

TITLE: MANAGEMENT OF IMMATURE NON VITAL TOOTH USING CONCENTRATED GROWTH FACTOR (CGF) – A CASE REPORT

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INTRODUCTION: In case of teeth with open apices we have two treatment options –apexogenesis & apexification. Apexification is generally done using materials like calcium hydroxide, biodentine or MTA (to form the apical barrier) followed by obturation using custom made or thermoplasticised gutta percha whereas Apexogenesis is generally done by inducing bleeding into the root canal space to encourage physiological root formation. There are also some case reports in literature where apexogenesis has been successfully carried out using PRF. Apexogenesis is advantageous compared to apexification as it leads to increase in root thickness and root length thereby improving the long term survivability of the teeth.

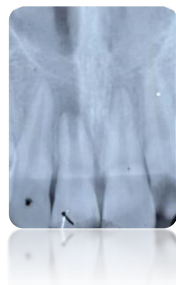
CGF is a novel 2nd generation platelet rich concentrate developed by Sacco in 2006. CGF is fibrin rich organic matrix which contains growth factors, platelets, leukocytes and CD34+ stem cells which help in regenerative process. Unlike PRF , CGF uses a variable rpm for centrifugation, and this results in a fibrin rich block that are much larger, denser and richer in growth factors than PRF. This case report explains a case of apexogenesis done using CGF.

CASE DISCUSSION:

A 15 years old male patient reported with the chief complaint of discolouration & pain in upper front teeth region for past 5 years. Patient gave a history of trauma in upper front teeth 7 years back. There was no relevant medical & dental history.

On clinical examination , Ellis class II fracture with yellowish discolouration was noted in 11 & Ellis class II fracture was noted in 21. Tenderness to percussion was positive in 11 & negative in 21. EPT showed no response in 11 and 21 was found to be vital. Intraoral Periapical radiograph (Fig 1) revealed open apex with periapical rarefaction in relation to 11.

Fig .1 : PRE OPERATIVE RADIOGRAPH



Diagnosis was given as Pulpal necrosis with symptomatic apical periodontitis in relation to 11 & Ellis class II fracture in 21. Treatment was decided as Regenerative Endodontic procedure using CGF in 11 followed by Full crown and Composite restoration in relation to 21.

PROCEDURE:

In the First visit access cavity was prepared under rubber dam isolation. Working length was determined as 19mm. The root canal was irrigated with 20ml of 1.5% sodium hypochlorite for 5 minutes followed by 20ml of 17% EDTA (DEOR) for 5 minutes. Intracanal medicament of Triple Antibiotic paste 1:1:1 of Ciprofloxacin (400mg) , Metronidazole (500mg) and Minocycline (100mg) was placed for about 15 day

In the second visit root canal was again irrigated with 17%EDTA solution. 10ml of patient's venous blood was drawn , transferred to a sterile Vacutech tube. CGF was prepared using Medifuge (MEDIFUGE, SILFRADENT, SOFIA , ITALY) machine (Fig.2). The Centrifuged product obtained (Fig.3) was shredded into pieces using sterile scissors and packed into the canal such that CGF is 3-4 mm apical to the Cemento enamel junction (Fig.4) . 3-4mm of biodentine(SEPTODONT) was placed over it .The access cavity was sealed with Glass Ionomer Cement(Fuji II).Immediate post operative radiograph was taken (Fig. 5)



Fig.2: MEDIFUGE

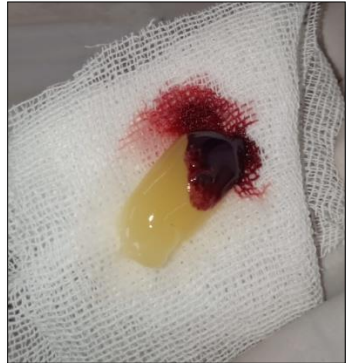


Fig.3: CONCENTRATED GROWTH FACTOR (CGF)



Fig.4 : CGF COMPACTED INTO THE

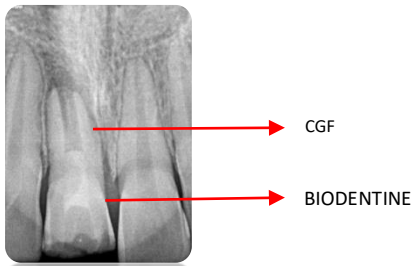


Fig. 5 : POST OPERATIVE RADIOGRAPH

Fig.6 : 3 MONTHS FOLLOW UP



THIN CALCIFIC BARRIER FORMED IN THE THIRD MONTH

In the third month postoperative radiograph (Fig. 6) calcified barrier could be appreciated in the Apical third of the tooth between the coronal biodentine & tooth apex. This calcified barrier seemed to increase in thickness with time (Fig. 7). The case was followed up for 1 ½ years and was found to be asymptomatic (Fig. 8). Full ceramic crown was placed in 11 and composite restoration was placed in 11 (Fig.10)

Fig.7: AT 6 MONTHS



Fig.8 : AT 1 ½ YEARS



THE CALCIFIC BARRIER INCREASED IN THICKNESS WITH TIME

Fig.9 : PRE OPERATIVE



Fig .10 : POSTOPERATIVE



DISCUSSION:

CGF is an autologous preparation from venous blood collected in sterile Vacutubes without anticoagulant solutions. The tubes are centrifuged (Medifuge, Silfradent, Sofia, Italy) with one step centrifugation protocol using variable RPM : 30sec -acceleration, 2min - 2700 RPM, 4min - 2400 RPM, 4min - 2700 RPM, 3min - 3000 RPM, 36sec – deceleration and stop.

CGF releases various growth factors such as Platelet-derived growth factor (PDGF), Transforming growth factor- β 1 (TGF β 1) and β 2 (TGF- β 2), Fibroblast growth factor (FGF), Vascular endothelial growth factor (VEGF), Brain derived growth factor (BDGF) and Insulin-like growth factor (IGF)

These growth factors stimulate cell proliferation, matrix remodelling and angiogenesis. They also predominantly play a role in osteoblast proliferation and differentiation.⁵

A study by Hong S et al on the stem cells of apical papilla concluded that both CGF and PRF can promote the proliferation, migration, and differentiation of SCAPs and hence CGF may be a promising alternative in regenerative endodontics.⁸ Another invivio study by Xia Chen et al concluded that CGF not only promotes the superior osteoinductive activity of BMSCs to enhance bone formation, but also out performs collagen in stimulating angiogenesis.⁶ A study by Takeda et al. performed on rats, it was observed that cell proliferation and osteoblastic differentiation in the cell culture from the CGF-treated group was significantly higher.⁴ In a study conducted by Rodella LF et al it has been reported that CD34-positive cells in the CGF also provide angiogenesis, neovascularization, and vascular continuity.³CGF seems be very effective in angiogenesis , osteogenesis and has positive effects in stem cells of apical papilla thus in the regenerative endodontics.CHEN & CHEN system classifies various responses of teeth to apexogenesis procedure.

CHEN & CHEN SYSTEM

TYPES	RADIOGRAPHIC APEX
Type 1	Increased thickening of the canals and continued root maturation
Type 2	No significant continuation of root development with root apex becoming blunt and closed
Type 3	Continued root development with the apical foramen remaining open
Type 4	Severe calcification (Obliteration of canal space)
Type 5	A hard tissue barrier formed in the canal between the coronal MTA plug and the root apex

In the present case, the formation of a calcific barrier between biodentine and root apex could be appreciated. This is a type V response according to Chen & Chen system. This calcific barrier was formed within 3 months which is faster compared to the other methods of apexogenesis. This may be attributed to its positive effects of CGF on the stem cells of Apical papilla and in neovascularisation

CONCLUSION:

CGF seems to be a promising material in regenerative endodontics and more efficient than its predecessors. Further investigations are necessary to establish its efficiency in regenerative endodontics.

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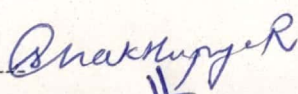
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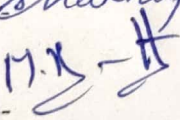
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