The custom cast abutment for the difficult cases of dental implant prosthetics

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Introduction:

Recently, with the advancements and spread of oral and maxillofacial and periodontal surgical technology in bone regeneration therapy, drastic changes have occurred in the paradigm of conventional implant therapy. There are still cases or patients who selected not to choose bone and soft tissue regeneration therapy or cases where further surgical intervention is counter-indicated due to underlying systemic diseases. In addition, there are cases where implant therapy is only possible in areas where there is sufficient bone structure for implant placement but problems associated with the parallelism of the implant and fabrication of the superstructure of the commercially available abutment (ready-made abutment) arise in these cases. In order to solve these problems, the Custom Full Cast Abutment (CFCA) was fabricated and utilized and more than satisfactory results were attained.
Purpose:
The objective was to develop the original fabrication method for the Custom Full Cast Abutment (CFCA) for clinical application in cases where commercially available abutments are not applicable. With the fabrication method for CFCA, we speculated that a broader spectrum for indication of implant therapy will be attainable and the possibilities of implant therapy for oral rehabilitation to increase.

Material and Methods:
From April 1997 to August 2001, a total of 148 cases underwent implant therapy at the Fukuhara Dental Clinic (private office) in which 16 cases (37 fixtures) underwent prosthetic treatment with the fabricated Custom Full Cast Abutment (CFCA).
**Fabrication Method for the Custom Full Cast Abutment (CFCA).**

1. The impression is obtained for the conjugated unit of the commercially available abutment and 1.5 mm wire instead of the commercially available abutment screw.

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1.5 mm wire & commercially available abutment

Conjugated unit
Impression taking of conjugated unit

2. The fabrication of the interconnector piece is made by pouring the pattern resin® (GC Co.) into the impression.

Interconnector pieces
3. On the working cast model after final impression, the resin-pattern fabricated above is set to the implant analog and wax up is performed with consideration for parallelism of the superior region of the abutment.
4. The metallic unit is fabricated with Type III metal.

5. The metallic CFCA unit is fixed to the fixture with glass ionomer cement. The remaining procedure is the same as for the cement-retained abutment method.
Result:

Of the 16 cases treated with the Custom Full Cast Abutment (CFCA), there were 4 males and 12 females, age range of 39 years to 63 years with the mean age of 52.9 years.

Implants utilized were: IMZ® (Interpore) 2 units, Replace Select® (Nobel Biocare) 21 units, and FRIALIT-2® (Friadent) 14 units. Observation period from the final prosthetic treatment ranged from 7 to 58 months with mean of 15.9 months. Reasons for the selection of the CFCA method were: problems associated with parallelism due to anatomical factors: 6 cases, problems associated with occlusal height: 6 cases, aesthetic problems associated with bone resorption: 4 cases, and cases where surgical intervention is contraindicated due to underlying diseases: 1 case each for angina pectoris, epilepsy, and 2 cases for hypertension and 2 cases for anemia (Table). There are no post- CFCA treatment problems with all patients as of date.
<table>
<thead>
<tr>
<th>Age</th>
<th>First Visit</th>
<th>Implantation: Date of Implantation</th>
<th>Restoration: Date of Prosthetic Cementation</th>
<th>Period: from final Restoration</th>
<th>kind of Implant &amp; No: R; Replace Select® (Nobel Biocare), F; FRIALIT-2®(Friadent), number of fixtures</th>
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**Summary of implant prostheses with CFCA**
Representative Cases

Problem of occlusal height

Problem of esthetic affairs
Discussion:
There are cases where it is difficult to utilize implants due to problems associated with the anatomy and/or the condition of the bone where the implant is to be properly positioned. Recently for these cases, the range in application of implant therapy has increased with medical progresses of regeneration therapy and oral and maxillofacial surgery. But there still exists limitations for such treatment and furthermore, there are cases where regeneration therapy cannot be selected i.e.: surgical intervention is not possible due to the presence of underlying systemic diseases or other related reasons. For these cases, the use of commercially available abutments may lead to unfavorable results and continuous worry will exist. Therefore, there is a necessary requirement for a custom-made abutment.
Problems associated with the commercially available abutment.

1: Difficulty in the insertion and directional setting of commercially available abutment due to anatomical problems that cannot be corrected with routine countermeasures
   - Cases where excessive parallelism is lost.
   - Cases where occlusal height cannot be sufficiently attained.
   - Limitation in the size selection of the abutment.
2: The necessity in preparation of various and numerous types of abutment.

3: Presently with the commercially available abutment, there is no guarantee that a constant supply of related and/or corresponding parts is available.

4: With the commercially available abutment, there exists slight play between the fixture and the abutment screw, which may result in contamination expelling a foul smelling odor.
Advantages of the CFCA

1. Applicable for the vast majority of the cement-retained abutment cases.
2. Planning of prosthetic treatment is possible with the working cast model.
3. No necessity in preparation of various types of abutments.
4. Secondary prosthetic treatment is possible for implant cases treated at other institutions.
5. It is possible for application for the presently unavailable implants.
6. CFCA is cost efficient in comparison to other commercially available abutments.
Conclusion:

With the commercially available abutment available today, there are difficulties and limitations associated with its application to certain cases but with the fabrication method for the CFCA we had developed, it is applicable for these patients and more than satisfactory results have been attained. Presently, implants consist of an artificial root and with prosthetic treatment, there are no differences between those treated utilizing natural roots.

At present, there exists a universally accepted concept that the dentist must rely on screws with the conventional implant therapy but with a new concept on screws, I am confident that the dentist will be relieved from relying on screws for implant therapy. In the near future, a new implant system without screws will appear.