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Extraction of totally impacted lower third molar with CGF (concentrated growth factors) application into a post-extraction bone defect – a case report

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Abstract

Concentrated Growth Factors (CGF) are obtained after blood collecting and its centrifuging. As an autogenic material it gains an advantage over xenogeneic materials used in regenerative procedures. Due to high concentration of growth factors and CD34+ cells in such a small volume, CGF promotes tissue regeneration. The following the article presents a case of 32-year-old-patient who underwent the augmentation of the post-extraction bone defect with CGF after the extraction of totally impacted lower third molar. Reduction of post-operative complications was observed.

Key words: third molar, CGF, concentrated growth factors, PPP, CD34+, centrifuge, oral surgery, extraction, impacted tooth.

Impacted teeth are those, which are not present in dental arches (hidden in jawbones) after the time of their physiological eruption and ones with fully formed roots. Impaction state is also described, when the analogic tooth eruption on the other side of dental arch occurred half a year earlier, in comparison with the impacted one, and its root formation is completed [1].

Surgical extraction of impacted third molars is one of the most often-performed surgery procedures. Sometimes making a decision and planning third molar extraction causes a lot of difficulties, particularly in case of asymptomatic impacted third molars. Prophylactic indications are not always convincing enough for some doctors. Indications, subsequent complications and benefits for the patient should be taken under consideration [2].

CGF material is produced in special centrifuges, which use different speeds in one cycle. After collecting blood into 9 milliliters plastic tubes, the special centrifuging protocol is introduced: 30 seconds acceleration, 2 minutes at 2,700 rpm, 4 minutes at 2,400 rpm, 4 minutes 2,700 rpm, 3 minutes at 3,000 rpm and 36 seconds deceleration and stopped. Medifuge MF200 centrifuge by Silfradent is used in the aforementioned procedure [3].

Growth factors such as fibroblast growth factor (FGF), platelet-derived growth factor (PDGF), insulin-like growth factor (IGF), transforming growth factor-β1 (TGF-β1) and β2 (TGF-β2), vascular endothelial growth factor (VEGF) accumulated in CGF material are released from blood platelets. Particularly VEGF and TGF- β1 are present in Red Blood Cells layer of centrifuged plasma [4].

Case report

32-year-old patient was referred to the Oral Surgery Department for the extraction of the lower right wisdom tooth. OPG examination was performed. Patient's medical history was irrelevant, and showed no drug allergies. No significant surgery procedures in the past. Also the patient denied taking any mediations on a regular basis.

In extra oral examination no abnormalities were found. Intra oral examination revealed full dentition with partially impacted lower left third molar and totally impacted lower right third molar (Fig. 1). Taking into consideration the extensiveness of the surgery and potential post-operative complications, it was decided to place CGF material in the post-operative bone cavity.

The procedure plan was presented to the patient. All the surgery permissions were collected. Pre-operative medications and laboratory blood tests were recommended, and the surgery scheduled.

The patient was informed about the possible post-operative complications, particularly inferior alveolar nerve (IAN) function impairment. The details of postoperative recommendations and plan of obligatory follow-ups the day after surgery, one week and one month after surgery were presented to the patient.

Patient's blood was collected to special plastic tubes (Fig. 2) and placed into centrifuge (Silfradent MF200 Cells Separator) before the beginning of the procedure (Fig. 3). In local field block anesthesia the extraction of totally impacted lower right wisdom tooth was performed (Fig. 4, 5). Curettage of bone was performed. Post-operative bone defect (Fig. 6) was filled with the content of eight CGF tubes (Fig. 7, 8, 9). The wound was sutured (Fig. 10). Patient received post-operative recommendations; also antibiotic and analgesic therapy was introduced.

Intra- and postoperative process was uneventful. Follow-up examination was performed the day after operation. Proper healing of the wound was observed, along with mild edema of right cheek and slight pain, but with no IAN disfunction. Next follow-up and sutures removing were appointed in one week.

Seven days after the surgery sutures were removed (Fig. 11). Patient did not report any complaints. Edema of left cheek was not observed. IAN disfunction did not occur. The wound was completely healed.

Discussion

Regenerative medicine plays more and more significant role in oral surgery procedures, particularly the use of platelet preparations such as CGF or PRF. Not only do they regenerate bone defects, but also decrease post-operative complications with benefits for the patient. Their specific properties are associated with growth factors released from blood platelets.

Growth factors (GF) are biological substances that regulate a lot of biological processes including wound healing. The main GF accumulated in blood platelets are Tumor Necrosis Factor (TNF), Vascular Endothelial Growth Factor (VEGF), Transforming Growth Factor (TGF), Platelet Derived Growth Factor (PDGF), Brain Derived Growth Factor (BDNF), Bone Morphogenetic Proteins (BMP) and Insulin-like Growth Factor (IGF)[3]. TGF-β, FGF, VEGF and PDGF are reckoned to support bone regeneration in osteoconduction process. It was proven in clinical trials, where growth factors such as BMP – bone morphogenic proteins from TGF-β family factors were used to stimulate bone regeneration in alveolar ridge augmentation or sinus lift procedures [5].

It may be supposed that CGF application contribute to IAN regeneration, due to the presence of BDNF in CGF material. Thereby the possible IAN impairment may be significantly reduced.

One of the prospective studies, focusing on the damage of inferior alveolar nerve (IAN) presents that about 1,3% of third molars extractions cause temporary IAN function impairment. Namely 25% of these cases remain permanent[6]. Despite the fact that IAN disfunction after third molars extraction occurs rather rarely it is worth applying CGF material to minimalize the possible neural complications.

In the presented case application of Concentrated Growth Factors into post-extraction defect significantly decreased post-operative pain and necessity of analgesic intake. Also the period of the wound healing was significantly shortened. No alveolar osteitis was observed. The impairment of IAN function did not occur. Therefore application of materials reducing complications and increasing benefits should be a gold standard after third molars extractions. Application of CGF materials into bone defects such as jawbones cysts was described by some authors [7]. It seems to be a right way to applicate it also into bone cavities after third molars extraction.

CGF is also used with good results in the treatment of intrabony periodontal defects and in periodontal soft tissue and bone augmentation [8, 9]. It may reduce the risk of gingival recession in the region of lower second molars, where incisions are performed to create a soft tissue flap before third molars extraction.

All above information seems to be a strong argument in CGF application after extractions of impacted lower third molars.

Conclusions

Application of CGF material after teeth extractions reduces post-surgery pain.

Due to the presence of growth factors in CGF material, the potential IAN impairment after wisdom tooth extraction is minimalized.

Application of concentrated growth factors accelerates wound healing and reduces the risk of periodontal defects occurrence.

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Fig. 1. Intraoral view on operative region.

Fig. 2. Blood collecting.

Fig. 3. Plastic tubes placed in centrifuge.

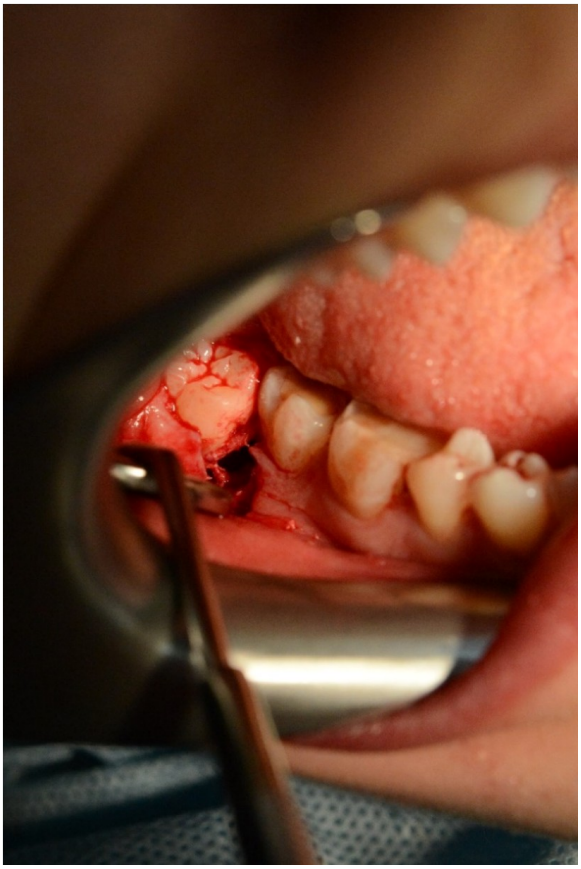

Fig. 4. Intraoperative view on almost extracted lower third right molar.

Fig. 5. Extracted tooth 48.

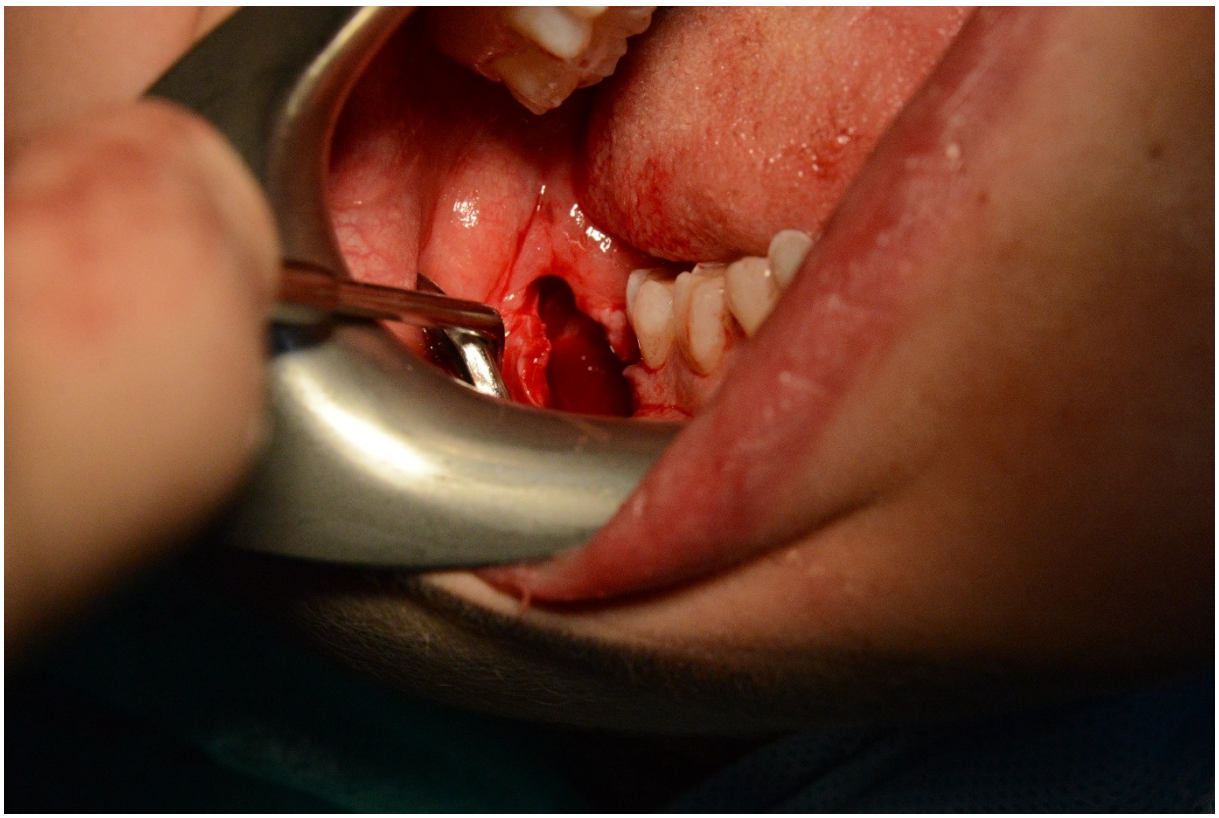

Fig. 6. Post-operative bone defect.

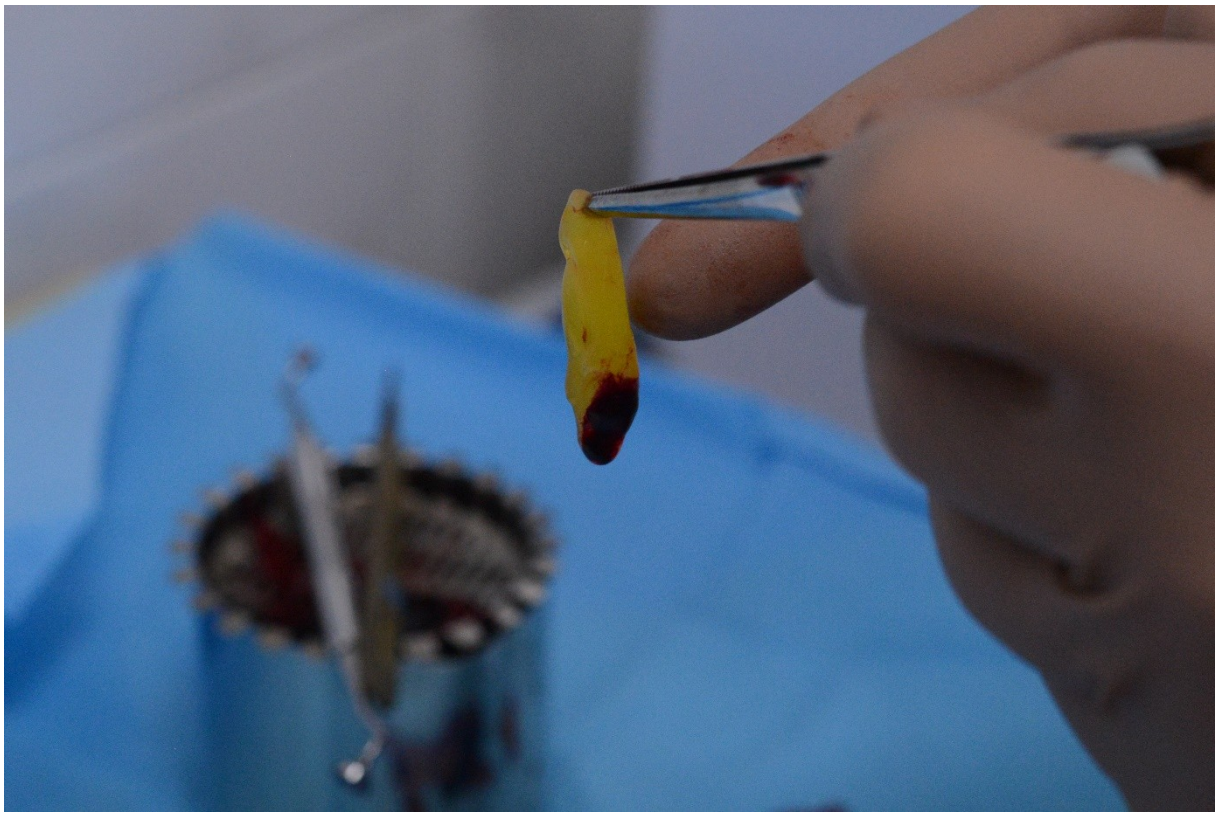

Fig. 7. Blood sample after centrifugation.

Fig. 8. Bone defect filled with CGF material.

Fig. 9. Bone defect filled with CGF material.

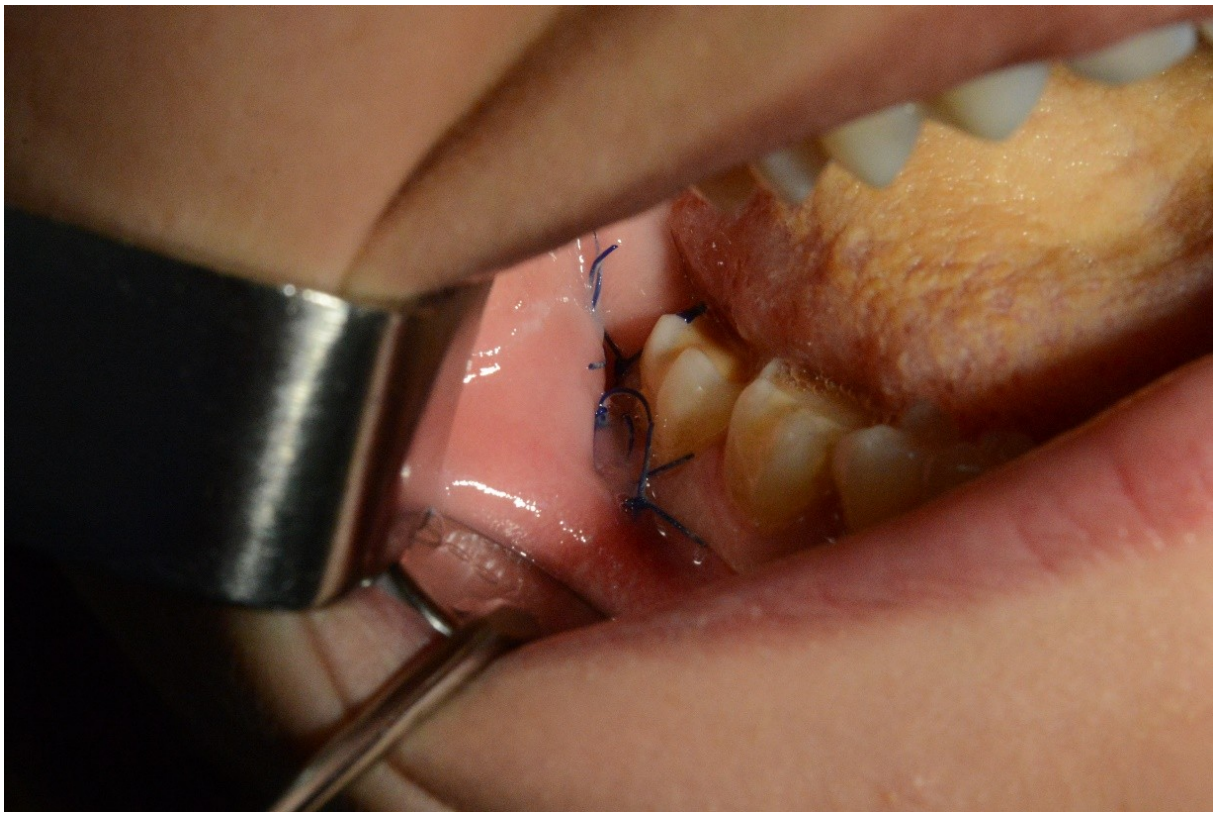

Fig. 10. Follow-up one week after surgery.

Fig. 11. Follow-up two weeks after surgery.