

## **Endodontic-Restorative Symbioses: Diagnosis and Treatment**

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### **Introduction**

The success of endodontic treatment is comprised of proper diagnosis and treatment which is easier to accomplish when the symptoms correlate to the clinical and radiographic findings. It is generally a more predictable treatment on anterior teeth as opposed to posterior teeth due to the number of canals and their internal configuration. A multidisciplinary approach has never been more essential to provide the patient with the best possible choices for treatment. Moreover, the general dentist and specialist must not only know what each member of the team must and is capable of doing, but such responsibilities are today being crossed over. Periodontist are modifying provisionals when dealing with acrylics and bonding for soft tissue preservation, especially when dealing with extractions and implant placement, Endodontist are utilizing various bonding techniques for the treatment and the sealing of the apex and canal. When modern implants were introduced, their placement was limited to Oral Surgeons and shortly after Periodontists were allowed to implement this practice. As techniques evolved, block and sinus grafts followed the same pattern. Today, even the General Dentist has put into practice these modalities. Is there a reason why Endodontists have not been more involved in this phase of Dentistry?

### **Evaluation and Diagnosis**

With the technological evolution and predictability of osseointegrated dental implants, where does the Endodontist responsibility lay? With the different options available today, where does Endodontic therapy stop and Implants begin? When is that decision made? Who makes it? Several questions must be analyzed: is the Endodontist responsibility limited to only do an excellent root canal treatment? Should his role be also that of a gate keeper and decision maker?

As treatment is initiated, many important questions will need answers:

- i) does the available bone supporting the tooth warrant to proceed with endodontic treatment?
- ii) is the tooth position and existing occlusion conducive to create a proper restoration?
- iii) is there a craze or fracture line present?
- iv) is there going to be a ferrule effect at the end of treatment?

Is the tooth going to need a post and if so will it accept a:

- a) cast post or
- b) direct technique due to canal configuration, tooth preservation and decreased likelihood of potential root fracture.
- c) should root canal treatment be completed to allow for orthodontic supraeruption for prosthetic purposes or to improve the bone architecture even if the tooth is to be extracted? And finally,
- d) what is the material of choice to close the endodontic access at the end of therapy? (Fig 1, 1a, 1b, 1c)

## Case I

Intermediate restorative materials with eugenol can inhibit and prevent proper bonding techniques. Current glass ionomer restoration can provide a better seal; they are less susceptible to early occlusal breakdown and can provide a more stable interproximal contour. Just as essential it is to communicate with the Restorative Dentist how the tooth is going to be rebuilt. Is the post going to be a cast post with a cemented technique or prefabricated post with a bonded technique? A requisite of the post is to have an excellent and passive fit<sup>1,2,3,4</sup> in the canal and it is desirable if mechanical retentions are present for the core build-up stability, if a direct technique is utilized. Reality tells us these prefabricated post sometimes need to be modified, therefore loosing some of their inherent properties. The Peerless Post™ with its pre-stressed glass fibers allows for adjustments (shortening) to be made on either or both ends without sacrificing the fit and any of its physical properties and advantages.



**Fig 1) Root canal completed with an intermediate restorative material. Note the gauging of the mesial wall of the molar crown.**



**Fig 1a) Occlusal view of endodontically treated tooth once the temporary material was removed. Having used an interproximal matrix could have prevented excess of material and gingival irritation.**

Different practitioners feel comfortable with different post techniques. Some of the available post systems have a post preparation bur that closely approximates the final shape of the post

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- 1 Gomes J.C., Cavina D.A., Gomes O.M., Neto J.P., Romanini J.C., Uso dos pino intrarradiculares adesivos nao metalicos. Revista Academia Brasileira De Odontologia 1999.
  - 2 Kogan E., Postes flexibles de fibra de vidro (tecnica directa) para restauracion de dientes tratados endodonticamente. R. Asoc. Dent. Mex. Ene Feb 2001.
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  - 4 Christensen G., Post concepts are changing, JADA Sep. 2004.

space, thereby ensuring a very close adaptation to the walls of the canals such as: SybronEndo-Peerless Post™, Coltene- Whaledent-Parapost™, Bisco-DT-Light Post™ among others.

When analyzing post failures we should understand the nature of the problem. Was the cast post improperly made yielding a *non passive fit*? Could dislodgement be due to bonding failures as a result of the eugenol contained in some endodontic sealers such as Roth's sealer, Kerr Pulp Canal sealer and others? For the techniques that utilize resin based cementation, an alternative sealer such as Ah2 or Resilon, a resin based Endodontic filling method may be indicated.



**Fig 1b, 1c) Tooth isolated with properly adapted interproximal matrices to avoid gingival overhangs during the build up. Tooth to be rebuilt with 5th generation bonding agent, self cure resin cement and prefabricated post with mechanical undercuts and core build up retentions.**

The final outcome as it relates to predictability and long term success from the procedure must be visualized at the early stages of diagnosis, and with a favorable answer the treatment can be completed. The complexity lies when the previous mentioned concepts do not lead us to a clear and definite *diagnosis, treatment plan* and or at the completion of treatment we feel the prognosis of the treated tooth is *guarded*.



**Fig 1d) Upper second premolar rebuilt with a conservative prefabricated post composite build-up. The tooth is ready to be restored with a crown as well as replacing the adjacent crowns due to poor contours and marginal fit.**

## Case II

On certain occasions, endodontic treatment or extraction followed by the placement of an implant are both available and should be presented to the patient. The questions are many and the order in which they are asked will lead to: are the teeth restorable? If so, can the Endodontist provide a stable area, free of disease upon which the restorative work will take place? Will the supporting periodontal tissues be preserved? It becomes necessary to take a heuristic approach to decision making in this type of cases.

When a tooth has been considered for extraction (Fig 2), we question whether heroic treatments are still indicated, applicable and worthwhile?



**Fig 2) Initial radiograph showing periapical pathology and tooth with guarded prognosis (1994)**

Even though implants were an option at the time (1994), the overall understanding and comfort level of replacing a single tooth was still evolving in the areas of implant design, abutments and soft tissue management. With this information at hand, the patient was keen on saving his teeth. Cases like this represent an enormous challenge, because they require a multidisciplinary approach and a high degree of operative and laboratory skill in order to obtain biological and esthetically sound results. The patient presented with both teeth filled with a non soluble paste. Endodontic re-treatment was performed first, to alleviate symptoms and to attempt to determine the available remaining root structure from a restorative point of view. When the resorptive defect was noted on the upper left central, apicoectomies were performed on both teeth. Once periodontal stability was created and the periapical lesions eliminated, cast posts were made due to the canal size and coronal destruction, followed by porcelain crowns (Fig 2a). After functioning for 12 years and due to a subgingival fracture of the root, the lateral was lost a year after the x-ray was taken. Careful evaluation of the occlusal patterns of this case permitted the patient to enjoy the use of his natural teeth, while at the same time preserving the crestal bone, as can be appreciated from the before and after radiographs.



**Fig 2a) Endodontic treatment completed and tooth restored with a cast post and core and a crown (1994)  
Root canal treatment by Paul Bery D.D.S.**

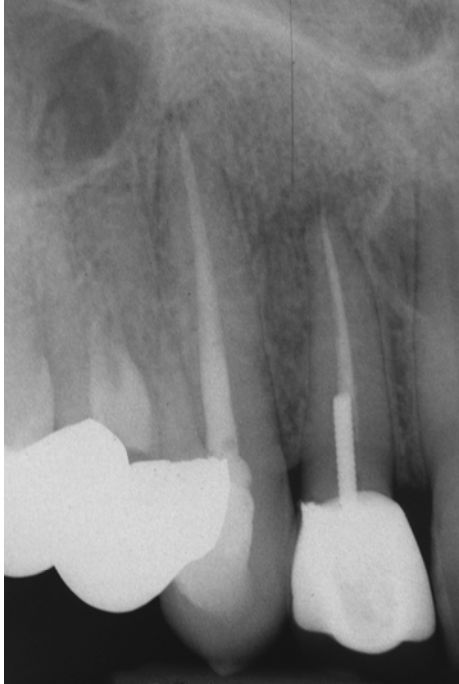
### **Case III**

On the same patient, the contralateral side (upper right lateral) also presented unique challenges (Fig 3). Although the coronal structure had been preserved to a larger degree than the other upper lateral, the patient presented at a later date, with the loosening of the original post and crown. As the Endodontic therapy had been performed recently, it was decided to only redo the post and core and crown (Fig 3a, 3b). While the results were initially favorable, the root canal therapy failed eventually, necessitating an apicoectomy (Fig 3c). In this instance, it is evident that the original endodontic treatment should have been retreated. It has been shown that endodontically treated teeth exposed to the oral cavity will exhibit contamination of the root system in a relatively short period of time<sup>5,6</sup>. Thus, by the time the patient presented himself with the problem, the canal had been exposed to then oral environment for several days, jeopardizing the long term success of the endodontic treatment. This was evident upon the failure of the treatment, necessitating surgery in order to resolve the problem. The surgery was uneventful, allowing the patient to retain the upper right lateral for 11 more years. In retrospect, the loss of this tooth was due, not to the endodontic treatment, but to the difficulty in properly restoring a tooth with significant loss of the coronal structure.

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5 Torabinejad M., et al: In vitro bacterial penetration of coronally unsealed endodontically treated teeth, *JOE* 16:566, 1990.

6 Lazarsky et al: Epidemiological evaluation of the outcomes of nonsurgical endodontic therapy in a large cohort of insured dental patients, *JOE* 27:791, 2001.



**Fig 3) Initial radiograph of Root canal recently completed (1995)**



**Fig 3a) Post and core and crown showing periapical radiolucency 11 years later (2006)**



**Fig 3b) Crown on upper right lateral in place for 11 years before requiring its extraction due to subgingival fracture (note height of gingival margin).**



**Fig 3c) Radiograph of upper right lateral with apicoectomy**

The ability and opportunity to allow for materials and techniques to improve over the years without compromising the patients' long term care can prove in some instances to be invaluable, especially if an irreversible procedure is recommended, such as an extraction and the placement of an implant. Sometimes, even with a poor prognosis it is important to preserve a tooth if only for a relatively short period of time in order to perform orthodontic supraeruption.

It is for this reason that an interdisciplinary approach can dictate optimum treatment from the onset. Patients are hesitant to invest in a root canal treatment for a tooth that could be extracted shortly. If a root canal is already present in the involved tooth, patients may accept orthodontic treatment more easily (Fig 3d). Root canal treatment prior to the supraerupting procedure will eliminate any discomfort associated with the incisal or occlusal reduction of the tooth and its proximity to the pulp tissue. If supraeruption is to be implemented and root canal therapy is not in place, the patients comfort could be at risk during this phase of treatment.

Once the extraction is completed, the expected result is to have bone and soft tissue remodeling. This natural response in the anterior region becomes more critical because the papillae(s) will be lost. With the attempt to preserve crestal bone, osseous grafting is not only indicated but needed. However this procedure will normally result in some shrinkage in a buccal



lingual and coronal direction. By supraerupting the tooth, bone and soft tissue migration will occur in an incisal or occlusal direction<sup>7,8</sup> (Fig 3e), and by over correcting these landmarks, when the tooth is extracted the soft tissue and bone should shrink to a normal gingival height. Then the options will be to immediately place the implant or do minimal bone grafting. As a consequence of improving the bone and soft tissue bed, the implant can be placed in an optimum location (Fig 3f, 3g).

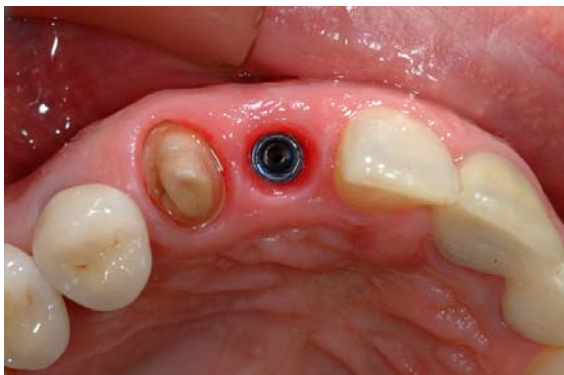
The combination of the supraeruption, proper surgical technique, provisionalization and completion of the implant supported crown with the appropriate contours will minimize or eliminate undesirable gingival embrasures, thus obtaining a more esthetic result. Final esthetics will depend on having the correct porcelain shade, value, texture and contours to maintain soft tissue health and support (Fig 3h).



**Fig 3d) Tooth over reduced incisally with provisional in place to supraerupt hopeless tooth**



**Fig 3e) Orthodontic supraeruption completed in order to bring down the bone and soft tissues.**



**Fig 3f) Incisal view showing implant position and excellent tissue response. Implant placed by Robert Bressman D.D.S, M.S. ( Periodontist, Skokie, Illinois)**

7 Salama H., Salama M., The role of orthodontic extrusive remodeling in the enhancement of soft and hard tissue profiles prior to implant placement: A systematic approach to the management of extraction site defects, *Int J Periodont Rest Dent* 1993;13(4):312-333.

8 Rubinstein S., Nidetz A., Hoshi M., A Multidisciplinary Approach to Single-Tooth Replacement, *QDT* 2004; 157-175.





**Fig 3g) Radiograph of implant and final restoration.**



**Fig 3h) Final crown implant supported with proper tissue contours and papillae preservation. Laboratory work by Fujiki Toshi RDT, Skokie, Illinois**

### **Conclusion**

There is no question that with changes in clinical philosophies and approaches, the roles of the general practitioner and the specialist are being redefined. The introduction and upwards spiraling popularity of dental implants has necessitated a change in the clinical approach to saving and restoring teeth. Heroic endodontic treatments on teeth are becoming less frequent and necessary because in many instances, a more predictable result can be obtained by the use of a dental implant. Because of the availability of alternative techniques, it has become imperative that good prognostic values are obtained during the treatment plan phase.

Modern Endodontic technology permits the clinician to make decisions based on sound findings, and not on guess work or empirical beliefs. Endodontists are better prepared to perform retreatment. At the same time, it has become necessary to learn to evaluate those retreatments, before definitive work is performed. The presence of altered internal anatomy, or the inability to fully instrument and clean the canal to its apical terminus are two important conditions that, when encountered may require reevaluation of the treatment plan or at least, a more prolonged period of observation to assess healing.

In this time of very sophisticated technological and scientific advances, it has become more important than ever, that a careful and well thought communication exists between practitioner, specialist and patient, in order not only to provide the best available treatment, but also to give the patient realistic expectations on the decisions that he will be required to make.

## References

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