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RESEARCH ARTICLE

BIODENTINE V/S BIOSTRUCTURE MTA- THE BETTER ROOT END FILLING MATERIAL- CLINICAL CASE REPORT

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Abstract

An ideal root end filling material is the one which is biocompatible, easy to handle, dimensionally stable, radio opaque, set in the presence of wet environment, have good compressive strength, non staining, have adequate working time and must be antibacterial in nature. Newer materials have been introduced over the years and two such materials are Biostructure MTA and Biodentine. Both of them fulfil the criteria of an ideal root end filling material. So this case report compares the two materials and the post operative healing following the placement of the material.

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Introduction:-

The goal of a successful periapical surgery is to completely enucleate the cystic lesion and provide a good periapical seal that will accentuate the periapical healing, which mainly depends on the retrograde materials used and the procedural protocols followed.¹ An ideal retrograde material is the one which is biocompatible, easy to handle, dimensionally stable, radio opaque, set in the presence of wet environment, have good compressive strength, non staining, have adequate working time and must be antibacterial in nature etc.^{2,3}

Various materials have been used for the root end filling such as amalgam, glass ionomer, Zinc oxide eugenol, Biodentine, MTA, Bio aggregate etc. Among the above materials, Biodentine and MTA are suggested to be the best because of their biocompatibility and the hermetic seal. However the gold standard for the root end material is still debatable.^{4,5}

Biodentine, also known as the dentin substitute is composed of pure Tricalcium silicate, which regulates the setting reaction. It also contains calcium carbonate (filler) and zirconium dioxide (radiopacifier). The liquid contains calcium chloride (accelerator), reducing agent and water.^{6, 7} It can be used for direct or indirect pulp capping, pulpotomy, apexification, and root perforation, internal and external resorption and also as a effective root end filling material following periapical surgery.^{8,9} The advantage of Biodentine over other calcium silicate based materials is the reduced setting time, better handling and mechanical properties.^{10, 11,12}

Bio structure MTA, introduced as a root repair material has been suggested to be used for perforation repair, root end filling, cavity liners in case of recurrent caries etc.^{13, 14} It has a reduced setting time of 16 minutes as recommended by manufacture and has an added advantage of excellent biocompatibility, sets in the presence of moisture and blood, high mechanical resistance, low solubility and high alkalinity.¹⁵

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Hence this case report compares two clinical cases with Biodentine and Biostructure MTA being used as root end filling material with the 1 and 6 months follow up.

Case 1: Biostructure MTA As Root End Filling Material

An 18 year old healthy female patient reported to the department of conservative dentistry and endodontics with a chief complaint of pain in her upper front tooth region since 2 weeks. Patient presented a history of trauma on her front tooth region by hitting on to a metal rod 8 years back following which she had consulted a dentist and had undergone restoration for the same. On clinical examination, 11 and 21 was tender on percussion and found to be non vital. A pre-operative radiograph revealed an incomplete root canal treatment w.r.t 11 and 21, and there was loss of lamina dura. With respect to 11, a hazy radiolucency suggestive of periapical abscess was noted and with respect to 21 a large periapical radiolucency of approximately 2.5 cm x 2 cm was seen suggestive of periapical cyst. Hence root canal treatment was completed with respect to 11 and 21 following standard protocols, followed by periapical surgery and apicectomy with respect to 21. Mucoperiosteal flap was elevated and cystic enucleation was done. Root end resection of 3 mm was done followed by 2 mm of root end preparation and the retrograde filling was done using Biostructure MTA. Mucoperiosteal flap was placed back and sutured. Patient was recalled after 1 month and 6 month for follow up and the periapical healing and apical seal was found to be satisfactory. The clinical pictures have been depicted in figure 1.

Case 2:- Biodentine As Root End Filling Material

A 56 year old healthy female patient reported to the department of conservative dentistry and endodontics with a chief complaint of pain in her upper front tooth region since 5 days. Patient presented a history of trauma to her front tooth region following a road traffic accident 15 years back following which she had consulted a dentist and had undergone restoration for the same. On clinical examination there was composite restoration with respect to 12 and PFM crown with respect to 11 and 21. Further, 11, 12 and 13 were tender on percussion and found to be non-vital. A pre-operative radiograph revealed deep composite restoration approaching the pulp with respect to 12, with loss of lamina dura and a large periapical radiolucency of approximately 2 cm x 2 cm suggestive of periapical cyst. Hence root canal treatment was completed with respect to 11, 12 and 13. Periapical surgery followed by apicectomy was planned with respect to 12 and executed. Root end resection of 3 mm, followed by 2 mm of root end preparation was done and Biodentine was placed as the retrograde filling material and the mucoperiosteal flap was placed back and sutured. Patient was recalled and reviewed after 1 month and 6 month interval and the periapical healing and apical seal was found to be satisfactory. The clinical pictures have been depicted in figure 2.

Discussion:-

An ideal root end filling material is the one that provides a good apical seal with good handling properties. The materials used in this case reports are Biodentine and Biostructure MTA, which is a modification of MTA with shorter setting time. The above mentioned materials were selected as per the manufacturer's claim that suggests faster setting and good handling properties.

In the former case Biostructure MTA was used, which is a modified form of MTA with reduced setting time. The study results showed good periapical healing and appreciable apical seal, which is in accordance with the studies conducted by Saravanapriyan et al, Shetty et al, Ecnomides et al and Caliskan et al, who concluded that MTA when used as a retrograde filling material gave good apical seal, push out bond strength and better healing. The advantages of the Biostructure MTA include faster setting of around 15 minutes, sets in the presence of wet environment, good apical seal and better radioopacity, lower cost compared to latter. This is in accordance with the manufacturers claims. Tough there are studies where MTA has been used as retrograde filling material but not much studies were Biostructure MTA was used. Hence, further studies are required to know about the strength and other aspects of the material.

In the latter case, Biodentine was used as a retrograde filling material showed a good post operative healing. These results were in accordance with the study conducted by Pawar et al, where Biodentine when used as a retrograde filling material for the management of a large cystic lesion showed a completely healed cystic lesion within 18 months of follow up. This is also supported by studies conducted by Ahmed et al and Caron et al.

The advantage of Biodentine as found in this study are as follows, they mimic dentin radiographically, had a faster setting of around 12- 15 minutes, good post operative healing and good apical seal. Moreover there are studies by Aggarwal et al and Chaudhari et al where they have suggested that the push out bond strength of Biodentine was

comparable or slightly greater than MTA. A study conducted by Biocanin et al suggested that the marginal adaptation of Biodentine was equal to that of MTA.

But the drawbacks are that it is difficult to handle and delayed setting in presence of wet environment and requires a triturator for mixing. This can be validated by the study conducted by Gupta et al, where it was found that microleakage was greater during manual manipulation when compared to that of triturator. Studies by Alhodiry et al, Moosani et al and Shalabi et al concluded that blood contamination had a detrimental effect on the push out bond strength of Biodentine and delays the setting time. However contrary to this, the study by Paulo et al suggested that blood contamination do not effect the setting of Biodentine.

Hence, this study would conclude that both Biodentine and Biostructure MTA have shown good periapical healing. However the handling properties may vary and none of this can solely be considered as a gold standard for root end filling material. The material of choice again depends on the clinician's preference and the clinical demand.



Figure 1:- A) Pre-Operative Radiograph B) Surgical Photograph C) Post Operative Radiograph After Biostructure MTA Placement D) 1 Month Follow Up E) 6 Month Follow Up.

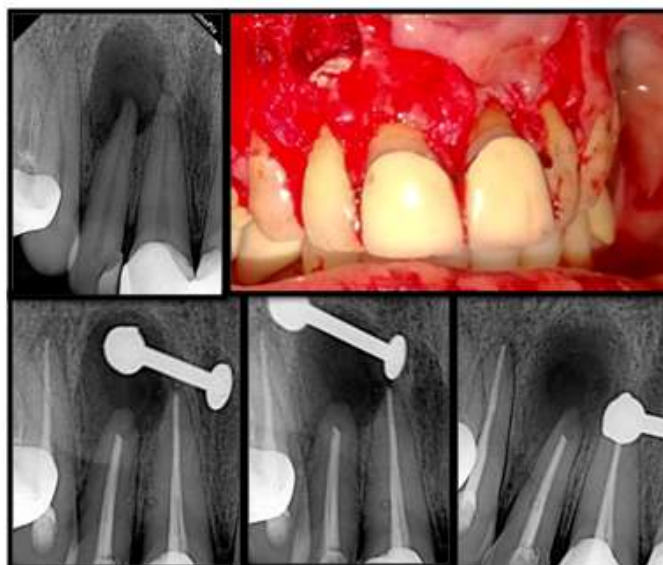


Figure 2:- A) Pre-Operative Radiograph B) Surgical Photograph C) Post Operative Radiograph After Biodentine Placement D) 1 Month Follow Up E) 6 Month Follow Up.

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