Clinical Report

Unconventional prosthodontics: Post, core and crown technique

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BACKGROUND AND OBJECTIVE: Endodontically treated teeth, over-zealously prepared teeth, teeth with crowns seated on carious dentin, secondary spread of decay underneath an existing crown or trauma - all these can lead to partial or complete coronal fractures of the teeth with or without damage to the existing prosthetic crowns. Clinicians often have to deal with these prosthetic emergencies in their daily practices and quite often due to budgetary and time constraints that result in having a protracted struggle for themselves and the prosthetic patient; this is due to lack of quick laboratory support and/or the absence of CAD CAM ceramic systems. This article describes one such emergency clinical situation that is treated by adopting an unconventional technique and achieving acceptable success. **MATERIALS AND METHODS:** A case of anterior tooth trauma resulting in the fracture of the coronal portions of the tooth along with the existing ceramic crown was successfully rehabilitated adopting an unconventional treatment protocol; the technique involved the utilization of the existing ceramic crown as a mold and then retrospectively the construction of a core in order to finally support the existing ceramic restoration. The undamaged ceramic crown was simply cemented back onto the newly constructed core. **DISCUSSION AND CONCLUSION:** Modern day dental practices are equipped with state-of-the art technologies such as CAD/CAM ceramic systems that can repair or remake ceramics restorations as mere chair-side procedures today, thereby greatly saving time and the frequency of visits for both the patient and the dentist. However, the costs of such systems are huge and are not feasible in all practices. A relatively inexpensive, unconventional technique was adopted in rehabilitating one such prosthetic emergency with satisfactory acceptable success establishing both esthetics and patient satisfaction.

Key words: Composite core build-up, post-endodontic restorations, prefabricated gold-plated posts

INTRODUCTION

With current advancements escalating in the field of dentistry, technological improvements have progressed to levels where it is now possible to restore teeth with high-grade ceramics merely with chair-side procedures. CAD/CAM-aided milling technology has made ceramic dentistry very effortless and convenient for both the dentist and the patient that it totally eliminates the constraints related to time and other laboratory-related factors, which are normally associated with conventional ceramic restorations.[1] It is now possible to fabricate and deliver an all-ceramic restoration at the touch of a button in just an hour or less. Ceramic repairs are almost instantaneous; if the possibility of a repair is not deemed feasible then even re-fabrication does not pose to be a difficulty.[1,2] Manageable prosthetic emergencies related to crown loss or fractures can be easily handled without the burden of laboratory support, and the patient can leave the dental office with a completed ceramic restoration in the same session. Although the advantages of such a superior technology are huge, the major setback of such a system cannot be completely ignored, which is mostly cost related.[1] Such advanced technology is relatively expensive and definitely cannot be made available to the average dental practitioner. CAD/CAM ceramic milling technology is considered to be quite unaffordable by the majority throughout the world, thereby retaining conventional laboratory ceramic procedures as a routine practice. The dental offices still lack the luxury of this high-grade technology; even now, conventional laboratory-based ceramic procedures have to be practiced for their routine, emergency and repair procedures, which are majorly dependent on time and laboratory convenience. This article demonstrates the use of a simple clinical technique in dealing with a particular emergency clinical situation of a tooth fracture in the coronal portions along with the existing ceramic crown with virtually no damage to the ceramic crown. The technique of reattachment of broken, but otherwise intact, crowns is worthy to be explored.[3] Most of the conventional types of treatment can be quite time consuming. Multiple appointments may be needed, and the surprise in learning this reality may be overwhelming to the patient. Quite often, a

patient that is in need of reattachment of a crown will have many other dental needs.[3] Exhausting the finance of a patient as well as their time limits in restoring just one tooth may not be prudent.[4] It may make more sense to repair, if only temporarily, one tooth and to go on to the next most pressing dental concern. Reattachment of the crown, although not always an easy solution, can be learned and with practice, the technique can be expanded to include more difficult cases.[3]

The technique described in this clinical case report involves the novel use of the existing ceramic crown itself in constructing a composite resin core onto a prefabricated cemented post.[5-7] The existing undamaged crown would then be re-cemented back onto the constructed core.

CASE REPORT

A 35-year-old male reported to the dental surgery with fractured porcelain crown restoring the right upper central incisor tooth (Tooth 11). Patient gave a history of trauma where the crown fractured with the portions of tooth earlier the same day [Figure 1]. On examination, the coronal portions of the central incisor had fractured in its entirety with the crown, leaving out only as much as the gingival one-third of the original tooth. There was no pain or any associated pulpal exposure or bleeding. Further examination also revealed that there were no other associated trauma to the remaining dentition and contiguous structures. The dislodged ceramic crown suffered no marked damage such as chipping of the porcelain, and after evacuating the debris, the crown could be perfectly approximated to the existing prepared finish line present on the fractured portions of the tooth with no discrepancies in the fit. Periapical radiographs of the fractured tooth failed to reveal any indication of root canal therapy performed on the fractured tooth. Patient expressed the need for an immediate crown and also greatly emphasized on the budget and time constraints.

Treatment plan

After a thorough radiological and clinical examination and keeping in mind the needs and constraints of the patient, the following treatment plan was advocated:

- A single-visit root canal therapy was to be performed
- Followed by a post-and-core build-up[8,9] using a prefabricated gold-plated post with a composite resin core, utilizing the existing ceramic crown as a mould template and
- Finally, re-cement the existing crown.

MATERIALS AND METHODS

Root canal therapy/canal preparation for post and post cementation

1. Single sitting root canal therapy was performed abiding with the sound principles of endodontic therapies. Root canal preparation was performed using a rotary Nickel-Titanium (Ni-Ti) file system (ProTaper®, Dentsply) and obturation was completed with Pro-taper gutta-percha using the single cone obturation technique, the entrance cavity was temporarily sealed with a temporary cement; a gross scaling procedure was performed to eliminate the presence of any supra/sub gingival plaque and calculi deposits present on the fractured tooth. The patient was recalled after 24 h for follow-up and further management [Figure 2].
2. After 24 h, the entrance filling was removed and the canal optimally re-prepared up to the apical two-thirds to receive the prefabricated gold-plated post (Svenska Dentorama gold-plated prefabricated post) of appropriate diameter [Figure 3].
3. Care was taken to maintain the integrity of the already existing external finish lines on the remaining tooth structure. Since the remaining tooth portions were already prepared to fit accurately to the existing porcelain crown, it could not be altered in any event and any new modification would alter the fit resulting in a compromised marginal fit of the crown.
4. A triple shoulder axial preparation was adopted in this case with the already existing shoulder accounted as the first shoulder, and further subsequent shoulders were meticulously prepared in the radial axial regions of the tooth to receive the composite resin core. After optimal preparation of the canal length and the shoulders, the appropriate post for the prepared length and diameter was tried into the canal and cemented using zinc phosphate cement [Figure 4].
5. Care had to be exercised to limit the cement to only the canal portions and not to overlap the axial shoulders.

Core build-up

6.1. Following the final setting of the luting cement, the excess cement was evacuated using an ultrasonic scaler and all the prepared shoulders on the tooth surface were exposed.

6.2. The debris was evacuated from the porcelain crown using an ultrasonic scaler and the crown was cleansed using an ultrasound cleanser. The crown was then tried onto the tooth to check for marginal fit and for any interference the cemented post may present. All the interferences between

the cemented post and the crown were checked and corrected to ensure that the margins of the porcelain crown completely approximated with the existing tooth margins.

6.3. A self-etching two-component bonding system (Clearfil S.E., Kurraray) was used in this case. The bonding agent was applied and cured onto the tooth as per the instructions of the manufacturer. An initial increment of flowable composite core build-up material (MultiCore® Flow) was first applied and cured in the radial axial regions supporting the post and was restricted to within the canal orifice only. This increment was to ensure that a proper seal was achieved and the space between the post and the tooth was adequately sealed and support for the post on the axial shoulders was established.

6.4. The final core was intended to be constructed

Figure 1: Fractured coronal tooth portions with intact ceramic crown

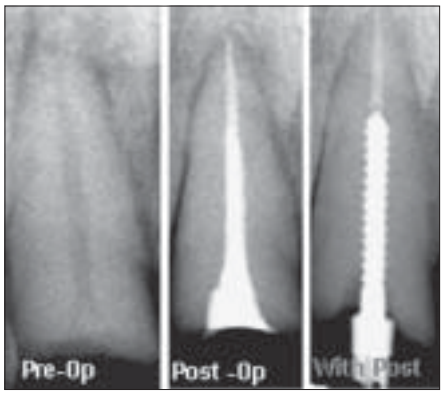

Figure 2: Preop and postop radiographs

Figure 3: Root canal filling excavated and canal prepared for post-cementation

Figure 4: Prefabricated gold-plated post-cemented with zinc phosphate luting cement

Figure 5: Crown packed with core build-up material and initial curing of core build-up material being carried out

Figure 6: Crown being gently removed from the initially polymerized core

Figure 7: Curing being completed

Figure 8: Completed final core

Figure 9: After final cementation of the crown

using the existing porcelain crown as a mould to achieve the final core shape. The inner portion of the porcelain crown was coated with a thin layer of vaseline gel with a small cotton pledget.

6.5. The core was built up using a self-curing composite core build-up material with a light curing option (MultiCore® HB) and by employing the molding technique in this case. An increment of the mixed core material was first placed on the remainder of the exposed post surface. The bulk of the core material was then completely filled into the porcelain crown. The material was effectively manipulated on the post surface and within the crown to eliminate any air entrapment or bubbles.

6.6. The ceramic crown was then approximated onto the tooth and held in place tightly to expel any excess material flow. The excess material was carefully removed using an explorer and the margins of the crown was light cured for 6-8 s to facilitate initial core hardening [Figure 5].

6.7. After the initial light cure, utmost care was exercised and the porcelain crown was then gently teased out from the initially cured core [Figure 6]. The molded core was inspected for any defects and then completely light cured until final set [Figure 7]. After the final polymerization of the constructed core, re-preparation was done to ensure proper fit and eliminate any prematurities between the core and the crown [Figure 8].

Crown cementation

1. The ceramic crown was cleansed to eliminate the vaseline from the inner surface, and the inner surface was sandblasted using a chair-side mini-blaster. The completed core was then polished using polishing paste and composite polishing brush to eliminate any vaseline residue from the surface.
2. The crown was again try-fitted to check the marginal integrity, fit and occlusal relations. After the necessary corrections were made, the crown was finally cemented using a zinc phosphate luting cement [Figure 9].

DISCUSSION

Although CAD/CAM systems now inhabit most of the advanced dental offices in current day practice, it cannot totally substitute the needs of laboratory-based ceramic work. Even today, conventional laboratory-based ceramic work is considered far superior in terms of color, esthetics and durability. Although each has its own indications and limitations, they cannot completely replace each other. Laboratory-based ceramics are considered far superior to the CAD/CAM ceramics; on the contrary, exceptionally good results can be achieved by ardent ceramists even with the latter. Cost is a predominant factor in acquiring this highly evolved technology, but it is definitely worth the investment when justifying it with the indications related to time and chair-side needs. The abovementioned case although clearly highlights the need for this advanced system in the modern prosthetic practice, it also does not fail to convey that such a clinical emergency situation could be handled by a simple, unconventional technique in achieving acceptable success. The demonstrated case ideally would have been required to be first endodontically treated followed by a custom post-and-core followed by a crown. Since the situation was governed by various constraining factors such as time and budget constraints, lack of laboratory compliance in early delivery, and the absence of an in-office CAD/CAM ceramic system led to the adoption of this unconventional treatment protocol, where an already existing final ceramic restoration must be used in retrospectively constructing the core over a prefabricated post and finally cementing it back onto the new core.

CONCLUSION

An unconventional retrospective post-and-core build-up technique was employed to treat a prosthetic clinical emergency, as described in this study, which can be suggested to be successfully employed in similar clinical situations in daily clinical practice; We conclude that the results obtained by adopting this relatively quick, inexpensive and unconventional technique ensured both esthetic success and patient satisfaction.

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