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M.S Kruger

Cape Peninsula University of Technology

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THE DENTAL REHABILITATION OF A PATIENT SUFFERING FROM RAMPANT CARIES

Kruger M.S

National Diploma Dental Technology, Department of Dental Sciences, Cape Peninsula

University of technology, Bellville, Cape Town, South Africa.

Return address:

PO Box 92

Moyanshe

Rustenburg

0390

Contact nr: 0824133541

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Summary

This article represents a specific case of a young man which was diagnosed with rampant caries due to the excessive use of methamphetamine (“TIK”). Restorative dentistry was attempted but failed in most of the teeth because of additional caries. Crowns, a Co-Cr removable partial denture, and a conventional acrylic denture were fabricated.

Introduction

The term rampant caries refers to the rapid destruction of multiple teeth and it normally occurs on surfaces of teeth that are caries-free, namely the buccal surface of the posterior teeth and interproximal areas on the anterior teeth. Rampant caries is also known as ‘Bottle caries’, because it normally occurs in the primary dentition. Rampant caries is very common in methamphetamine abusers.

One effect that “TIK” has on a user is that it leaves the mouth dry. Users try to solve this by the frequent intake of fizzy and sugary drinks and eats. After a few years of use, the user experiences pain while brushing teeth and thus avoid brushing completely or only once a day; and while high on “TIK”, users neglect their oral health completely and only concentrate on when and where they can find their next high.^{1, 2}

In the Western Cape “Meth” is also known as “TIK” and among dentists as “Meth Mouth”.

Case History

The patient is a 21 year-old male. In 2003, at the mere age of 16, he was diagnosed with a mild case of rampant caries. He also had a discoloured permanent maxillary left central incisor (2·1) due to a previous unsuccessful root canal treatment. The caries, at this stage, was treated with restorative dentistry; composite fillings were done on the anterior teeth while amalgam fillings were done on the posterior teeth. The discoloured permanent maxillary left central incisor (2·1) received intrinsic bleaching. Intrinsic bleaching is the process where by the tooth is bleached through the pulp chamber with bleach and cotton.^{3, 4, 5, 6}

Late in 2007, at the age of 20, the patient returned to the dentist with the hope that his natural teeth could be saved. On examination of the patient, the dentist saw a discoloured the permanent maxillary left central incisor (2·1). In the file, the dentist saw that intrinsic bleaching had previously been done, in 2003, in an attempt to save the tooth aesthetics, but it had failed.⁵ On further examination, the dentist found that the restorative work had been done on the permanent maxillary right central incisor (1·1), the permanent maxillary left second premolar (2·5) and the permanent maxillary right third molar (1·8).

The permanent maxillary right third molar (1·8) and the permanent maxillary left second molar (2·7) had additional carries but, because there is sufficient tooth structure left, the only way they could have been saved was through crowning these teeth. Unfortunately, the rest of the maxillary teeth could not be saved by conventional restorative dentistry and had to be extracted.

The teeth that had to be extracted in the maxillary arch were the permanent maxillary right lateral incisor (1·2), the permanent maxillary right canine (1·3), the permanent maxillary right first premolar (1·4), the permanent maxillary right first molar (1·6), the permanent maxillary left lateral incisor (2·2), the permanent maxillary left canine (2·3), the permanent maxillary left first premolar (2·4), the permanent maxillary left second premolar (2·5) and the permanent maxillary left first molar. The teeth that needed to be extracted on in the mandibular arch were from the permanent mandibular left third molar (3·8) right trough to the permanent mandibular right third molar (4·8), thus leaving the mandible edentulous.

The clinical treatment options for this case were limited and thus it was decided to prepare the permanent maxillary right second molar (1·7), the permanent maxillary left central incisor (2·1)

and the permanent maxillary left third molar (2·8). The mandibular teeth were extracted and the alveolar bone was examined to assess whether it would be sufficiently for the placement of implants. Figures 1 a and b represent the case in stone models.



Fig 1a. A model of the maxillary arch



Fig. 1b. A model of the mandibular arch

There were a few prosthetic treatment options that could suit the clinical treatment.

For the maxillary arch there were four options and each of these options had its own advantages and disadvantages:

Maxillary options:

- 1) All ceramic crowns on the prepared teeth with a Cobalt-Chrome removable partial denture
- 2) Implants with full ceramic restorations
- 3) Implant with porcelain-fused-to-metal restorations
- 4) A PFM crown on the 2·1 with a ceramic margin, gold crowns with milled rest seats on the 1·7 and 2·8 with a Co-Cr removable partial denture

1) All ceramic crowns on the prepared teeth with a Cobalt-Chrome removable partial denture

The advantages of this option were that the aesthetic produced by an all-ceramic crown were good, particularly the translucency because the crowns were fabricated in an all-ceramic material so there was no metal visible from the facial view or inter-proximal.⁷ The advantage of the cobalt-chrome removable partial denture was that, when compared to an acrylic removable partial denture, it could be made relatively small thin and could thus withstand breaking forces.⁸

The disadvantages of this option were that all ceramic margins are fragile and chip easily if not handled with care. All-ceramics are also more costly to fabricate when compared to the PFM crown. It has also been proven that ceramics wear opposing natural teeth over time.⁸

2) Implants with full ceramic restorations

The all ceramic crowns also have good aesthetics, especially translucency, so the crowns look more natural to the patient and others and, to the patient it has a natural feel in the mouth. Implants can last a life time if they are placed and looked after correctly, and if the crowns are fabricated and fitted to the best standards, they can all last a life time (10 -20 years).

Unfortunately there are disadvantages; the laboratory as well as the clinical procedure to place the implants are very expensive. When comparing the laboratory cost to that of PFM crowns and even acrylic dentures the PFM crowns are more costly to fabricate. The waiting time when using a CAD/CAM system with an off-site milling centre can be long (2 days to 1 week).⁹

3) Implant with porcelain-fused-to-metal restorations

The metal substructure of the PFM crowns is strong and the aesthetics are good.⁹ However, the disadvantages of the PFM crowns are that the metal can be visible inter-proximally, the metal can have an effect on the colour of the ceramic material and a bluish gum may be visible at the margin area in the mouth. Implant surgery, as well as the laboratory cost, is high, as mentioned previously.^{7,9}

4) A PFM crown on the 2 · 1 with a ceramic margin, gold crowns with milled rest seats on the 1 · 7 and 2 · 8 with a Co-Cr removable partial denture

The PFM crown with ceramic shoulder has good aesthetic; no bluish gum will be visible from the facial view because of the ceramic shoulder.⁷

A disadvantage with the PFM is that the metal might still be visible inter-proximally and, because of the greyiness of the metal, if not utterly opaque it can have an effect on the shade of the ceramic material.^{8,11}

The milled gold crowns are relatively easy to fabricate, and the milled rest seats provide extra retention to the Co-Cr removable partial denture.^{8,10} The colour of gold is not aesthetically pleasing and thus it is not recommended for use in the anterior region; however, it can be used in the posterior region where it works well. Precious metals are quite expensive and thus a disadvantage when a large crown is needed.

Fabricating a Co-Cr removable partial denture in combination with gold milled crowns have an advantage above normal gold crowns, the milled rest seats of the gold crowns add retention. The Co-Cr removable partial denture can be made small, thin and still be able to withstand breaking

forces when compared to a conventional acrylic removable partial denture. With a Co-Cr removable partial denture the aim is to make it as small as possible but, functional. The Co-Cr removable partial denture is designed in such a way that the palatal area is mostly free and thus the patient can still distinguish between hot and cold. Like with all other appliances there are disadvantages to the Co-Cr removable partial denture, if the clasps are placed too far anteriorly, the clasps may be visible. If the patient is not taught, by the dentist, the path of entry and exit when removing and replacing the Co-Cr removable partial denture the clasps may distort.^{8, 12}

There are 3 prosthetic treatment options that will suit the mandibular arch and each of these options has its own advantages and disadvantages:

Mandibular options:

- 1) A Conventional acrylic denture with labial gum-tinting
- 2) Implants with a over denture
- 3) Implants with a full ceramic restoration

1) A Conventional acrylic denture with labial gum-tinting

A conventional acrylic denture is relatively easy to fabricate and can be repaired quite easily too. Labial gum-tinting makes the removable acrylic denture appear more natural when the lower denture is visible. This option is also inexpensive when it is compared to the implants with crowns. Even though it has such good advantages, it also has disadvantages, if the acrylic denture is not made correctly it can be bulky, this causes discomfort to the patient and the patient would not wear the denture. All the masticatory forces are directly directed upon the alveolar bone and this can cause the alveolar bone to be resorbed over time. A removable acrylic denture can break

or a tooth can crack when dropped but has an advantage that it could be repaired. The gum-tinting of a patient can be difficult to simulate.¹³

2) Implants with a over denture

When comparing an implant retained over denture to a conventional acrylic denture the implant retained over denture have good retention and good stability and this improves function.^{9, 14} Due to the implants, the alveolar bone can be preserved because the dentures masticatory forces are not applied directly on to the alveolar bone but, rather on the implants axis.¹⁴

An implant retained over denture is more costly when it is compared to a conventional acrylic denture and are often more bulky than a conventional acrylic denture. Another draw back of implant retained over dentures are, the maintance that has to be done on the implants and the patient's oral hygiene should also be of a good standard.¹⁴

3) Implants with a full ceramic restoration

It is a fixed prosthesis and thus the patient can carry on with their daily living without the fear that the prosthesis might fall out or be lost.⁹ The full ceramic crowns have a natural look and feel as well as good aesthetics. The disadvantages are the same as that of the full ceramic restorations of the maxillary arch. The patient should have good oral hygiene if this option should be chosen and maintance are also required for this option, the same as all the other implant prostheses.^{9, 15}

While looking at the advantages and disadvantages of each option, the option of choice was probably not the ideal option but, it was the option which would suit the patient the best.

The prosthetic option of choice for the maxillary arch was a PFM crown on the 2·1 with a ceramic margin, gold crowns with milled rest seats on the 1·7 and 2·8 with a Co-Cr removable partial denture and the option for the mandibular arch a conventional acrylic denture with labial gum-tinting.

Dental laboratory procedures

Conventional laboratory procedures were followed in fabricating the crowns, starting with the primary impressions for maxillary as well as mandibular in stock trays, pouring a gypsum model, fabricating special trays from light cure material and a mandibular record block from base plate wax, pouring a peach stone model for the crown and bridge model and a yellow gypsum model from the secondary impressions. The crown and bridge model are prepared. The two models are articulated using the bite registration received from the dentist on the mandibular bite block. The PFM crown was fabricated in the conventional way only by adding a porcelain margin. The gold crowns were waxed-up to full contour, milled in the palatal area to create palatal rest seats, invested and by making use of the lost wax technique the gold milled crowns were cast.^{7, 10} Once the crowns were finished they were fitted in the patient's mouth and cemented.

A second impression was taken and a yellow stone model was poured for the fabrication of the Co-Cr removable partial denture.

The Co-Cr framework was designed on the yellow stone model, it was then blocked out, duplicated and a refractory model was poured. The frame was waxed-up on the refractory model, sprued, invested and cast. After casting it was divested, sandblasted and checked that all the components of the framework cast. Once everything was in place the sprues were removed and

the framework was worked off and highly polished ready for a metal try-in. Figure 3 illustrates the finished Co-Cr removable partial denture framework. ^{12, 16, 17}



Fig. 3. Co- Cr frame work in conjunction with the crowns

Once the metal frame work returned, the teeth were set-up on both the maxillary as well as on the mandibular and sent to the dentist for a try-in.

The try-in was finished after it was received back. The maxillary denture was fabricated by making use of self cure acrylic resin, where as the mandibular was cured by making use of the heat cure water bath method. The labial gum-tinting was also done at this stage. The salt and pepper method was used to achieve the selective labial gum-tinting. ¹³ Gum tinting was done on the lower acrylic denture because the gum of the patient will exposed due to a lower lip that opens low and because he is so young he would like it to appear as natural as possibly can.

Once the mandibular acrylic work was done it was divested and the maxillary was removed from the pressure curing unit and both were work off. The acrylic dentures were highly polished, ready for placement this if illustrated in figure 4.¹³



Fig. 4. Finished case in articulation

Problems Experienced in the laboratory work

- 1) An incomplete casting was experienced on one of the milled crown due to the milled wax surface being too thin. The crown had to be redone and a plastic spacer was used as a guide for the milling.
- 2) I also had porosity in the Co-Cr framework this was over come by using stainless steel wrought wire in conjunction with the laser welder. This problem could be eliminated by using a clean crucible.
- 3) Some of the retention grid was closed, due to excessive hardener on the refractory model. The grid was opened by making use of stone burs.

Future treatment for clinical as well as technical

Only if the patient improves his oral hygiene can implant retained overdentures or even bridges are an option.

It also depends on how much the alveolar bone has been resorbed by the time the patient has improved his oral hygiene.

Conclusion

In the literature, there were several options, some better than others, but then the patient could not afford the most ideal option.

The gold milled crowns provide extra retention to the Co-Cr removable partial denture, because of the insufficient undercut on the buccal surface of the teeth. The Co-Cr removable partial denture was made as small as possible, but still functional. With the Conventional removable acrylic removable mandibular denture, the selective gum-tinting were achieved above of the expectation of what the patient had in mind.

With the chosen option, it was found that these appliances improved the patient's aesthetics, masticatory function, facial appearance, as well as his confidence.

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