

## Screw-retained implant-supported crowns: An option of prosthetic restoration

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### Abstract

This paper shows the clinical steps for preparing a screw-retained crown for the restoration of a single implant. A 66-year-old female patient came to the clinic wanted to replace partial edentulous after extraction of 24 and 25. Patient wanted to have implant treatment with fixed restoration because he had experienced with the same treatment before in another regions. Impression-taking using open-tray technique and delivery of the crown is presented in a step-by-step manner elucidated by detailed photographs. Furthermore, the advantages and disadvantages of screw-retained crowns are discussed in comparison with the cemented restorations.

**Keywords:** Retrievability; Screw-retained crown; Dental implant; Medicine

### 1. Introduction

The use of implant-supported single crowns has become a well-established and preferred approach to compensate for missing single teeth [1]. There are two different types of prosthetic restorations fixed on dental implants: Screw-retained and cemented restorations. The choice of method is usually based on the clinician's preference [2]. Retrievability is the main advantage of screw-retained crowns that would make it more favorable to many clinicians [3]. It allows better control on the hygiene of the implants and surrounding mucosa, also, crowns can be easily repaired in case of crown fracture.[4] On the other hand, cases when the access hole is on the incisal edges or cusps teeth or easier access to the posterior area of the mouth is needed, cemented crown restorations could be more practical [4,5].

During the life of an implant prosthesis, the clinician may need to remove the restoration for hygiene, repairs and abutment screw tightening, and screw-retained designs make all of these procedures easily achievable. Screw-retained restorations, however, require precise implant placement for optimal location of the screw access hole; deviations from the optimal position and angulation can lead to an unaesthetic restoration. Many clinicians have emphasized the advantages of the cement-retained prosthesis, including its greater versatility for aesthetics and simplicity of the technique. Another advantage might be the potential for complete passivity when a cemented restoration is placed on the implants. The absence of a screw to draw inadequately fitting components together with a clamping force would be likely to eliminate strain that the tightening force of the screw would introduce into the restoration/implant assembly. This potential advantage, together with the others mentioned, has made cement-retained implant restorations increasingly popular.

### 2. Case

A 66-year-old female patient came to the clinic who wanted to replace partial edentulous after extraction of 24 and 25. This patient wanted fixed restoration in order to eat and chew well and expected high aesthetic results. This patient had experienced using implants to replace teeth loss in other regions. In this case, the patient lost her first and second

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premolar on the left maxilla. Two fixture implants (4,5 mm x 11,5 mm) (Hiossen ETIII SA, Osteem, USA) were placed in regions 24 and 25. Two months after the operation, the cover screws were changed with healing abutment. After using healing abutments for two weeks, gingival profiles were created when healing abutments opened. The patient wanted to have implant treatment with fixed restoration because he had experienced the same treatment before in another region, so the prosthodontic treatment option was using implant-supported crowns.



**Figure 1** Radiograph examination for the preparation



**Figure 2** Upper: two dental implant fixtures were inserted along with its radiographic examination 2 months after insertion. Lower: healing abutments were inserted for two weeks, Gingival profiles were created when healing was removed



**Figure 3** Upper: transfer coping was inserted for the impression process. Lower: Two screw-retained crowns were ready after the laboratory process



**Figure 4** Two screw-retained crowns have been inserted and had good adaptation with the gingival mucosa

### 3. Discussion

The choice of a screw-retained versus a cemented crown is a decision that involves several points of consideration. The clinician should have good awareness regarding the advantages and disadvantages of using a screw-retained versus a cemented crown. Here are some factors the clinician should put in consideration when choosing which type to use.

#### 3.1. Retrievability

The main advantage of screw-retained crowns is retrievability. It is always nice to have the option to easily remove an implant crown or re-tighten the screw whenever it is needed without any damage to the restoration. In the case of crown loosening, crown fracture, screw replacement, implant assessment, and cleaning of the surrounding tissue, the crown can easily be removed. While the screw-retained crown is certainly retrievable, removing a cemented crown can be problematic particularly if full ceramic crowns are used.

#### 3.2. Hygiene

Excess cement left behind cemented restoration is a major problem and can result in soft tissue damage, bone loss, and/or chronic inflammation. The literature shows that the soft tissue surrounding screw-retained crowns are healthier than the peri-implant mucosa surrounding cemented restorations [6]. However, by removing cement thoroughly, the risk of leaving cement subgingivally that could cause peri-implantitis is reduced significantly.

#### 3.3. Retention

Abutment height, degree of taper, and surface area are all factors that affect the retention of cemented crowns. Abutment height is an important factor for proper retention. Longer abutment walls have more surface area, consequently are more retentive. At least 5 mm of abutment height is needed for proper retention of cemented crowns [7]. Therefore; screw-retained crowns are necessary for situations when limited inter-arch space dictates an abutment that would be shorter than 5 mm [8].

#### 3.4. Esthetics

In screw-retained restorations, the access hole will exit through the central fossa of the prosthetic crown. The screw hole in the prosthesis may compromise esthetic, occlusion, and porcelain strength; [9] especially if the diameter of the screw was wide [4]. The cemented crown obviously has no entrance cavity. All-ceramic screw-retained crowns reduce the challenge of masking underlying discoloration from showing through the occlusal access opening once it is sealed by resin cement.

#### 3.5. Implant inclination

Particularly, when a screw-retained crown is planned to be the prosthetic choice, a surgeon should bring to attention the inclination of the implant fixture accordingly while planning the surgical procedure. This typically does not cause a problem with posterior implants, since the posterior implants are more axially positioned with regard to the alveolus and tooth. However, it may be an issue with anterior teeth where the implant needs to be inclined lingually to allow screw emergence through the cingulum area of the restoration.

#### 3.6. Accessibility

Placing a screw-retained restoration in a patient with a limited opening and/or in the posterior area of the mouth can be challenging if there was not sufficient space for the screwdriver to be inserted [10,11].

### 3.7. Screw loosening

The frequency of screw loosening is reported to be between 5% and 65% [9,12,13]. Using a mechanical torque instrument to tighten the screw to a recommended torque level (20-30 Ncm) has greatly diminished this prosthetic complication [14,15].

Pjetursson et al. [13] conducted a systematic review and reported that the survival rate of the metal-ceramic implant-supported fixed dental prosthesis was 96.4% after 5 years and 93.9% after 10 years. The most frequent complications over the 5-year observation period were fractures of the veneering material (13.5%), loss of access hole restoration (5.4%), abutment or screw loosening (5.3%), and loss of retention of the cemented prosthesis (4.7%).

Screw-retained implant restorations may have the advantage of predictable retrievability, but they demand the precise placement of the implant for optimal location of the screw access hole. Deviation from this optimal direction can lead to an unaesthetic restoration if screw retention is used. Screw-retained implant restorations may also present a screw access opening that can weaken the porcelain around the openings and at the cusp tips, resulting in unstable occlusal contact.

Cementation of implant restorations eliminates unaesthetic screw access holes and problems related to the development of stable occlusal contacts. With the introduction of more precise abutments, which improve abutment-to-implant fit, the arguments against cementation (i.e. fear that the abutment complex may loosen) may be questioned. In the present study, these more precise components were used, which, with careful and selective equilibration to achieve optimal occlusion and the avoidance of contact in lateral and protrusive movements, may also explain the lack of complications related to screw loosening during this investigation. Accurate evaluation of the occlusal scheme and the provision of appropriate variations to the occlusal contacts, both static and dynamic, may also explain the lack of prosthetic complications, such as porcelain fracture and loosening of provisionally cemented definitive crowns. Furthermore, it should be noted that cemented crowns require particular attention to the removal of all subgingival cement at the cementation phase, so that problems associated with peri-implant gingival tissues may be prevented.

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## 4. Conclusion

There was no evidence that one method of retention was superior to another in population, therefore the choice of cementation versus screw retention seems to be primarily related to the clinician's preference.

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### Compliance with ethical standards

#### *Disclosure of conflict of interest*

The authors declare that the authors do not have conflict of interests.

#### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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