SPECIAL REPRINT, JIRD® CE Article No. 2, 2015

Inside this issue:
Guidelines for implant overdenture treatment with standard or narrow diameter implants: A clinical rationale
Michael D. Scherer, DMD, MS
EDUCATIONAL OBJECTIVES

The overall goal of this course is to provide the reader with an overview of implant overdenture treatment options, along with a better understanding of how to choose between using standard or narrow diameter implants.

On completion of the course, participants should be able to:

1. Summarize the traditional number and location of implants supporting removable mandibular and maxillary prostheses.

2. Understand the advantages and drawbacks of using both standard and narrow diameter implants for overdenture therapy.

3. Discuss the prosthetic options available with both.

4. Make use of a decision tree for the optimal abutment choice when planning overdenture therapy.

ABSTRACT

 Debate exists over whether standard or narrow diameter dental implants should be used for implant overdenture therapy. This article reviews the characteristics of each, principles relating to the use of standard or narrow diameter implants, and indications for each type. Additionally, a decision tree to aid with choosing between standard or narrow diameter implants is presented.
Debate exists over whether standard or narrow diameter dental implants should be used for implant overdenture therapy. This article reviews the characteristics of each, principles relating to the use of standard or narrow diameter implants, and indications for each type. Additionally, a decision tree to aid with choosing between standard or narrow diameter implants is presented.

Key Words: narrow diameter implants, overdenture, standard diameter implants, clinical guidelines

Introduction
Tooth loss is multifactorial and often results from a complex interaction of comorbidities that, left unresolved, may progress to complete edentulism. Edentulism is considered a chronic oral disease that is a terminal outcome of the interplay between biological and non-biological processes. It ultimately results in physical impairment, disability, and handicap. While the rate of edentulism has been decreasing throughout the past three decades, the increase in the older population has resulted in an increased total number of edentulous people. These older “baby boomers” tend to have significantly higher levels of edentulism, with the number of edentulous arches expected to rise from 57 million in 2000 to 61 million in 2020. As a result, the demand for treatment will increase.

The traditional treatment for edentulism has been the fabrication of removable, tissue-supported complete dentures. Historically, one of the greatest challenges facing dentists has been to provide removable prostheses that have adequate retention and stability. The use of dental implants to retain and/or support removable prostheses is a well-accepted treatment option with long-term successful outcomes. As a result, implant overdenture therapy is considered to be the first choice standard of care for the edentulous mandible.

Implant Overdenture Treatment Overview
Treatment options for dental implant therapy in conjunction with mandibular removable prostheses typically involve the use of two to four standard diameter implants (>3mm) placed in the anterior mandible (Fig. 1). Implants are traditionally placed into the interforaminal portion of the mandible, with distal implants placed 5mm anterior to the mental foramen and mesial implants placed 3.5mm distal to the midline. These positions correspond to the first premolar and lateral incisor sites. Implant placement in this region is common, as many
Implant edentulous patients exhibit substantial posterior alveolar ridge resorption with limited bone volume to accommodate implants above the inferior alveolar canal. Additionally, the anterior mandible typically has limited critical anatomy such as nerves and blood vessels, and the average bone quality is higher and denser than posterior sites.20-22 Maxillary implant overdentures typically are supported by four to six standard diameter implants spread more evenly throughout the arch (Fig. 2). The implants are traditionally placed in the first molar, first premolar, and canine sites, which have greater bone volume and require less angulation than more anterior locations. If the sinus anatomy and surgical access permit placement in the posterior region, many clinicians advocate placement as posteriorly as possible to maximize the number and distribution of implants.23

Characteristics of Standard and Narrow Diameter Implants
While many authors advocate using standard diameter implants as the first choice for treatment of the edentulous arch, some patients may be excluded from this therapy because of a lack of sufficient bone to accommodate an implant with a diameter greater than 3mm.24 To place implants greater than 3mm in diameter in such patients, additional surgical procedures may be necessary such as onlay bone grafting, osteotomy enlargement, or ridge splitting. Alternatively, a clinician can gain access to more ridge width by using ridge-height reduction procedures, as the mandibular bone becomes wider inferiorly. However, all these procedures may elevate the risk of complications, increase morbidity, and/or prolong treatment times.24,26 The placement of narrow dental implants may reduce the need for these more complex surgical procedures.

Table 1 summarizes the differences between standard and narrow diameter dental implants for implant overdenture therapy. Standard diameter implants are larger, with more overall surface area and often have a more conservative thread design. In contrast, while both traditional and contemporary narrow diameter implants are smaller and have less overall surface area than standard diameter implants, traditional narrow diameter implants are a one-piece design with less aggressive threads. The contemporary narrow diameter implant designs often feature aggressive threads and a two-piece design, typically accepting only one type of abutment, such as a LOCATOR® Abutment (Manufactured by Zest Anchors, Distributed by BIOMET 3i, Palm Beach Gardens, Florida, USA).

The number of prosthetic options also distinguishes standard from narrow diameter implants. The two-piece design of standard diameter implants enables them to accept more types of abutments and restorative platforms (Fig. 3). In addition to full-arch removable prostheses, standard diameter implants can also be used to support single and multiple fixed implant restorations. Also, if a younger patient gets one type of treatment and later in life decides to convert to another type of restoration, standard diameter implants will facilitate this conversion.27
For example, if a middle-aged patient is treated with two standard diameter implants to retain an implant overdenture, he or she can have additional implants placed and convert to a fixed implant restoration later in life.

In contrast, the prosthetic options for narrow diameter implants are limited. Most systems typically permit use only with a full-arch removable prosthesis (Fig. 4). For older patients who are generally satisfied with a removable prosthesis and are principally interested in denture stabilization, narrow diameter implants are a good alternative. Many of these older patients also tend to have increasingly complex medical histories and would benefit from a minimally invasive surgical approach.

**Bone Volume and Implant Diameter**

Having adequate bone around any implant helps to ensure the implant’s osseointegration and long-term clinical stability and preserve the crestal bone. Generally accepted clinical guidelines regarding peri-implant bone volume have been established.\(^{28-30}\) On average, more than 1.0-1.5mm of alveolar bone should surround the implant to ensure proper blood supply and minimize alveolar remodeling and crestal bone resorption. These recommendations stem from the observation that 0.5mm to 1.59mm of bone loss can result from implant placement using a flap procedure.\(^{31-34}\)

Variations in bone width in the edentulous arch can be influenced by the location (anterior or posterior), the length of time the patient has been edentulous, and any history of periodontal disease. Average crestal mandibular bone width has been reported as 3.64mm ± 1.83mm in the anterior region, 4.82mm ± 2.16mm in the premolar region, and 6.02mm ± 1.67mm in the molar region.\(^{35}\) Maxillary bone widths are similar except in the molar region, where the bone tends to be significantly wider. In contrast, average mandibular bone width 3mm below
the crest has been reported as 5.29mm ± 2.37mm in the anterior region, 6.77mm ± 1.63mm in the premolar region, and 7.31mm ± 2.16mm in the molar region.\textsuperscript{35} The crestal bone resorbs at a faster rate than the bone below the crest, due to interrupted blood supply after surgery, tooth loss, and occlusal pressure from the forces of mastication.

Ensuring adequate bone at the implant-placement site is important when treatment planning. Table 2 lists minimum bone-volume recommendations when placing standard and narrow diameter implants. For treatment-planning purposes, a 3.4mm standard diameter dental implant requires a minimum of 6.4mm in buccal-lingual width, whereas a 2.4mm narrow diameter implant requires a minimum of 5.4mm in width (Fig. 5).

**Prosthetic Space Treatment Considerations**

Implant overdentures require space to contain the attachment, denture attachment apparatus, acrylic resin, and teeth. This prosthetic space is further bound by the occlusal plane, supporting tissues of the edentulous arch, and non-supporting tissues such as the cheeks, tongue, and lips.\textsuperscript{36} The minimum height required for a LOCATOR\textsuperscript{®} Abutment and attachment for either a standard or narrow diameter implant is 9-11mm from the bone crest to the polished cameo surfaces or incisal edge of the denture (Fig. 6). If the prosthetic space is insufficient, the alveolar ridge can be re-contoured to create sufficient room for the implant abutment and attachments.

For either standard or narrow diameter implants, it is essential to measure the soft-tissue height in order to choose the appropriate abutment (Fig. 7). Because multiple abutment heights are available for standard diameter implants, this step can be completed after the implants have been placed and are ready to restore. For narrow diameter implants, however, it should be completed with the assistance of bone sounding or

---

**Table 1:** Characteristics of standard versus narrow diameter dental implants for overdenture therapy.

<table>
<thead>
<tr>
<th>Standard Diameter</th>
<th>Narrow Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Diameter greater than 3mm</td>
<td>• Diameter less than 3mm</td>
</tr>
<tr>
<td>• Greater overall surface area</td>
<td>• Less overall surface area</td>
</tr>
<tr>
<td>• Varying thread design</td>
<td>• Conservative or aggressive thread design</td>
</tr>
<tr>
<td>• Two-piece design</td>
<td>• One- or two-piece design</td>
</tr>
<tr>
<td>• One-stage or submerged healing</td>
<td>• Unsubmerged healing</td>
</tr>
<tr>
<td>• Internal connection</td>
<td>• External connection</td>
</tr>
<tr>
<td>• Platform switching</td>
<td>• No platform switching</td>
</tr>
<tr>
<td>• Accepts multiple abutments and a variety of prosthetic parts and tissue-cuff heights</td>
<td>• Two-piece design accepts only a LOCATOR\textsuperscript{®} Abutment and one of two tissue-cuff heights</td>
</tr>
<tr>
<td>• For fixed single restorations, overdentures, and full-arch fixed solutions</td>
<td>• Recommended for full-arch removable restorations</td>
</tr>
</tbody>
</table>

**Table 2:** Recommended buccal-lingual widths for implant overdenture placement.

<table>
<thead>
<tr>
<th>Implant Diameter (mm)</th>
<th>Bone Width (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.4</td>
<td>5.4</td>
</tr>
<tr>
<td>2.9</td>
<td>5.9</td>
</tr>
<tr>
<td>3.25</td>
<td>6.4</td>
</tr>
<tr>
<td>4.0</td>
<td>7.0</td>
</tr>
</tbody>
</table>

**Table 3:** Indications of standard and narrow diameter implants.

<table>
<thead>
<tr>
<th>Standard Diameter</th>
<th>Narrow Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Patients with sufficient bone volume to accommodate a standard diameter implant</td>
<td>• Patients with narrow ridges that cannot accommodate a standard implant without complex surgical procedures</td>
</tr>
<tr>
<td>• Minimally invasive or standard flap procedures</td>
<td>• Minimally invasive surgical procedures</td>
</tr>
<tr>
<td>• Low or high bone density</td>
<td>• High bone density</td>
</tr>
<tr>
<td>• Younger patients</td>
<td>• Older patients</td>
</tr>
<tr>
<td>• Individuals who may wish to convert from an implant overdenture to a fixed restoration</td>
<td>• Individuals who are satisfied with complete dentures and are looking for a solution to stabilize a loose denture</td>
</tr>
</tbody>
</table>

---

**Implant Characteristics**

<table>
<thead>
<tr>
<th>Standard Diameter</th>
<th>Narrow Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Diameter greater than 3mm</td>
<td>• Diameter less than 3mm</td>
</tr>
<tr>
<td>• Greater overall surface area</td>
<td>• Less overall surface area</td>
</tr>
<tr>
<td>• Varying thread design</td>
<td>• Conservative or aggressive thread design</td>
</tr>
<tr>
<td>• Two-piece design</td>
<td>• One- or two-piece design</td>
</tr>
<tr>
<td>• One-stage or submerged healing</td>
<td>• Unsubmerged healing</td>
</tr>
<tr>
<td>• Internal connection</td>
<td>• External connection</td>
</tr>
<tr>
<td>• Platform switching</td>
<td>• No platform switching</td>
</tr>
<tr>
<td>• Accepts multiple abutments and a variety of prosthetic parts and tissue-cuff heights</td>
<td>• Two-piece design accepts only a LOCATOR\textsuperscript{®} Abutment and one of two tissue-cuff heights</td>
</tr>
<tr>
<td>• For fixed single restorations, overdentures, and full-arch fixed solutions</td>
<td>• Recommended for full-arch removable restorations</td>
</tr>
</tbody>
</table>
measurement via cone-beam CT radiography prior to implant placement (Fig. 8). Many narrow diameter implant systems offer a single (or very few) abutment height options. Evaluation of tissue depth is easily performed by using a tool to measure from the alveolar ridge crest to the superior aspect of the tissue outline. This visualization is facilitated by using a radiopaque polyvinylsiloxane (PVS) liner inside the intaglio surface of the complete denture, with cotton rolls separating the oral tissues from the denture surface.\(^{37-39}\)

**Submerged Versus One-Stage Healing**

Placement of standard or narrow implants can be accomplished either by flap elevation or a flapless procedure.\(^{32,37}\) When a flap must be raised, as in many cases where insufficient prosthetic space exists, alveolar bone recontouring is typically performed, and the implant is placed within the contours of the modified bone. The implant’s primary stability is usually assessed by noting the rotational resistance as the implant is inserted into the bone.\(^{40}\) This resistance is related to minimization of implant movement during healing, and it promotes osseointegration.\(^{41}\) The amount of cortical bone at the placement site and the implant length are also related to primary implant stability.\(^{42}\) If alveolar ridge reduction is necessary, a substantial portion of the crestal cortical bone may be lost. Additionally, if sufficient healing time is not allowed after extractions, inadequate crestal bone cortical formation may be encountered during flapless surgical techniques.

If the implant’s primary stability is insufficient, authors have advocated submerging the implant below the tissues to minimize occlusal loading.\(^{43,44}\) Standard diameter implants allow for submerged healing periods. However, narrow diameter implants typically only allow for transgingival, unsubmerged healing. If low implant insertion stability is encountered during surgical procedures for narrow...
diameter implants, a soft liner can be applied to the inside of the denture to minimize the chances of premature occlusal loading.

**Choosing between Standard and Narrow Diameter Implants**

Deciding between placement of standard or narrow diameter implants to retain overdentures can be challenging. Under ideal conditions, both designs have features that enable them to stabilize a complete denture and improve patient satisfaction and quality of life. However, clinicians typically encounter both ideal and non-ideal situations.

Table 3 lists indications for standard and narrow diameter implants. Figure 9 offers a guide for facilitating the typical decision-making process. The principal deciding factor for choosing between a standard and narrow diameter implant is the alveolar ridge width. If the ridge cannot accommodate an implant larger than 3mm, a narrow diameter implant may be indicated. However, if the ridge width can accommodate an implant larger than 3mm, either a standard or narrow diameter implant is generally indicated.

The next branch of the decision tree involves consideration of whether the patient is younger and/or may want to convert the implant overdenture into a fixed restoration in the future. If the patient has a ridge that is less than 5.4mm wide, and expresses interest in a future fixed option, alveolar bone grafting is indicated to create width sufficient to accommodate standard diameter implants. If the patient is uninterested in a future fixed option, a narrow diameter implant is generally indicated. The risks of the patient undergoing complex surgical procedures must be weighed against the likelihood that those procedures will substantially benefit the patient sometime in the future.

<table>
<thead>
<tr>
<th>Ridge width</th>
<th>Prosthetic space</th>
<th>Bone Density</th>
<th>Bone Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;5.4mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;5.4mm</td>
<td>The patient is interested in a fixed restoration in the future</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;9-11mm</td>
<td>Prosthetic space</td>
<td>Bone Density</td>
<td>Bone Density</td>
</tr>
<tr>
<td>&lt;9-11mm</td>
<td>The patient is interested in a fixed restoration in the future</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Standard diameter, flap or flapless, submerged or unsubmerged healing</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Low</td>
<td>Standard diameter, flap, submerged healing</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Low</td>
<td>Standard diameter, alveolar reduction, flap, submerged or unsubmerged healing</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Low</td>
<td>Standard or narrow diameter, alveolar reduction, flap, submerged or unsubmerged healing</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Yes</td>
<td>Standard diameter, flap or flapless, submerged or unsubmerged healing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Standard diameter, flap or flapless, submerged or unsubmerged healing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Standard or narrow diameter, alveolar reduction, flap, submerged or unsubmerged healing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Standard or narrow diameter, alveolar reduction, flap, submerged or unsubmerged healing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Bone grafting to achieve &gt;5.4mm ridge width, then standard diameter implant placement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>The patient is interested in a fixed restoration in the future</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Prosthetic space</td>
<td>Bone Density</td>
<td>Bone Density</td>
</tr>
<tr>
<td>No</td>
<td>The patient is interested in a fixed restoration in the future</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Bone Density</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Yes</td>
<td>Narrow diameter, flap or flapless, unsubmerged healing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Narrow diameter, alveolar reduction, flap, unsubmerged healing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Narrow diameter, alveolar reduction, flap, unsubmerged healing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Narrow diameter, alveolar reduction, flap, reduced osteotomy, unsubmerged healing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Narrow diameter, alveolar reduction, flap, unsubmerged healing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Narrow diameter, alveolar reduction, flap, reduced osteotomy, unsubmerged healing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Narrow diameter, alveolar reduction, flap, reduced osteotomy, unsubmerged healing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Fig. 9.** Decision tree for choosing between standard and narrow diameter implants.
The next determining factor is whether sufficient prosthetic space exists within the patient’s current prosthesis to accommodate the abutment, the attachment assembly, and approximately 2-3mm of acrylic resin surrounding these components. If the prosthetic space is insufficient, flap elevation and alveolar ridge recontouring is necessary to place either narrow or standard diameter implants. If sufficient prosthetic space exists, either standard or narrow diameter implants can be placed in a flapless procedure. When a patient presents with sufficient prosthetic space and narrow crestal alveolar ridge width, the clinician must decide whether to reduce the alveolar ridge to gain access to sufficient width to accommodate standard diameter implants or place a narrow diameter implant without surgically altering the ridge height. If sufficient prosthetic space and bone volume enable placement of narrow diameter implants without alveolar reduction procedures, a narrow diameter implant is indicated. High to average alveolar bone height has been linked to patient satisfaction. Reducing the alveolar ridge height to accommodate a standard diameter implant when a narrow diameter implant would suffice is inadvisable.

Bone density is a critical factor for achieving implant primary stability. For patients who have alveolar ridge widths that are greater than 5.4mm but are Type III or IV bone density, submerged healing with a standard diameter dental implant is indicated. For those with alveolar ridge widths less than 5.4mm but sufficient prosthetic space, a flapless procedure is indicated. However, the clinician would need to vary the surgical protocol to compensate for the lower bone density by reducing the osteotomy size. For patients with limited alveolar ridge width, high bone density, and limited prosthetic space, alveolar reduction and placement of narrow diameter implants is indicated. If bone densities are high for patients with alveolar ridge widths greater than 5.4mm, the patient should be asked about any possible interest in a future fixed restoration. Older patients who are principally interested in denture stabilization are good candidates for either standard or narrow diameter implants, so the choice of which to use depends upon the clinician’s preference. The pros and cons of both standard and narrow diameter implant options should be discussed with the patient. For many people, the use of a minimally invasive surgical procedure is desirable and can be achieved with standard or narrow diameter implants. For many clinicians, particularly those who are new to implant dentistry, the allure of surgical simplicity and a high safety threshold makes narrow diameter implant placement desirable.

Conclusion

Deciding whether to use a standard or narrow diameter implant for treating edentulous patients can be challenging. Clinicians who evaluate patients interested in implant overdenture therapy need to consider a multitude of factors. The decision tree presented in this article is intended to facilitate the decision-making process. The surgical simplicity of narrow diameter implants is alluring to many clinicians.

References


In support of their research or for preparation of their work, one or more of the authors of the publications cited in the references may have received financial remuneration from BIOMET 3i LLC.

**Michael D. Scherer, DMD, MS**

Dr. Scherer received his dental degree from Nova Southeastern University in Ft. Lauderdale, FL and his Masters of Science and Graduate Certificate in Prosthodontics from Ohio State University in Columbus, OH. He is a fellow of the American College of Prosthodontists, an Assistant Clinical Professor at Nova Southeastern University, and his Masters of Science and Graduate Certificate in Prosthodontics from Ohio State University in Columbus, OH. He is a fellow of the American College of Prosthodontists, and a Clinical Instructor at the University of Nevada, Las Vegas. Dr. Scherer maintains a private practice limited to prosthodontics and implant dentistry in Sonora, CA. Email: mds@scherer.net

†The contributing clinician has a financial relationship with BIOMET 3i LLC and ZEST Anchors LLC resulting from speaking engagements, consulting engagements, and other retained services.

ZEST Anchors LLC products are distributed by BIOMET 3i LLC.
CE Quiz N°2

Guidelines for implant overdenture treatment with standard or narrow diameter implants:
A clinical rationale

Michael D. Scherer, DMD, MS°

To complete this quiz online and immediately download your CE verification document, visit www.dentallearning.net/GIO-ce, then log into your account (or register to create an account). Upon completion and passing of the exam, you can immediately download your CE verification document. We accept Visa, MasterCard, Discover, and American Express.
1. Implants supporting mandibular removable prostheses typically are placed in the interforaminal region because:
   a) Alveolar bone resorption in the posterior is often substantial
   b) The presence of the inferior alveolar nerve commonly limits implant placement options
   c) The anterior mandible contains few critical nerves and blood vessels
   d) All of the above

2. Maxillary implant-retained overdentures:
   a) Usually are supported by two or three implants
   b) Are best supported by angled implants
   c) Are best supported by implants positioned evenly throughout the arch
   d) Are best supported by implants placed as anteriorly as possible

3. If a patient lacks sufficient bone to accommodate implants with a diameter greater than 3mm:
   a) Narrow diameter implants may be an alternative
   b) A tissue-supported prosthesis is likely to be the best option
   c) The ridge may only be augmented using a ridge-splitting technique
   d) Use of a 3.25mm diameter implant may still be successful

4. Narrow diameter implants:
   a) Typically have a more conservative thread design
   b) Have less overall surface area
   c) Accept many types of abutments and platforms
   d) Can be used to support single- and multiple-implant fixed restorations

5. Older patients considering narrow diameter implants:
   a) Should be discouraged from choosing this option
   b) Should understand that narrow diameter implants will only support a removable prosthesis
   c) May have to undergo bone-grafting procedures before having them placed
   d) Should consider their cost, relative to standard diameter implants

6. To ensure proper blood supply and minimal alveolar remodeling:
   a) Two-stage implant placement is always preferable
   b) Implants should generally be surrounded by at least .5mm of bone
   c) Implants should generally be surrounded by at least 1.0-1.5mm of bone
   d) Implants should generally be surrounded by at least 3mm of bone

7. On average, crestal bone:
   a) Tends to be wider in the molar region of both arches
   b) Tends to be wider only in the maxillary molar region
   c) Resorbs more slowly than the bone below the crest
   d) Is usually unaffected by periodontal disease

8. For treatment-planning purposes, a 3.4mm standard diameter implant requires a minimum buccal-lingual width of:
   a) 6.4mm
   b) 5.4mm
   c) 3.8mm
   d) 2.4mm

9. Measurement of the tissue depth to determine the attachment height:
   a) Is not always essential
   b) Is only important if standard diameter implants are being placed
   c) Should always be done after the implants have been placed
   d) Should be completed prior to implant placement if the implants are less than 3mm in diameter

10. If the primary stability of narrow diameter implants is insufficient:
    a) They should be removed
    b) There is no cause for concern because narrow diameter implants do not require primary stability
    c) They should be allowed to heal submerged for 4-6 months
    d) A soft liner can be applied to the inside of the denture to minimize the chances of premature occlusal loading
Guidelines for implant overdenture treatment with standard or narrow diameter implants: A clinical rationale
Michael D. Scherer, DMD, MS

CE ANSWER FORM (E-mail address required for processing)

Name: 
Address: 
City: 
State: 
Zip: 
AGD identification No.: 
License Renewal Date: 

EDUCATIONAL OBJECTIVES
• Summarize the traditional number and location of implants supporting removable mandibular and maxillary prostheses.
• Understand the advantages and drawbacks of using both standard and narrow diameter implants for overdenture therapy.
• Discuss the prosthetic options available with both.
• Make use of a decision tree for the optimal abutment choice when planning overdenture therapy.

COURSE EVALUATION
Please evaluate this course using a scale of 3 to 1, where 3 is excellent and 1 is poor.

1. Clarity of objectives 
A B C D
2. Usefulness of content 
A B C D
3. Benefit to your clinical practice 
A B C D
4. Usefulness of the references 
A B C D
5. Quality of written presentation 
A B C D
6. Quality of illustrations 
A B C D
7. Clarity of quiz questions 
A B C D
8. Relevance of quiz questions 
A B C D
9. Rate your overall satisfaction with this course 
A B C D
10. Did this lesson achieve its educational objectives? Yes No
11. Are there any other topics you would like to see presented in the future?

PRICE: $29  CE Credits: 2

AGD Codes: 254, 255

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10. 

READ INSTRUCTIONS ON PREVIOUS PAGE.

Please photocopy answer sheet for additional participants.

If you have any questions, please email Dental Learning at questions@dentallearning.net or call 1.888.724.5230.
Fax 1.732.303.0555

Copyright © 2015 Dental Learning, LLC. All rights reserved. www.dentallearning.net/GIO-ce

*E-mail: *Na
*City: *Zip
*State: *Account Number
*Expiration Date

Dental Learning, LLC
500 Craig Road, First Floor
Manalapan, NJ 07726

*Account Number

*Expiration Date

The charge will appear as Dental Learning, LLC.

If paying by check, make check payable to Dental Learning, LLC.

Please direct all questions pertaining to Dental Learning, LLC or the administration of this course to questions@dentallearning.net. Course Evaluation and Participant Feedback: We encourage participant feedback pertaining to all courses. Please be sure to complete the evaluation included with the course. INSTRUCTIONS: All questions have only one answer. Participants will receive confirmation of passing by receipt of a verification certificate. Verification certificates will be mailed within two weeks after submitting a completed examination. EDUCATIONAL DISCLAIMER: The content in this course is derived from current information and research-based evidence. Any opinions of efficacy or perceived value of any products mentioned in this course and expressed herein are those of the author(s) of the course and do not necessarily reflect those of Dental Learning. Completing a single continuing education course does not provide enough information to make the participant 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. COURSE CREDIT/COST: All participants scoring at least 70% on the examination will receive a CE verification certificate. Dental Learning, LLC is an ADA CERP recognized provider. Dental Learning, LLC is also designated as an Approved PACE Program Provider by the Academy of General Dentistry. The formal continuing education programs of this session program providers are accepted by AGD for Fellowship, Mastership, and Membership Maintenance credit. Please contact Dental Learning, LLC for terms and procedures. Participants are urged to contact their state dental board for continuing education requirements. Dental Learning, LLC is a California Provider. The California Provider number is RD5562. The cost for courses ranges from $19.00 to $100.00. RECORD KEEPING: Dental Learning, LLC maintains records of your successful completion of any course. Please contact our office 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 request. Dental Learning, LLC maintains verification records for a minimum of seven years. CANCELLATION/REFUND POLICY: Any participant who is not 100% satisfied with this course can request a full refund by contacting Dental Learning, LLC in writing or by calling 1.888.724.5230. Go Green, Go Online to www.dentallearning.net to take this course. © 2015 Dental Learning, LLC.
SPONSOR/PROVIDER: This continuing education activity has been planned and implemented in accordance with the standards of the ADA Continuing Education Recognition Program (ADA CERP) through joint efforts between Dental Learning, LLC and BIOMET 3i LLC. DESIGNATION STATEMENTS: Dental Learning, LLC is an ADA CERP recognized provider. ADA CERP is a service of the American Dental Association to assist dental professionals in identifying quality providers of continuing dental education. ADA CERP does not approve or endorse individual courses or instructors, nor does it imply acceptance of credit hours by boards of dentistry. Dental Learning, LLC designates this activity for 2 CE credits. Concerns or complaints about a CE provider may be directed to the provider or to ADA CERP at www.ada.org/goto/cerp. Dental Learning, LLC is also designated as an Approved PACE Program Provider by the Academy of General Dentistry. The formal continuing education programs of this program provider are accepted by AIG for Fellowship, Mastership, and membership maintenance credit. Approval does not imply acceptance by a state or provincial board of dentistry or AIG endorsement. The current term of approval extends from 2/1/2012 - 1/31/2016. Provider ID: #40-624R. Dental Learning, LLC is a Dental Board of California CE provider. The California Provider number is RPS862. This course meets the Dental Board of California’s requirements for 2 units of continuing education. EDUCATIONAL METHODS: This course is a self-instructional journal and web activity. Information shared in this course is based on current information and evidence. REGISTRATION: The cost of this CE course is $29.00 for 2 CE credits. PUBLICATION DATE: April, 2015. EXPIRATION DATE: March, 2018. REQUIREMENTS FOR SUCCESSFUL COMPLETION: To obtain 2 CE credits for this educational activity, participants must pay the required fee, review the material, complete the course evaluation and obtain a score of at least 70%. AUTHENTICITY STATEMENT: The images in this course have not been altered. SCIENTIFIC INTEGRITY STATEMENT: Information shared in this continuing education activity is developed from clinical research and represents the most current information available from evidence-based dentistry. KNOWN BENEFITS AND LIMITATIONS: Information in this continuing education activity is derived from data and information obtained from the reference section. EDUCATIONAL DISCLAIMER: Completing a single continuing education course does not provide enough information to result in the participant being 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. PROVIDER DISCLOSURE: Dental Learning does not have a leadership position or a commercial interest in any products that are mentioned in this article. No manufacturer or third party has had any input into the development of course content. CE PLANNER DISCLOSURE: The planner of this course, Casey Warner, does not have a leadership position or commercial interest in any products or services discussed in this educational activity. She can be reached at cwarner@dentallearning.net. TARGET AUDIENCE: This course was written for dentists, dental hygienists, and assistants, from novice to skilled. CANCELLATION/REFUND POLICY: Any participant who is not 100% satisfied with this course can request a full refund by contacting Dental Learning, LLC in writing or by calling 1-888-724-5328. Please direct all questions pertaining to Dental Learning, LLC or the administration of this course to cwarner@dentallearning.net. Go Green, Go Online to www.dentallearning.net to take this course. © 2015

Dr. Scherer has a financial relationship with BIOMET 3i LLC resulting from speaking engagements, consulting engagements, and other retained services.