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Treatment Planning Guidelines and Prosthetic Options for the Edentulous Patient

A Peer-Reviewed Publication
Written by Alessandro Geminiani DDS, MS

Abstract

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Educational Objectives

During this course the participant will:

1. Review the options for the rehabilitation of the edentulous patient
2. Review the indications/ contraindications of implant-related treatment options
3. Evaluate advantages/disadvantages of fixed vs. removable implant options
4. Become familiar with the All-on-4 treatment concept

Author Profile

Doctor Geminiani received his DDS and MSc degree from the University of Siena (Italy). He continued his education at Eastman Institute for Oral Health, University of Rochester, Rochester NY, where he pursued a certificate in Advanced Education in General Dentistry, a certificate in Periodontics and a Master of Science in clinical and translational investigation. He is a diplomate of the American Board of Periodontology and is currently in private practice in Rochester, NY.

Author Disclosure

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Abstract

The loss of all of the teeth is a life-changing event that brings functional challenges. The consequences of complete edentulism impact areas such as anatomical, esthetic, nutritional, self-esteem, and social interaction. The treatment options for edentulous patients range from conventional complete dentures to fixed implant-retained or supported removable prosthetics (overdenture) to fixed implant.

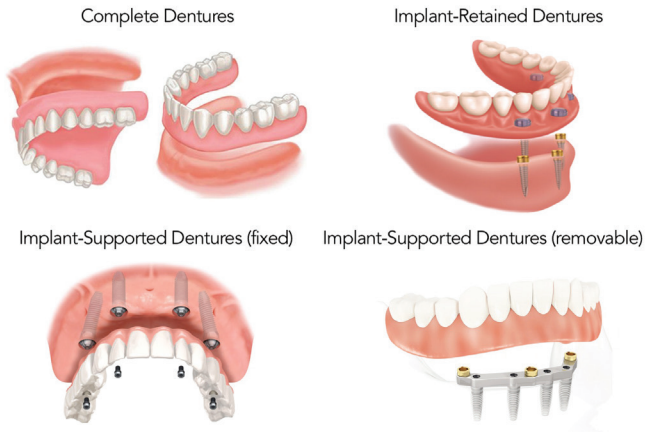
Introduction

Edentulism is a condition secondary to infection or trauma of the teeth. In the US, the percentage of edentulous patients is declining 10% each decade.[1] However, this reduction is more than off-set by the aging baby boomer population and the increase in life expectancy portending an increased number of edentulous patients. In the past, these patients would have been treated with a conventional, removable complete denture. However, current improvements in surgical protocols and technology allow clinicians to offer their patients predictable and reliable implant-based treatment options.[2] Each option offers different levels of function and comfort with its own indications and contraindications (Table 1 and Figure 1).

Table 1

Treatment options for the edentulous patient
Complete Dentures (CD)
Implant-retained Complete Dentures (IRCD)
Removable
• with prefabricated attachments
• with bar attachments
Implant-supported Complete Dentures (ISCD)
Fixed
• screw retained on four or more implants (i.e., All-on-4)
• cemented on prefabricated/custom abutments
Removable
• supported by a substructure (i.e., bar-overdenture)

Figure 1 – Treatment options for the edentulous patient



Treatment planning

Meticulous diagnosis and treatment planning is critically important to obtaining a predictable outcome. Several factors play a role in treatment selection such as anatomy, phonetics, esthetics, available interocclusal space, neuromuscular function, cost, and patient compliance (i.e., oral hygiene). Moreover, the maxilla and mandible present different anatomical and functional challenges related to their arch morphology, resorptive patterns, quantity and quality of the bone, presence of anatomical structure, and biomechanics.[3] When a clinician is planning the rehabilitation of an edentulous patient, he/she should realize that the edentulous maxilla and mandible pose different challenges. The maxilla is affected by a vertical and horizontal type of bone resorption,[4] possibly requiring support of the upper lip to restore esthetics. The mandible will present a more functional challenge with reduced bone support and the need for neuromuscular control of the tongue.

Medical and dental history

Dental implants can be safely used to rehabilitate the vast majority of patients,[5] including those who present with chronic debilitating maladies such as heart disease and diabetes. Provided the medical condition is well managed and there is patient compliance, surgical placement is indicated. Some treatable contraindications exist and must be evaluated with the patient's treating physician to avoid intraoperative and postoperative complications. Such reversible contraindications include: diabetes, recent myocardial infarction, chronic steroidal anti-inflammatory medications, anticoagulant therapy, intravenous bisphosphonates, and radiation.[6] Pretreatment consultation with the treating physician is required. In some cases, a modification of the pharmacological therapy might allow immediate care, or a delay until the condition is brought under control.

Fortunately, dental implants are rarely a contraindication in and of themselves, however, there are multiple factors that help steer the treating dentist toward the selection of a more adequate treatment option based on the patient's dental history.

Lip support and lip line

Lip support is one of the most important criteria in the selection of a fixed versus removable implant prosthesis. Lip support is determined by the shape of the alveolar ridge (supporting the portion of the lip closer to the base of the nose, or the columella) and by the buccal aspect of the incisors and canine teeth (supporting the vermillion border of the lip). The maxillary alveolar process presents a resorption pattern that proceeds cranially and medially[4] resulting in the loss of vertical dimension and lip support. Depending on the severity of the bone resorption there can be considerable discrepancy between the position of the anterior teeth and the alveolar bone. The acrylic flange of the patient's existing maxillary denture, or a newly fabricated diagnostic denture can help determine if enhancement is required. If the flange is needed to fully support the upper lip, a fixed implant might not be possible unless the patient undergoes extensive bone grafting procedures. Another related factor is the amount of alveolar ridge displayed during smiling.[7] If prominent, the final junction between the restoration and the gingiva (transition line) will be visible in a fixed implant supported restoration. (Figure 2).

Figure 2 - Alveolar process of an edentulous patient visible while smiling

This can be corrected with alveoloplasty at the time of implant placement: the amount of alveolar ridge shown while smiling is measured preoperatively, and a corresponding amount of bone is removed during the surgical procedure. This results in a lower smile line and a transition line that is more easily camouflaged. The illusion of natural looking interproximal papillae can then be created prosthetically using a gingival color restorative.

Bone quality, quantity, and location

The presence of adequate bone volume is critically important for the placement of dental implants. Therefore, it is important to understand progressive bone resorption as a challenge for clinicians planning the rehabilitation of an edentulous patient. Lekholm and Zarb[8] compiled a classification of bone resorption and quality that is still widely used. This system considers the residual amount of alveolar ridge and basal bone.

Class A is a perfectly preserved alveolar ridge that does not show any vertical or horizontal resorption, while Class E is a completely resorbed alveolar ridge with moderate to advanced resorption of the basal bone. This classification also includes the quality of bone (class 1 to 4) based on the ratio of cortical/medullar bone. While this classification has been used for many years, as is still currently used in clinical research, it does not provide the clinician with valuable information in the best restorative treatment option for the edentulous patient. Mitch et al (Misch CE 1999) introduced a classification for the dental implant patient that included the amount of bone available as well as the type of implant restoration used to rehabilitate the patient. The Misch classification is a very useful tool for the practicing implant dentist, however it can be complicated to understand, and difficult to apply when the entire subclassifications system is used, especially for the clinician approaching the world of dental implants. For ease of understanding, a three-level bone classification will be used in this course for rapid bone volume evaluation, however the clinical reality may present many more variations.

CLASS I BONE LEVEL – DEFINITION AND TREATMENT

DEFINITION: Class I is the well-preserved alveolar ridge presenting vertical and horizontal bone resorption varying from none to mild. Here, good structural lip support exists, substantiated by removing the buccal acrylic flange. The artificial teeth are well positioned on the residual alveolar ridge with a minimal buccal angulation. The discrepancy between the cervical portion of the teeth and the surface of the underlying alveolar mucosa is minimal (within 1 mm to 2 mm), allowing for the fabrication of artificial teeth of natural or slightly-longer-than-natural length without the need for an artificial gingival transition line.

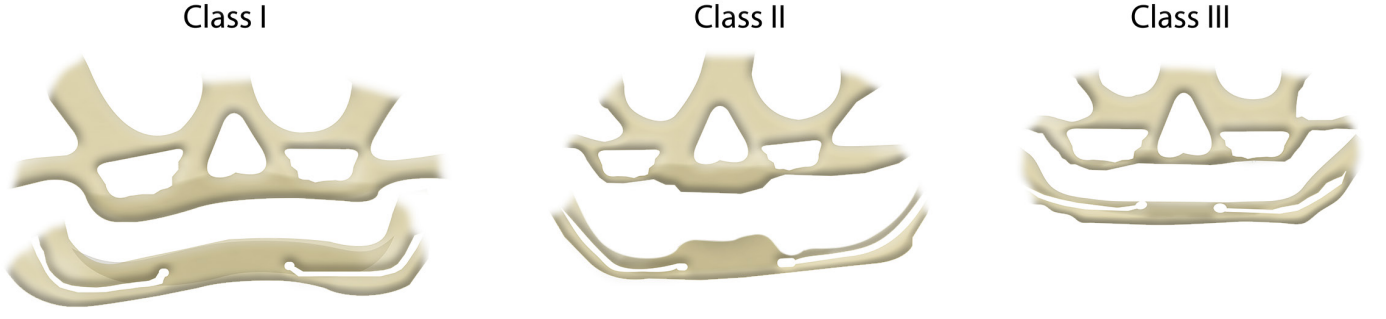


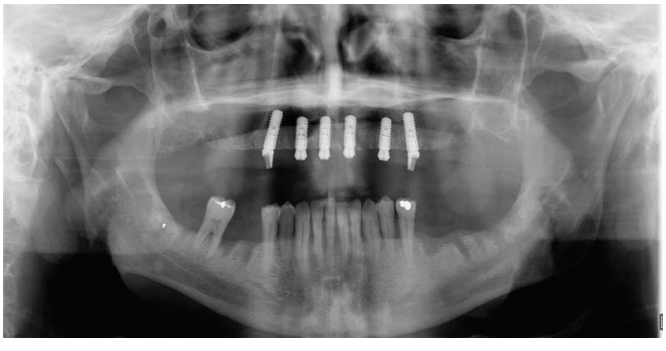
Figure 3 - A duplicate of the patient denture fabricated with clear acrylic allows easy modification of the buccal flange to assess lip support.

TREATMENT OPTIONS:

An implant-retained option (i.e., implant overdenture) would most commonly require the use of four implants in the maxilla (canine and premolar areas), and two implants in the mandible (intraforaminal area, most commonly canine or first premolar areas). If the treatment plan includes an implant-supported fixed restoration, several options are available: a full arch implant prosthesis cemented on custom abutments (requiring six or more implants), or a screw-retained full arch implant prosthesis (requiring four or more implants, i.e., All-on-4). The former is a prosthetic solution commonly based on a metal ceramic technique similar to classic crown and bridge work. Custom abutments (titanium and/or all-ceramic) provide the needed prosthetic support. These prostheses are commonly fabricated in sections, including single crowns and three (or more) unit partial dentures, but one-piece solutions can also be used. An ovate pontic design might be used to achieve an even more natural look.

The screw-retained full arch implant prosthesis requires the use of fewer implants (four or more) that are spaced out to obtain the maximum anterior-posterior spread.[9] Most commonly in the maxilla, the implants are placed in the premaxillary area anterior to the maxillary sinus. The use of tilted implants[10] that follow the slope of the anterior wall of the maxillary sinus greatly increases the anterior posterior spread and eliminates the need for sinus augmentation surgery (Figure 4).

Figure 4 - Panoramic radiograph demonstrating the use of angled dental implants to avoid maxillary sinus grafting.



In the mandible the implants are commonly placed intraforaminal. However, if bone is available distal to the mental foramen, the placement of a dental implant in the second premolar or first molar area might be more biomechanically advantageous compared to using a tilted implant in the mental foramen area. Screw-retained full arch implant prostheses are always one piece and can either be fabricated using a titanium bar veneered by acrylic and denture teeth or with monolithic zirconium oxide.

CLASS II BONE LEVEL – DEFINITION AND TREATMENT

DEFINITION: Class II is the alveolar ridge that undergoes moderate to advanced resorption. There is considerable vertical resorption of the anterior maxillary alveolar bone and insufficient upper lip support due to horizontal resorption. The posterior maxillary alveolar ridge presents a reduced vertical height, and the placement of dental implants is not possible without additional bone surgery[11] (i.e., sinus augmentation). In the mandible, bone resorption prevents implant placement distal to the mental foramen.

TREATMENT OPTIONS:

The Class II maxillary arch can be rehabilitated with either fixed or removable implant prostheses. One of the most important selection criteria is the need for support of the upper lip.[12] If maxillary alveolar ridge bone resorption affects columellar support,[13] the only prosthetic option will require an acrylic flange. (Figure 5) This would be an implant-supported removable complete denture or an implant-retained removable complete denture.[14]

Figure 5 - Front and lateral photograph of a patient with (bottom) and without (top) maxillary denture. Without the denture (top) the lip is unsupported and esthetically unappealing.

In an implant-supported complete denture, the implants must provide retention for the denture and receive 100% of the masticatory forces. The number and positioning of implants is similar to fixed implant-supported prostheses for Class I bone.

This requires six or more implants and frequently requires bone grafting of the maxillary sinuses.

The implant-retained complete denture distributes forces in a different way.[15,16] During mastication, forces are distributed to the alveolar mucosa and alveolar ridge, and the implants. Moreover, the implants offer additional retention to vertical dislodging forces. This option requires the placement of a minimum of four dental implants, and it might require grafting of the maxillary sinus. Unfortunately, the use of tilted implants, with the intention of avoiding sinus grafting, is still not commonly adopted as it increases the technical difficulties of fabricating the implant-retained prosthesis. The recent introduction of angled prefabricated denture attachments (i.e., angled Locator attachment) might prove helpful for this application, however, it was only recently introduced and lacks long-term results.

The class II mandible is a good candidate for different treatment options, ranging from the implant-retained complete denture using two or more implants, to the fixed implant-supported solutions using four or more implants. The esthetic and functional challenges of the class II mandible can be overcome with removable or fixed prostheses. Esthetic and lip support does not play a major factor like it does in the maxilla, therefore the type of prosthesis used for the rehabilitation of the class II mandible relies on patient preference, finances, or the need for additional surgery or bone grafting.

CLASS III BONE LEVEL – DEFINITION AND TREATMENT

Class III is the severely resorbed alveolar ridge. The majority, if not all of the alveolar process, has resorbed, leaving only basal bone. In the maxilla this results in a complete loss of the support of the upper lip and is accompanied by extreme pneumatization of the maxillary sinuses, leaving a minimum amount of bone in the posterior maxilla. In the mandible the amount of bone in the intraforaminal area is minimal, and there is no residual alveolar ridge posterior to the mental foramina. The implant-based treatment options for patients with class III bone resorption are very limited unless the patient undergoes extensive bone grafting (Wood et al 1988). In the maxillary arch, the use of two zygomatic dental implants[17] combined with two implants in the premaxillary area could be adopted to provide the patient with a fixed implant supported restoration. The amount of anterior cantilever will complicate oral hygiene and the patient should be seen frequently for motivation and maintenance. Treatment options might include an implant-retained overdenture or a fixed implant-supported prosthesis.

Technical factors and materials

It is important for clinicians to be aware of the relevance that technological factors play in the planning of an implant-based prosthesis. This is so complications such as unexpectedly high laboratory charges or last minute changes in the design of the prosthesis can be avoided.

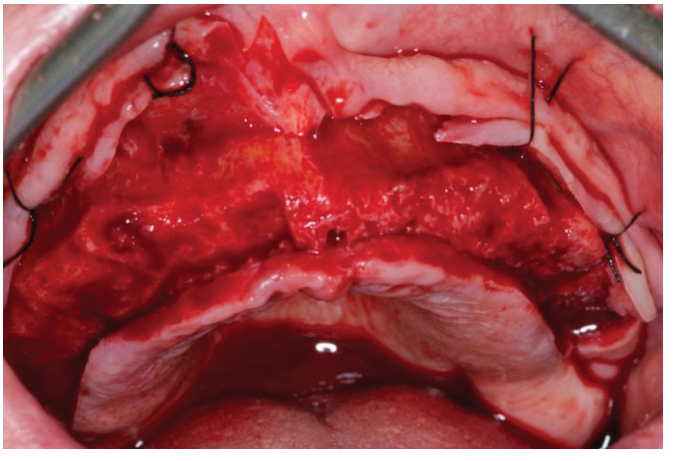
Some of these factors include interocclusal space requirement, metal-ceramic vs. all-ceramic, anterior-posterior spread, attachment vs. bar, and more.

Interocclusal space requirement

Implant-supported restorations require a minimum amount of interocclual or interarch space to provide an esthetically acceptable result and long-term function with reduced incidence of complications. In edentulous patients, the interocclusal space is bound by the alveolar mucosa and the occlusal plane. The minimum space for the fabrication of an implant-retained over denture is 9 mm when low profile attachments are used, and 14 mm for a bar.

Implant-supported prostheses have different space requirements; fixed implant-supported prostheses on custom abutments require a minimum vertical height of 7 mm. However, the average height of a tooth is 10mm, therefore clinicians should consider 10mm the minimum space requirement as anything less is likely to look unattractive. An implant-supported overdenture can require up to 16 mm of vertical space[18] depending on the design of the milled-bar, the respective female counterpart, and the type of attachment used. Latch-type connections require less vertical space than locator-type attachments soldered on the bar, however these are more cumbersome to use and require additional patient dexterity. Clinicians should keep in mind that dexterity might be reduced over time, especially after a stroke or other ischemic phenomena. The screw-retained implant-supported prosthesis requires a minimum of 12 mm of vertical space to accommodate all the components. When limited interocclusal space is diagnosed before the placement of dental implants, it can be easily corrected with an alveoloplasty (Figure 6) or by increasing vertical dimension.

Figure 6 - An alveoloplasty is performed (left side) to gain the necessary interocclusal space.



However, when the limited interocclusal space is not diagnosed and the implants are placed, the fabrication of the final prosthesis might have higher laboratory costs than anticipated,

or require implant removal. Creating a wax denture setup at the proper VDO will assist in diagnosing not only where implants need to be placed but also the vertical space available for the prosthetics to fit within.

Meta- ceramic vs. all-ceramic

Metal ceramic has traditionally been the material of choice for implant-supported prostheses on custom abutment, however, delamination of the veneering porcelain has been reported.[19] In order to overcome this limitation, monolithic materials such as zirconium oxide have been used. The adoption of a one-piece zirconium oxide structure (Figure 7) reduces the number of interfaces that could fail and reduces space requirements. Traditionally, zirconium oxide was avoided for the anterior area due to the lack of translucency but contemporary manufacturing and glazing techniques have greatly improved the esthetic of zirconium oxide prostheses. Zirconia is quickly becoming the material of choice for screw-retained types of prostheses as it reduces the incidence of cantilever fracture, and eliminates chipping of dentures that can affect up to 50% of patients at five years.[20,21]

Figure 7 - Monolithic zirconium oxide implant-supported complete dentures

Conclusions

A variety of treatment options are available for edentulous patients that all offer reliable, long-term, comfortable solutions. Several factors play a role in the most appropriate option for each patient, including but not limited to lip support, quality and quantity of bone, patient desire and expectation, and financial reasons. The treatment should be customized to each patient's needs, and clinicians should keep in mind that lip support plays a major role in the esthetic outcome of rehabilitation of edentulous patients. Recently introduced treatment modalities that rely on the use of tilted dental implants (i.e., All-on-4) have reduced the need for bone augmentation surgery, which reduces the cost, time, and complexity of the dental treatment.

References

1. Slade G, Akinkugbe AA, Sanders AE. Projections of U.S. Edentulism prevalence following 5 decades of decline. J Dent Res. 2014 Oct;93(10):959-65.
2. Adell R, Eriksson B, Lekholm U et al. A long-term follow up study of osseointegrated implants in the treatment of totally edentulous jaws. Int J Oral Maxillofac Implants 1990; 5: 347-359.
3. Wicks R A. A systematic approach to definitive planning for osseointegrated implant prostheses. J Prosthodont 1994; 3: 237-242.
4. Tallgreen A. The reduction in face height of edentulous and partially edentulous subjects during long term denture wear: a longitudinal roentgenographic cephalometric study. Acta Odontol Scand 1966; 24:195-239.
5. Brånemark PI, Hansson BO, Adell R. Osseointegrated implants in the treatment of the edentulous jaw. Experience from a 10 years period. Stand J Plastic Recanter Surg Supple 1977; 16:1-132.
6. Marx RE, Sawatari Y, Fortin M, Broumand V. Bisphosphonate-induced exposed bone (osteonecrosis/osteopetrosis) of the jaws: risk factors, recognition, prevention, and treatment. J Oral Maxillofac Surg 2005; 63:1567-75.
7. Tjan AH, Miller GD, The JG. Some aesthetic factors in a smile. J Prosthet Dent 1984; 82:188-196.
8. Wakimoto M, Matsumura T, Ueno T, Mizukawa N, Yanagi Y, Iida S. Clin Oral Implants Res. 2012 Nov;23(11):1314-9. Bone quality and quantity of the anterior maxillary trabecular bone in dental implant sites.
9. Jemt T. Fixed implant-supported prostheses in the edentulous maxilla. A five-year follow-up report. Clin Oral Implants Res 1994; 5: 142-147.
10. Krekmanov L, Kahn M, Rangert B et al. Tilting of posterior mandibular and maxillary implants for improved prosthesis support. Int J Oral Maxillofac Implants 2000; 15: 411.
11. Kent J N, Block M S. Simultaneous maxillary. Sinus floor bone grafting and placement of hydroxylapatite coated implants. J Oral Maxillofacial Surg 1989; 47: 238.
12. Jemt T, Book K, Linden B, Urde G. Failures and complications in 92 consecutively inserted overdentures supported by Branemark implants in severely resorbed edentulous maxillae: a study from prosthetic treatment to first annual check-up. Int J Oral Maxillofac Implants 1992; 7: 162-167.
13. Chiche FA, Leriche MA. Multidisciplinary implant dentistry for improved aesthetics and function. Pract Perio Aest Dent 1998; 10: 177-186.
14. Hutton JE, Heath MR, Chai JY et al. Factors related to success and failure rates at 3-year follow-up in a multicenter study of overdentures supported by Branemark implants. Int J Oral Maxillofac Implants 1995; 10: 33-42.
15. Naert I, DeClercq M, Theuniers G et al. Overdentures supported by osseointegrated fixtures for the edentulous mandible. A 2.5 year report. Int J Oral Maxillofac Impl 1988; 3: 191-196.
16. Palmqvist S, Sondell K, Swartz B. Implant-supported maxillary overdentures: outcome in planned and emergency cases. Int J Oral Maxillofac Implants 1994; 9: 184-190.
17. Balshi T J, Wolfinger G J, Balshi S F 2nd. Analysis of 356 pterygomaxillary implants in edentulous arches for fixed prosthesis anchorage. Int J Oral Maxillofac Implants 1999; 14: 398-406.
18. Chee WL. Considerations for implant overdentures. CDA 1992; 25-28.
19. Choi BK, Han JS, Yang JH, Lee JB, Kim SH. Shear bond strength of veneering porcelain to zirconia and metal cores. J Adv Prosthodont. 2009 Nov;1(3):129-35.
20. Cardelli P, Manobianco FP, Serafini N, Murmura G, Beuer F. Full-Arch, Implant-Supported Monolithic Zirconia Rehabilitations: Pilot
21. Tischler M, Ganz SD, Patch C.An ideal full-arch tooth replacement option: CAD/CAM zirconia screw-retained implant bridge. Dent Today. 2013 May;32(5):98-102.

Author Profile

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Questions

1. The number of the edentulous patients in the Western World is estimated to be:
   a. Less than 1 millions
   b. Between 5 and 10 millions
   c. More than 35 millions
   d. None of the above
2. The percentage of edentulous patients in the United States is:
   a. Slowly declining
   b. Rapidly increasing
   c. Stable
   d. None of the above
3. Which one of the following treatment modalities is available for the edentulous patient:
   a. Complete Removable Dentures
   b. Implant-Supported Complete Dentures
   c. Implant-Retained Complete Dentures
   d. All of the above
4. Which one of the following factors play a role in the decision of the best treatment option for edentulous patient:
   a. Phonetics and Esthetic
   b. Patient compliance with oral hygiene
   c. Cost
   d. All of the above
5. The treatment of the edentulous maxillary and mandibular arches:
   a. Is better address by a "one-kind-fits-all" treatment modalities
   b. Presents no challenges for the clinician
   c. Presents different anatomical and functional challenges that are typical for each arch
   d. All of the above
6. Dental implants are absolutely contraindicated in patients with medical history positive for:
   a. Pre-hypertension
   b. Well-controlled diabetes
   c. Bisphosphonate therapy discontinued for more than 3 monhts
   d. None of the above
7. The following condition(s) in the patient dental history constitute(s) an absolute contraindication to dental implant treatment:
   a. Bruxism
   b. Reduced or absent salivary flow
   c. History of periodontal disease
   d. None of the above
8. Patient with parafunctional habits, such as bruxism or clenching:
   a. Experience an increased rate of implant failure
   b. Experience an increased incidence of prosthetic complications
   c. Experience an increased need for maintenance appointments
   d. Both b and c
9. Which one of the following factor(s) play(s) a major role in the decision of the best treatment modality for the edentulous patient:
   a. Age
   b. Patient expectation
   c. Treatment cost
   d. b and c
10. Lip support and lip line:
    a. Play an important role in the selection of fixed versus removable prostheses
    b. Can be assessed with the use of diagnostic dentures
    c. If deficient can be corrected by the use of a buccal acrylic flange
    d. All of the above
11. If the edentulous alveolar ridge is shown during a patient full smile:
    a. Surgical correction (alveoloplasty) might be required
    b. A fixed implant-supported prosthesis is always the best treatment option
    c. The esthetic outcome of a fixed implant-supported prosthesis could present a challenge for the clinician
    d. a and c
12. When considering bone quantity and quality of the edentulous arch:
    a. Abundant availability of bone (class I) always implies the use of a fixed implant prostheses
    b. Limited availability of bone (class III) always implies the use of a removal implant prostheses
    c. Progressive bone resorption is not a challenge for the treating clinician
    d. None of the above
13. In patients with a abundant amount of bone available (class I):
    a. Surgical correction (alveoloplasty) might be required
    b. A removable implant-retained prostheses is always contraindicated
    c. Always requires the use of more than 6 implants in each arch
    d. None of the above
14. In patients with abundant amount of bone (class I) seeking rehabilitation of the edentulous maxillary arch:
    a. An implant-supported fixed prostheses could offer the most comfortable outcome
    b. An implant-supported fixed prostheses could require alveoloplasty to increase the inter arch vertical space
    c. An implant-supported fixed prostheses could be fabricated using as few as 4 dental implants.
    d. All of the above
15. In patients with moderately resorbed alveolar bone (class II)
    a. An implant-supported fixed prostheses always offers the best outcome
    b. An implant-retained removable prostheses might be needed to support the upper lip
    c. Bone grafting of the maxillary sinuses is frequently needed if dental implants are placed in the posterior maxilla
    d. b and c
16. In patients with moderately resorbed (class II) maxillary arches, the single most important criteria for the decision of fixed vs removable implant prosthesis is:
    e. The need for support of the upper lip by mean of an acrylic flangeCost
    f. Patient age
    g. Initial implant stability
17. A complete denture can be:
    a. Exclusively supported by implants
    b. Exclusively supported by the mucosa
    c. Either be fixed or removable
    d. All of the above
18. An implant-supported complete denture, differs from an implant-retained complete denture:
    a. In the former, the occlusal load is transferred to the implants exclusively
    b. In the latter, the occlusal load is distributed between implants and mucosa
    c. a and b
    d. None of the above
19. An implant-supported complete denture:
    a. Requires a minimum of four dental implants
    b. Can have an buccal acrylic flange
    c. Can still be a removable prostheses
    d. All of the above
20. An implant-retained complete denture:
    a. Requires a minimum of two implants in the mandibular arch
    b. Requires a minimum of four implants in the maxillary arch
    c. Always requires the removal of the prostheses during routine home care oral hygiene
    d. All of the above

Questions (Continued)

21. An implant-supported complete denture on four dental implants:
    a. Can reduce the need for grafting of the maxillary sinuses
    b. Has a reduced cost, compared to options requiring five, six or more implants
    c. Requires complex oral hygiene maneuvers
    d. All of the above

22. An implant-supported complete denture on four dental implants:
    a. Involves the placement of dental implants in the anterior maxilla, an area that commonly present a good amount/quality of bone
    b. Allows for the use of acrylic material to mask the transition line
    c. Can create challenging esthetic outcome in patient with high lip line and/or short upper lip
    d. All of the above

23. For patients with severely resorbed (class III) maxillary arches:
    a. The use of dental implants, frequently requires bone grafting
    b. The use of zygomatic dental implants could be required
    c. Most likely requires support of the upper lip with an acrylic flange
    d. All of the above

24. For patients with severely resorbed (class III) mandibular arches:
    a. An implant-supported fixed prostheses in never possible
    b. An implant-retained removable prostheses is always the best treatment option
    c. Bone grafting is always required for implant treatment options
    d. None of the above

25. The interocclusal space requirement of implant prosthesis:
    a. Can be underestimated as it does not create a challenge for the clinician
    b. Ranges from a minimum of 9 to 16 or more millimeters
    c. Can be easily corrected after implant placement
    d. Is related to the patient gender

26. The interocclual space required for an implant-retained prosthesis
    a. Is a minimum of 9mm if prefabricated low-profile attachment are used
    b. Can be as high as 16mm if a custom milled-bar is used
    c. Can be easily corrected after implant placement
    d. a and b

27. The retention of an implant overdenture:
    a. Frequently requires the use of a bar for the maxillary overdenture
    b. Cane commonly achieve with the use of attachment for the mandibular overdenture
    c. Is dependent on the angulation of the dental implants
    d. All of the above

28. The laboratory costs for the fabrication of an implant prostheses
    a. Is normally less for implant-retained prosthesis
    b. Is higher for implant-supported prosthesis
    c. Should be accurately estimated when planning the implant treatment
    d. All of the above

29. The domiciliary care of implant prosthesis
    a. Is easier for removable prosthesis
    b. Is easier for fixed prosthesis
    c. Does not play a role in the long term success of an implant prosthesis
    d. Is not necessary as long as the patient return for biannual professional hygiene recalls

30. To establish the best treatment option for the edentulous patient:
    a. The clinician has to consider several parameters such as: esthetic, phonetics, anatomy.
    b. The clinician should take into consideration the patient: compliance, neuromuscular function, and expectations
    c. The clinician should discuss advantages and disadvantages of each treatment modality with the patient, so to involve them in the final decision
    d. All of the above

Notes

ANSWER SHEET

Treatment Planning Guidelines and Prosthetic Options for the Edentulous Patient

Name: Title: Specialty:

Address: E-mail:

City: State: ZIP: Country:

Telephone: Home ( ) Office ( )

Lic. Renewal Date: AGD Member ID:

Requirements for successful completion of the course and to obtain dental continuing education credits: 1) Read the entire course. 2) Complete all information above. 3) Complete answer sheets in either pen or pencil. 4) Mark only one answer for each question. 5) A score of 70% on this test will earn you 3 CE credits. 6) Complete the Course Evaluation below. 7) Make check payable to PennWell Corp. **For Questions Call 800-633-1681**

Educational Objectives

1. Review the options for the rehabilitation of the edentulous patient
2. Review the indications/contraindications of implant-related treatment options
3. Evaluate advantages/disadvantages of fixed vs. removable implant options
4. Become familiar with the All-on-4 treatment concept

Course Evaluation

1. Were the individual course objectives met?

Objective #1: Yes No Objective #2: Yes No

Objective #3: Yes No Objective #4: Yes No

Please evaluate this course by responding to the following statements, using a scale of Excellent = 5 to Poor = 0.

2. To what extent were the course objectives accomplished overall?	5	4	3	2	1	0
3. Please rate your personal mastery of the course objectives.	5	4	3	2	1	0
4. How would you rate the objectives and educational methods?	5	4	3	2	1	0
5. How do you rate the author's grasp of the topic?	5	4	3	2	1	0
6. Please rate the instructor's effectiveness.	5	4	3	2	1	0
7. Was the overall administration of the course effective?	5	4	3	2	1	0
8. Please rate the usefulness and clinical applicability of this course.	5	4	3	2	1	0
9. Please rate the usefulness of the supplemental webliography.	5	4	3	2	1	0
10. Do you feel that the references were adequate?		Yes		No		
11. Would you participate in a similar program on a different topic?		Yes		No		

12. If any of the continuing education questions were unclear or ambiguous, please list them.

_____

13. Was there any subject matter you found confusing? Please describe.

_____

14. How long did it take you to complete this course?

_____

15. What additional continuing dental education topics would you like to see?

_____

If not taking online, mail completed answer sheet to

PennWell Corp.
Attn: Dental Division,
1421 S. Sheridan Rd., Tulsa, OK, 74112
or fax to: 918-831-9804

**For IMMEDIATE results,
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3.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	18.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
4.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	19.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
5.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	20.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
6.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	21.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
7.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	22.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
8.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	23.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
9.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	24.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
10.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	25.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
11.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	26.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
12.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	27.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
13.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	28.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
14.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	29.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
15.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	30.	Ⓐ	Ⓑ	Ⓒ	Ⓓ

AGD Code 315

PLEASE PHOTOCOPY ANSWER SHEET FOR ADDITIONAL PARTICIPANTS.

COURSE EVALUATION and PARTICIPANT FEEDBACK

We encourage participant feedback pertaining to all courses. Please be sure to complete the survey included with the course. Please e-mail all questions to: hhodges@pennwell.com.

INSTRUCTIONS

All questions should have only one answer. Grading of this examination is done manually. Participants will receive confirmation of passing by receipt of a verification form. Verification of Participation forms will be mailed within two weeks after taking an examination.

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All participants scoring at least 70% on the examination will receive a verification form verifying 3 CE credits. The formal continuing education program of this sponsor is accepted by the AGD for Fellowship/ Mastership credit. Please contact PennWell for current term of acceptance. Participants are urged to contact their state dental boards for continuing education requirements. PennWell is a California Provider. The California Provider number is 4527. The cost for courses ranges from $20.00 to $110.00.

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PennWell maintains records of your successful completion of any exam for a minimum of six years. Please contact our offices for a copy of your continuing education credits report. This report, which will list all credits earned to date, will be generated and mailed to you within five business days of receipt.

Completing a single continuing education course does not provide enough information to give the participant the feeling that s/he is an expert in the field related to the course topic. It is a combination of many educational courses and clinical experience that allows the participant to develop skills and expertise.

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