procedure in the third quarter of oral cavity and future dental implants placement, the augmentation with CGF material was planned.

The patient was presented with treatment plan and after obtaining the consents; pre-operative medications and laboratory blood tests were recommended and surgery was scheduled.

The patient was informed about postoperative recommendations and obligatory follow-up the day after surgery, one week and one-month post surgery.

Patient's blood was collected to special plastic tubes and placed into centrifuge (Silfradent MF200 Cells Separator) before the beginning of the procedure. In local block anesthesia teeth 36, 37 and 38 were extracted (Fig. 3). Curettage of bone was performed. Post-extraction bone defect was filled with the content of eight CGF tubes (Fig. 4, 5). Three of them were used to prepare CGF

membranes to cover dental sockets (Fig. 6). The wound was sutured (Fig. 7). Patient received post-operative recommendations.

Intra- and postoperative period passed without complications. Follow-up examination was performed the day after surgery. Proper healing of the wound was observed, mild swelling of left cheek and only slight pain. The patient took no analgesics or antibiotics. Next follow-up and sutures removing were appointed in one week.

Seven days after surgery sutures were removed. Patient did not report any complaints. Swelling of left cheek was not observed. The wound was completely healed.

One month after surgery, follow-up presented well-healed alveolar part of mandible, prepared for dental implant placement (Fig. 8).

Discussion

Regenerative medicine is becoming more and more popular these days, particularly in a field of surgery procedures. Post-operative defects reconstruction using autogenic materials, which induce bone and soft tissue healing should become stable part of the surgery protocol.

Regenerative properties of CGF result from high concentration of growth factors revealed from blood platelets. Growth factors belong to the group of substances, which stimulate proliferation, differentiation and growth of cells. A few of platelet growth factors are TGF- β1 and TGF- β2 – transforming beta growth factors, PDGF – platelet-derived growth factor, FGF – fibroblast growth factor, VEGF – vascular endothelial growth factor, IGF – insulin-like growth factor[4]. Four of them, TGF-β, FGF, VEGF and PDGF are considered to stimulate bone healing in osteconduction process [5]. In CGF material the presence of VEGF, TGF-β and also CD34+ haematopoietic cells was proved [2].

Applying CGF materials enhance osseointegration process, which is particularly important in implantology [6]. Also sinus lift procedures with the use of concentrated growth factors have been described [7]. Namely in periodontology CGF was used in vertical and horizontal bone defects treatment [8, 9].

The main purpose is reaching more and more predictable reconstruction treatment results and shortening convalescence period.

Application of Concentrated Growth Factors into larger than dental socket bone defects was also described in the case of cyst removal [3].

Concentrated Growth Factors material can be mixed with bone autografts or xenografts and used as “sticky bone”. The whole structure is then denser and on post-operative radiographs bone defect is almost unnoticed. Autogenic materials, created by centrifuging patient’s blood are certainly an important direction in regenerative medicine.

In the presented case application of Concentrated Growth Factors into post-extraction defect significantly decreased post-operative pain, swelling and necessity of analgesic or antibiotics intake. Also the period of wound healing was shortened. No alveolar osteitis was observed.

Despite the fact that preparation and application of CGF requires professional devices, blood collecting abilities and prolong whole surgery procedure, advantages of Concentrated Growth Factors enforce the theory of its indisputable role in regenerative medicine.

Due to the fact, that wound healing process is regulated by tissue environment factors, including growth factors; it seems to be a proper direction in applying CGF materials in clinical practice.

Conclusions

Application of CGF material after teeth extractions reduces pain and drugs intake and also accelerates wound healing.

Alveolar augmentation process inhibits its atrophy and allows for better local conditions for dental implants placement.

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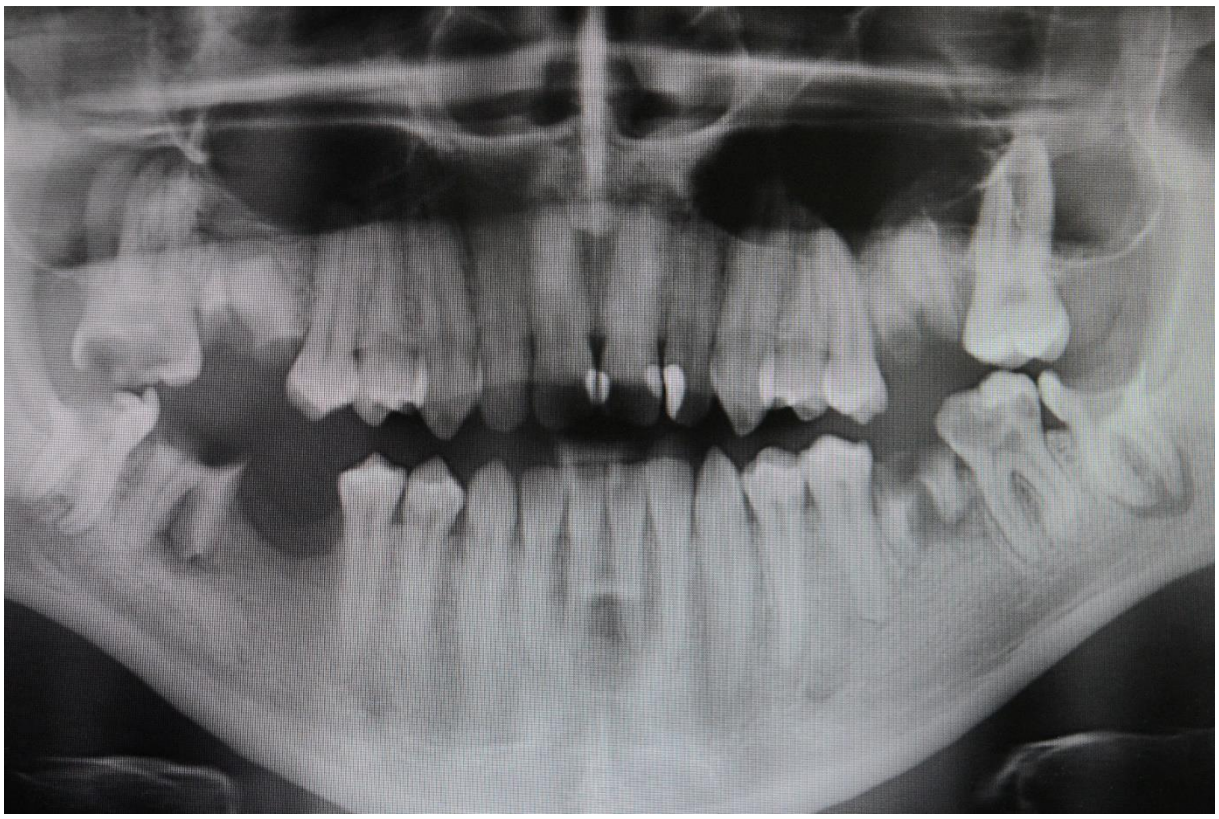

Fig. 1. Preoperative panoramic radiograph.

Fig. 2. Intraoral view on teeth 36, 37 and 38.

Fig. 3. Clinical situation after teeth extraction.

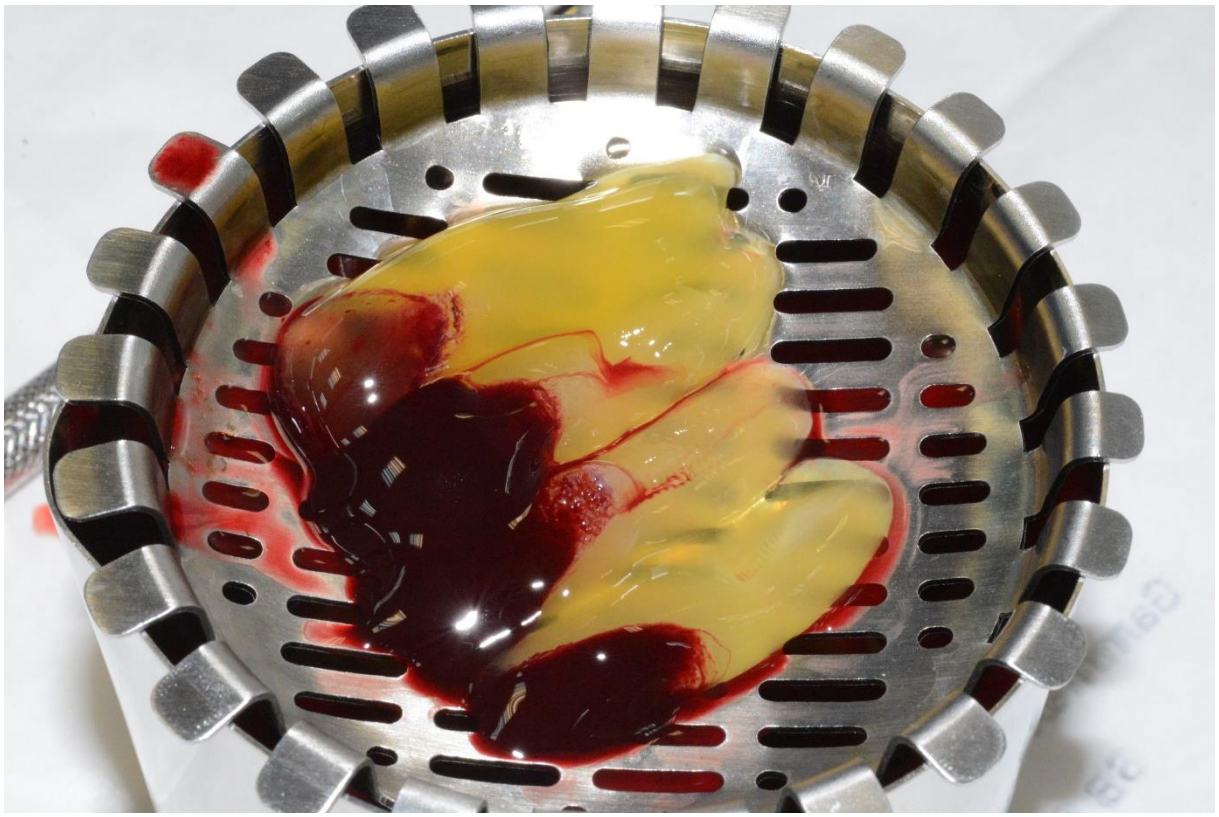

Fig. 4. Blood samples after centrifugation.

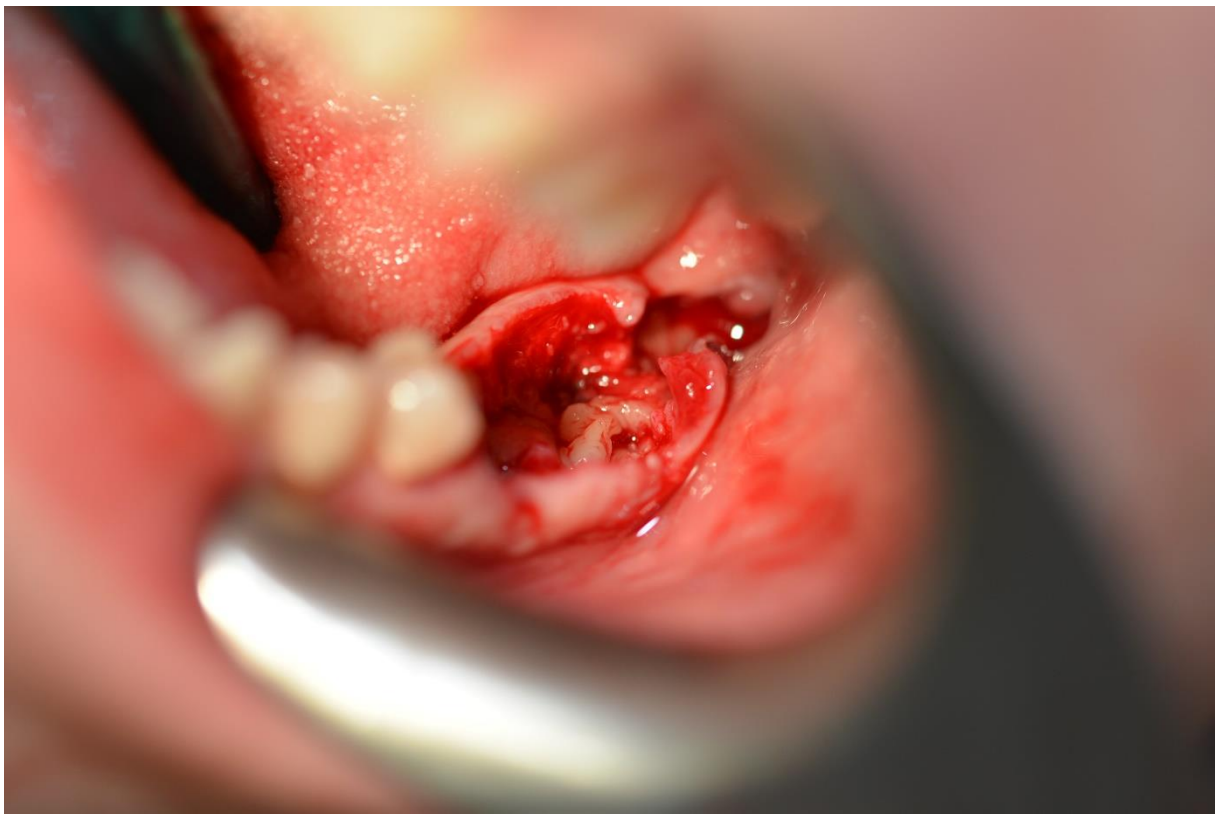

Fig. 5. Partially filled teeth sockets with CGF material.

Fig. 6. Fully filled teeth sockets, covered with CGF membrane.

Fig. 7. Clinical situation after suturing.

Fig 8. Follow-up one month after surgery.