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"Monday Morning Pearls of Practice by Bobby Baig"

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Angulated Screw Channel for a single implant screw retained restoration: A new norm in Implant dentistry??? Case report.

Introduction:

Angulated screw channel abutments and dynamic abutments are different names for the same concept.

1. Today' s patients expect longevity, function, and esthetics from their implant-supported restorations.
2. The esthetic outcome of an implant-supported restoration is dependent on the soft tissue contour and affected by the appropriate positioning of the implant.
3. However, the presenting anatomy of the anterior maxilla often does not allow for an implant angulation that will allow a screw-retained restoration without the use of additional components. Often the remedy for this type of implant angulation is to provide an abutment designed to receive a cemented restoration.

Disadvantages: Cemented vs Screw retained restorations:

1. The consequences of excess cement,
2. Lack of retrievability

Several authors have advocated approaching ideal implant placement from a 3-dimensional perspective. They describe the most significant error in implant positioning as angling the implant too far facially, thereby apically displacing the soft tissue contours of the restoration.

The use of screw-retained or cemented pre-angled abutments is a prosthetic option. However, these components require implants to be placed more apically to accommodate the labial dimensions of pre-angled abutments whether they are for screw or cemented restorations. Also, timing these abutments with the nonrotating feature of the abutments and the cost of additional components could be an issue. (Fig 1-6)

Acknowledgement: Pictures courtesy of MEGA GEN implants.

Fig 1

Fig 2

Fig 3

Fig 4

Fig 5

Fig 6

Figure 1-3: Single implant cemented restoration with a titanium gold nitrite coated abutment with an all ceramic crown.
Figure 4-6: Single implant cemented restoration with a zirconium abutment with an all ceramic crown

Angulated screw channel and or Dynamic Abutments are that allows the angulation of the screw access to diverge from the angulation of the implant. This abutment makes it possible to alter the angulation of the abutment by up to 30 degrees based on the manufacturer and the implant diameter {Dynamic abutment 0-30 degrees (Fig 10), Nobel Biocare ASC abutment 0-25 degrees (fig 7-9)}, allowing for a screw retained restoration with no additional component as opposed to an implant placed with an ideal angulation for screw retention. The angle correction occurs before casting the restorative framework or with a CADCAM design.

Fig 7

Fig 8

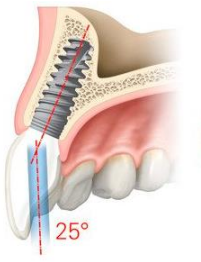

Fig 9

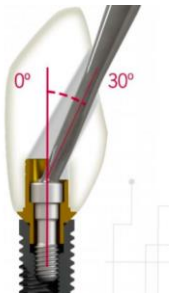

Fig 10.

Angled vs straight abutments:

In 2011, Cavallaro et al analyzed the results of photo elastic stress assessments, Clelland et al about finite element analysis, Kao HC et al about micro-motion, have published studies that indicated that increased abutment angulations result in a greater amount of stress on prostheses and the surrounding bone than that associated with straight abutments.

However, survival studies did not demonstrate a significant decrease in prosthesis longevity when angled abutments were used, and also there was no additional bone loss adjacent to implants that supported angled abutments compared with straight abutments, and angled abutments did not lead to an increased incidence of screw loosening.

ASC abutment / Dynamic Abutment:

It consists of a base with a semisphere which can be freely moved to deviate from the axis by up to 0-30 degrees (Fig 8-10). The fixation screw is unique and allows tightening while off axis with a screwdriver with a hexagonal 1.30-mm-faceted sphere.

These abutment is made to be compatible with the following implant systems: Straumann, Dentsply Astra Tech, Nobel Biocare (Brånemark system, Replace, Standard and Multiunit abutments), Biomet 3i, Zimmer, Ankylos etc systems.

CLINICAL REPORT:

A 45-year-old healthy woman presented to my office with a history of fractured tooth, this tooth was restored multiple times, this tooth has a history of trauma, patient is not symptomatic. She was wearing a interim removable prosthesis that was fabricated in the past. This tooth had a questionable prognosis and the proposed treatment plan was to extract this tooth and restoration by placement of a single implant supported restoration. Fig 11-14.

(Fig 11-14)

patient was referred to a periodontist for extraction and implant placement. The tooth was extracted and the site was grafted due to thin buccal plate and inadequate bone anatomy for an immediate implant placement, the interim flipper was adjusted for proper seating, 3 months later impressions were made to fabricate implant placement guide, a straumann implant bone level RC 4.1 mm X 10mm is placed (Fig 15). The healing was uneventful and the implant has osseointegrated.

Fig 15

Fig 16-17

the implant has a buccal angulation, In order to obtain an esthetic outcome and to optimize the tissues, an interim fixed screw retained crown was recommended, the implant restoration contour should transition from the dimensions of the implant platform to the correct cervical tooth anatomy; this is facilitated by the interim restoration to form the peri-implant mucosa. This was accomplished by making a preliminary impression of the implant with an open tray impression coping, VPS impression material and stock tray (Fig 16-17)

The stone around the implant platform was contoured to the appropriate cervical tooth anatomy in the stone model, and a screw-retained interim restoration was created to fill the space. Before the interim restoration is placed two vertical incisions are made in the mesio-palatal, disto-palatal area (Fig 18, 20) to resect the circular fibers and prevent too much tissue blanching. The resulting interim restoration with a screw retained buccal access was placed clinically and gradually displaced the soft tissues as directed by the shape of the submucosal contours of the interim restoration. (Fig 19-23)

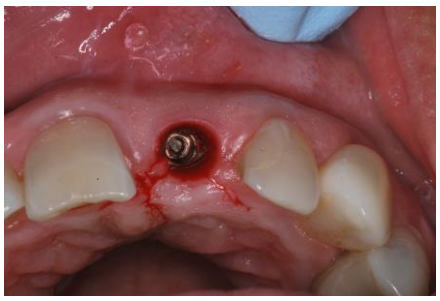

Fig 18

Fig 19

Fig 20

Fig 21

Fig 22

Fig 23

Su et al described the importance of soft tissue esthetics in relation to the emergence profile. This profile is largely determined by the soft tissues forming around the interim restoration. This submucosal contour can be provided to the dental technician so that it can be predictably replicated on the definitive restoration, this is achieved by converting the stock impression coping is into a custom impression coping by placing flowable composite resin in the space between the coping and the peri-implant soft tissue. Fig 26-28

Fig 24

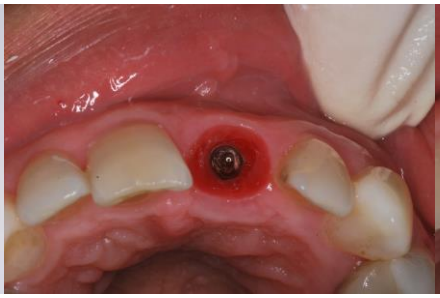

Fig 25

Fig 26

Fig 27

Fig 28

Fig 29-31.

Six weeks later the interim fixed screw retained prosthesis was useful to optimize the peri-implant soft tissues. Fig 29-31.

The screw access as determined by the angulation of the implant was located on the buccal surface of the central incisor (fig 24, 29-31). This was altered with use of the Dynamic Abutment. (fig 32/33 compared to fig 24) shows the change of the angulation and how the screw access of the implant was redirected to the palatal surface of the restoration.




Fig 32 Fig 33 Fig 34 Fig 35


Fig 36 Fig 37

In the above patient a zirconia abutment is used with layered porcelain and external staining with glazing to achieve optimal esthetics, in spite of a low smile line all esthetic and soft tissue optimization parameters are taken into consideration while planning and restoring the implant.

Discussion:

1. Eger et al compared clinical parameters such as probing depths, gingival level, gingival index, and mobility between implants restored with angled and standard abutments and found no significant difference for any of the parameters examined.
2. Ha et al compared the removal torque values (RTVs) of different abutments (straight, angled, and gold pre-machined direct) in external- and internal-hexagon implants after dynamic cyclic loading. They found that the angled abutment group showed significantly higher RTVs.

Conclusion:

1. Implant-supported screw-retained restorations have the benefit of retrievability and do not have the liability of retained excess cement.
2. When implants are placed within a 30-degree variance of the ideal trajectory, the Dynamic Abutment can be used and requires no increased depth of the implant or additional components.
3. These abutments can be torqued based upon the manufacture recommendation and are able to withstand functional loading.

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