

**Early spontaneous exposure of implant cover screw: A review on diagnosis and Management**

<sup>1</sup>Dr. Surjargha Mukherjee, Post Graduate Trainee, Department of Prosthodontics and Crown & Bridge, Dr. R. Ahmed Dental College & Hospital, Kolkata, West Bengal- 700014

<sup>2</sup>Dr. Piyush Dongre, Post Graduate Trainee, Department of Prosthodontics and Crown & Bridge, Dr. R. Ahmed Dental College & Hospital, Kolkata, West Bengal- 700014

<sup>3</sup>Dr. Swagata Deb, Post Graduate, Department of Prosthodontics and Crown & Bridge, Dr. R. Ahmed Dental College & Hospital, Kolkata, West Bengal- 70001

<sup>4</sup>Dr. T. K. Giri, Professor, Department of Prosthodontics and Crown & Bridge, Dr. R. Ahmed Dental College & Hospital, Kolkata, West Bengal- 700014

**Corresponding Author:** Dr. Swagata Deb, Post Graduate, Department of Prosthodontics and Crown & Bridge, Dr. R. Ahmed Dental College & Hospital, Kolkata, West Bengal- 70001

**Citation of this Article:** Dr. Surjargha Mukherjee, Dr. Piyush Dongre, Dr. Swagata Deb, Dr. T. K. Giri, “Early spontaneous exposure of implant cover screw: A review on diagnosis and Management”, IJDSIR- March - 2021, Vol. – 4, Issue - 2, P. No. 293 – 297.

**Copyright:** © 2021, Dr. Swagata Deb, et al. This is an open access journal and article distributed under the terms of the creative commons attribution noncommercial License. Which allows others to remix, tweak, and build upon the work non commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**Type of Publication:** Review Article

**Conflicts of Interest:** Nil

**Abstract**

In the two stage implant submerged protocol cover screw plays an important role in sealing off the communication between the implant fixtures and the oral environment which is essential for successful osseointegration. But often we encounter an early exposure of the cover screw before the stage II uncover of the implant. The reasons are various like improper flap design leading to tension over the suture, thin biotype of the gingival tissue, habits like smoking and alcohol use during healing and excessive pressure from the overlying prosthesis. Early perforations and partial exposure of cover screw act as foci of accumulation of plaque which leads to peri implant soft tissue changes like inflammation and purulent exudates

formation. Early crestal bone loss has been observed more commonly around such untreated implant sites. So an early diagnosis and prompt management of early exposure is mandatory. This review article attempts to highlight on the diagnosis based on an easy to follow classification of early cover screw exposure and management of individual categories depending on the amount of exposure that has occurred.

**Keywords:** Implant Cover screw, Submerged Implant, Partial exposure, early exposure, Peri implantitis, mucositis.

**Introduction**

In the two-stage endosseous implant placement, the implant is submerged beneath the mucosa during the

osseointegration period. This two-stage method provides an environment for the primary closure of the wound in a sterile and stress-free environment. Following the placement of implants; the sub-merged implants are covered with mucosa in the surgical site. The mucosa, which is of masticatory type is adapted to the underlying bone and sutured to establish primary healing and to avoid exposure of the implant cover screw to the oral cavity. It is a well known fact that during the osseointegration phase of healing, complete mucosal coverage and isolation of the implant from the oral cavity is important to avoid trauma and infection to the implant site.<sup>1</sup> But spontaneous early exposure of dental implants, between Stage I and Stage II surgery, is not an uncommon complication. In a 15-year study of osseointegrated implants, Adell et al found an occurrence of 4.6% early perforations in the treated patients in spite of a careful surgical protocol and postsurgical care.<sup>2</sup> They suggested that any communication of the implant surgical screw with the oral cavity observed during the first 6 weeks should be treated by excision of the perforated site, flap mobilization, re-suturing, and proper adjustment of the provisional prosthesis if present. Bacterial colonization can occur during the osseointegration period if a direct communication between the implant surface and the oral environment is established and may lead to early bone loss. Thus, early detection of these exposures becomes very important in terms of prevention.<sup>3</sup>

This article highlights on the diagnosis and management of the implant covers screw exposure based on an easy to follow classification system.

### **Etiology and classification**

The various factors that might lead to early spontaneous exposure of the cover screw are over tightened suture over the flap, closure under tension, presence of less amount of keratinized tissue, torn and lacerated wound edges, strong

muscle pull along the wound edges and oral habits like smoking and alcohol.<sup>4</sup>

Tal was the first to clinically describe and classify the spontaneous early exposure of submerged implants. He classified different clinical scenarios of spontaneous exposure of implants to fall in any one of the five categories mentioned here.<sup>5</sup>

Class 0: The mucosa covering the implant is intact.

Class 1: A breach in the mucosa is observed. Cover screw exposure can be detected by a periodontal probe.

Class 2: The mucosa above the cover screw is fenestrated. Cover screw is visible. The borders of the perforation's aperture do not reach or overlap the borders of the cover screw at any point.

Class 3: Cover screw is visible. In some parts, the borders of the perforation's aperture overlap the borders of the cover screw.

Class 4: Cover screw is completely exposed.

Barboza and Caula in 2002 proposed an easy-to-use classification for spontaneous early exposure of submerged implants based on diagnostic methods and treatment modalities to prevent or manage such complications.<sup>6</sup>

Class I—Cover screw spontaneous early partial exposure: A communication between the cover screw and oral cavity, with a fenestrated mucosa still partially covering the cover screw. Six types of such partial fenestration can be observed (Figure: 1a-1f).

Class II: Cover screw spontaneous early total exposure where the fenestration reveals the cover screw completely. This group is further divided into four sub groups based on clinical changes of periimplant soft tissues.

Class A. No signs of inflammation. Mucosa texture, volume, and colour are within the normal limits of health. No purulent exudate is observed.

Class B. No signs of inflammation. Mucosa texture, volume, and colour are within the normal limits of health; however, purulent exudate is present.

Class C. Signs of inflammation present. Mucosa texture and/or colour are altered. Edematous mucosa and/or pain may be present. However, visually or upon palpation, no purulent exudate is observed.

Class D. Signs of inflammation with suppuration. Fenestrated mucosa presents signs of inflammation, and, visually or upon palpation, purulent exudate is observed.

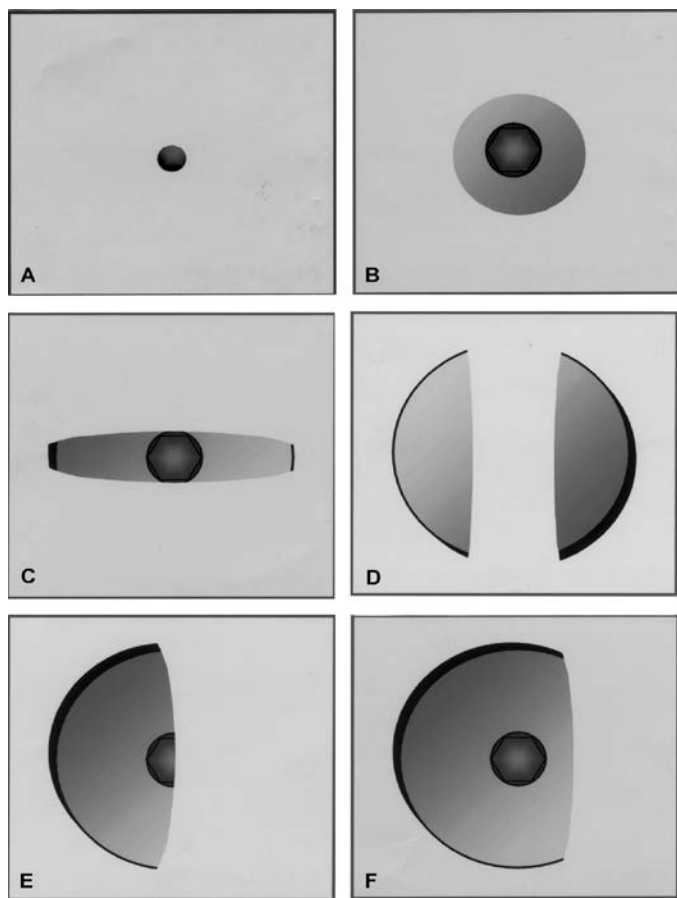


Figure 1: A-F: Class I: Early spontaneous partial exposure (From Eliane P. Barboza and André Luis Caúla, "Diagnoses, Clinical Classification, and Proposed Treatment of Spontaneous Early Exposure of Submerged Implants" in, *Implant Dentistry*, Vol. 11, no. 4, 2002, pp. 331-337).

## Methods of Diagnosis

Presence of edematous or painful mucosa may initially draw our attention when the exposure is of class II category. In case of class I exposure visual evaluation of the implant site with the help of mouth mirror, probe and air is helpful. Sometimes when inflammation and purulent exudate is present at the site palpation helps to identify the fenestration. Periodic radiographs are also beneficial in identifying loose cover screw and an early crestal bone loss.

## Treatment Modalities

Barboza proposed various treatment modalities that can be used when spontaneous early cover screw exposure is diagnosed.<sup>6</sup>

**Treatment Modality 1 (TM1):** It includes professional cleaning of the cover screw using specific curettes, abrasives, air, rubber cup, and polishing paste. Patient's oral hygiene practices should be checked, and a more effective oral hygiene routine should be emphasized. Rinses or local application of chlorhexidine digluconate (0.12%) twice daily must be prescribed. A frequent recall in every other week during the period of initial healing must be performed.

**Treatment Modality 2 (TM2):** It includes identification of causative microorganisms and antibiotic therapy. Microbiological samples must be collected to identify the pathogens. If the patient presents a localized peri implant problem, a topical antibiotic therapy can be considered. However, if the patient presents other areas of peri implant and/or periodontal diseases, a systemic antibiotic, should be administered.

**Treatment Modality 3 (TM3)** consists of surgical exposure of the cover screw and placement of a healing abutment. The mucosa borders overlaying the cover screw creates a bacterial focus resembling pericoronitis that needs to be eliminated. To avoid the mucosa regrowth and facilitate

patient oral hygiene, a healing abutment should be placed over the implant.

Treatment Modality 4 (TM4) includes peri implantitis treatment. If bone destruction is radiographically detected, surgical intervention to correct tissue morphology or to apply guided bone regeneration techniques are necessary.

### Discussion

The two stage implant protocol by Branemark in 1977 proposed submerging the implants for 3-6 months during the bony remodeling process to prevent infection and apical migration of soft tissue around the implant collar.<sup>7</sup> Though the implant covered by soft tissue may get exposed spontaneously. Tal et al. reported early exposure in 16.1% of external hex implants and 11% with internal hex implants.<sup>5, 8, 9</sup> Rosenquist and Grenthe observed 11% of the implants had early exposure when placed into extraction socket.<sup>10</sup> Therefore the risk of early exposure occurs approximately 5% to 15% of the time and is dependent on implant profile and the hard and soft tissue conditions. Toljanic et al reported early exposure at the time of the Stage II procedure in 14 implants (5%) in 7 patients (14%) of a total of 275 implants placed.<sup>3</sup> When the implant is exposed to the oral environment before the uncover stage the epithelium may become hyperkeratotic and becomes infiltrated with chronic inflammatory cells predominantly lymphocytes in the connective tissue layer. Toljanic also reported 3.9 times more bone loss in premature exposures, with a mean bone loss of 2.71 mm (standard deviation [SD]  $\pm 1.78$  mm) for prematurely exposed implants versus 0.43 mm (SD  $\pm 1.08$  mm) for nonexposed implants. Barboza et al. compared crestal bone loss for one-stage surgery versus a two-stage surgery in 10 patients with 56 implants.<sup>11</sup> They suggested that presence of crestal bone loss around the exposed implants may be contributed to the presence of higher numbers of micro organisms like, Streptococcus beta hemolysin,

Prevotella intermedia and Fusobacterium sp. This anaerobic condition around the implants may be due to loose cover screw which is not tightened to 10-30 Ncm or partially exposed cover screw forming a niche for the accumulation of bacteria. Both of these situations predispose to inflammation and exudate formation leading to more crestal bone loss around implant. This condition should be corrected with uncovering the implant completely with a hand tissue punch, tissue punch bur, or laser. If bone is present, a profiling bur (end cutting) can be used to remove the bone. A high-speed hand piece should not be used because implant damage may result. The area should then be flushed with chlorhexidine (0.12%) and a perimucosal extension (PME) or healing collar of smaller size usually 1mm above the soft tissue margin should be placed and no attempt should be made for primary closure of the flap. This should be followed by a twice daily plaque removal with a soft toothbrush and the direct application of Chlorhexidine (0.12%) and patients existing overlying prosthesis should be modified so that no direct force is applied to the implant site. In the presence of purulent exudates, microbiological samples must be collected to identify the putative pathogens. If the patient presents a localized peri implant mucositis, a topical antibiotic therapy can be considered. Also systemic antibiotics should be advised when the peri implant changes are more generalized.<sup>6</sup> Another factor that may contribute to greater marginal bone loss may be caused by micro gap formation. Normally bone grows around the cover screw crevice in submerged implants when overlying mucosa covers the implant. But in prematurely exposed implant sites the epithelium shifts to 0.5-1 mm below the cover screw crevice thus exposing this junction to the pathogenic organisms.<sup>12</sup> Other causes of cover screw getting exposed are incision line opening, excess tension on the incision line, thin biotype, interim

prosthesis pressure, immediate implant placement, implant design—high surgical cover screw.<sup>4</sup> The present periodontal diagnostic methods remain the mainstay of diagnosing early spontaneous exposure as they are non invasive, easy to perform and cost effective methods. Since probing cannot be employed as a routine examination method for dental implants; visual detection of presence of plaque, inflammatory changes and radiographic evidence of loose cover screw or bone loss around the implant can guide the clinician in proper decision making.

### Conclusion

Spontaneous exposure of the cover screw leading to early exposure of the implant fixture in the oral cavity before the stage II uncovering is not a very uncommon complication. Early Diagnosis and prompt management of such situations based on the level of the exposure and condition of the peri implant tissue is mandatory to prevent future bone loss around the submerged implant.

### References

1. Michael S. Block and John N. Kent, "Factors associated with soft- and hard-tissue compromise of endosseous implants", *Journal of Oral and Maxillofacial Surgery*, Vol. 48, no. 11, 1990, p. 1153-1160.
2. R. Adell, U Lekholm, B. Rockler and P.-I. Brånemark, "A 15-year study of osseointegrated implants in the treatment of the edentulous jaw", *International Journal of Oral Surgery*, Vol. 10, no. 6, 1981, p. 387-416.
3. Toljanic JA, Banakis ML, Willes LA, "Soft tissue exposure of endosseous implants between stage I and II surgery as a potential indicator of early crestal bone loss", *International Journal of Oral Maxillofacial Implants*, Vol.14,no.3 ,1999 , p.436–441.
4. Randolph Resnik, Carl Misch, *Misch's Avoiding Complications in Oral Implantology*. St. Louis, Missouri, Mosby Elsevier, 2017, p.1041
5. Haim Tal, "Spontaneous Early Exposure of Submerged Implants: I. Classification and Clinical Observations", *Journal of Periodontology*, Vol. 70, no. 2, 1999, p. 213-219.
6. Eliane P. Barboza and André Luis Caúla, "Diagnoses, Clinical Classification, and Proposed Treatment of Spontaneous Early Exposure of Submerged Implants" in, *Implant Dentistry*, Vol. 11, no. 4, 2002, p. 331-337.
7. Per-Ingvar Branemark, "Osseointegration and its experimental background", *The Journal of Prosthetic Dentistry*, Vol. 50, no. 3, 1983, p. 399-410.
8. Haim Tal and Dan Dayan, "Spontaneous Early Exposure of Submerged Implants: II. Histopathology and Histomorphometry of Non-Perforated Mucosa Covering Submerged Implants", *Journal of Periodontology*, Vol. 71, no. 8, 2000, p. 1224-1230.
9. Haim Tal and Dan Dayan, "Spontaneous Early Exposure of Submerged Implants: III. Histopathology of Perforated Mucosa Covering Submerged Implants", *Journal of Periodontology*, Vol. 71, no. 8, 2000, p. 1231-1235.
10. B Rosenquist and B Grenthe, "Immediate placement of implants into extraction sockets: implant survival", *Implant Dentistry*, Vol. 5, no. 4, 1996, p. 297.
11. Eliane P. Barboza, André Luis Caúla and Waldimir R. Carvalho, "Crestal Bone Loss Around Submerged and Exposed Unloaded Dental Implants: A Radiographic and Microbiological Descriptive Study", *Implant Dentistry*, Vol. 11, no. 2, 2002, p. 162-169.
12. Carl E. Misch, *Contemporary Implant Dentistry*. St. Louis, Missouri, Mosby Elsevier, 2008, p.723.