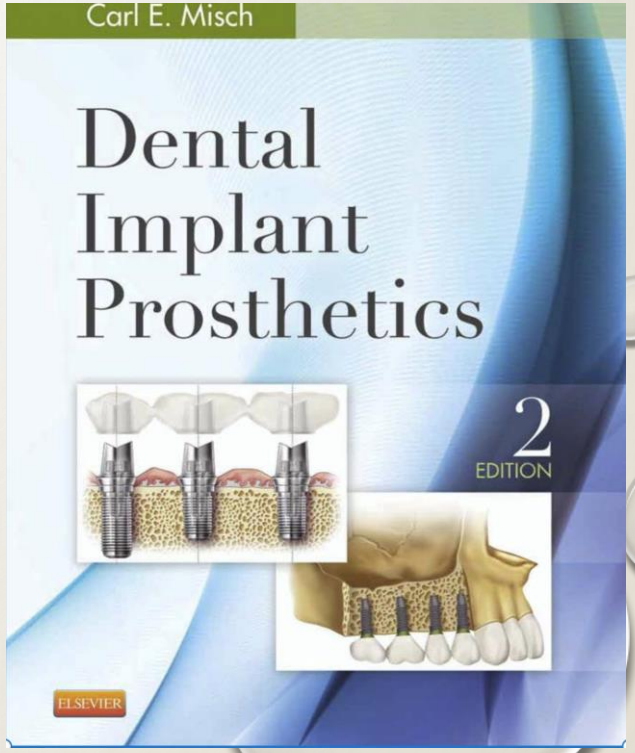
Mandibular and Maxillary Implant Overdenture

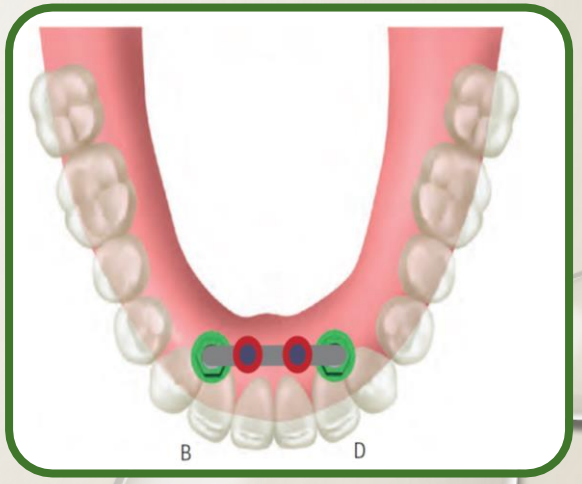
Dental Implant Prosthetics, 2 edition, Carl E. Misch, Chapter 29



Overdenture Option 2

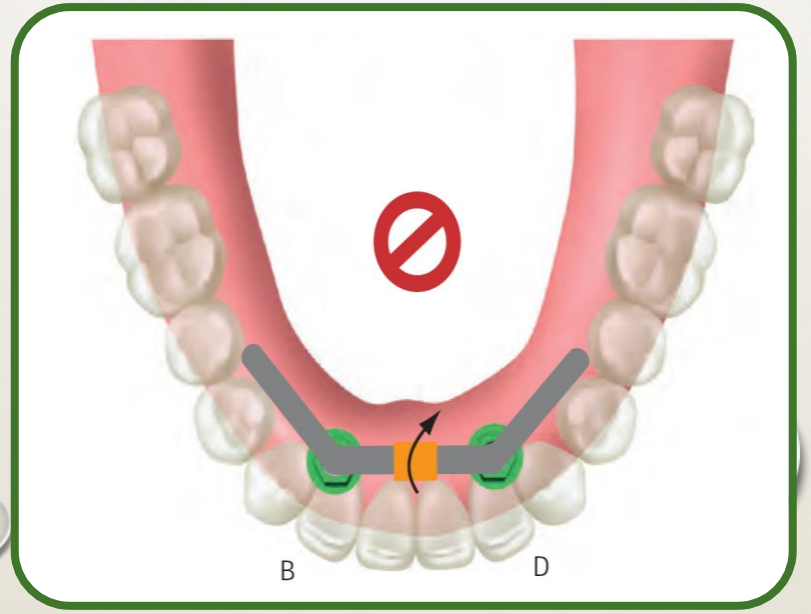
The implants in OD-2 are also positioned in locations B and D, but in this option, they are splinted together with a superstructure bar without any distal cantilever. Reduced loading forces are exerted on two anterior implants when splinted with a bar compared with individual implants. The second treatment option for a mandibular overdenture (OD-2) is selected as the initial option more often than OD-1. The anatomical needs and patient desires are similar to the first option, OD-1. Even when one implant is farther distal than the other, the bar is designed to position the attachments for added retention an equal distance off the midline parallel to each other at the same occlusal height and in a similar angulation.

The ideal distance between the implants is in the 14- to 16-mm range or B and D positions. It should be noted implants placed closer than the B, D position will result in reduced prosthesis stability during function, whether they are connected or independent units.



Overdenture Option 2

The connecting bar should not be cantilevered to the distal from the two implants. When a bar is cantilevered off the anterior implants, there is not enough A-P distance between two implants to counter the effect of the cantilever. An increased risk of prosthetic and abutment screw loosening exists with the cantilever.



Disadvantages of Splinted Implants in the A and E Positions

- Implants joined with straight bar are lingual to ridge
- Difficulty with speech
- Anterior tipping of overdenture
- Five times greater bar flexure than B and D positions
- Implants are joined with anterior curved bar
- Greater bar flexibility (nine times the B and D positions)

- Increased screw loosening
- Increased moment forces on anterior aspect of prosthesis
- Attachment of curved bar may prevent prosthesis movement
- Bite force is higher than for B and D positions
- Greater lateral load from prosthesis to implants than B and D positions

Patient selection criteria for OD-2 treatments include the following:

1. The patient's opposing arch is a complete denture.
2. Anatomical conditions for a traditional mandibular denture are good to excellent.
3. The posterior ridge form is an inverted U shape and provides good to excellent support and lateral stability.
4. The patient's complaints are minimal and relate primarily to retention.
5. The patient requires a new prosthesis and is willing to invest slightly more time and expense than the patient with the OD-1 option.
6. The mandibular residual arch is square or ovoid, and the dentate arch form is square or ovoid.
7. When the patient is unable to insert additional implants within a short time frame (within 3 years), an OD-2 is safer than an OD-1 independent implant approach.

The OD-2 prosthetic design has two primary advantages over the OD-1.

- Reduced loading forces are exerted on the two anterior implants when splinted together with a bar. This result in less screw loosening and crestal bone loss than option 1.
- the laboratory may position the attachments parallel to each other at the same height and equal distance from the midline regardless of the corresponding implant positions, thus reducing prosthetic complications.

Overdenture Option 2

The connecting bar and clips should be perpendicular to the path of rotation and parallel to the occlusal plane. This usually requires a straight bar perpendicular to the midline. The CHS above the attachment acts as a lever. The greater the crown height, the greater the force and the less stable the overdenture to any lateral force. However, the height of the attachments on the connecting bar should allow 3 mm of acrylic space between the denture teeth and attachment to permit adequate dimension for strength.

Some additional disadvantages of OD-2 treatments compared with OD-1 are possible tissue hyperplasia under the bar, more difficult hygiene under the bar, and a more expensive initial treatment option. Because a connecting bar is required for OD-2, a new prosthesis most often is indicated. Hence, a bar and new prosthesis increase the fee for the restoration.

Overdenture Option 3

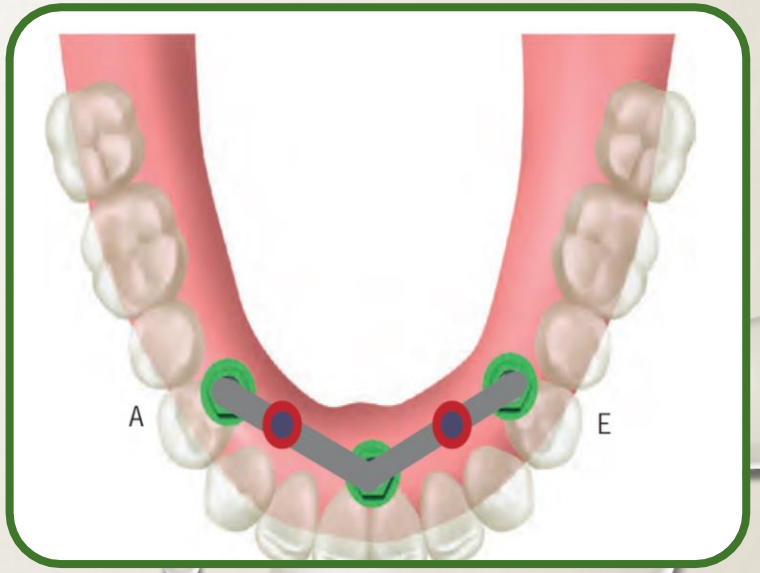
Three root form implants are placed in the A, C, and E positions for the third overdenture treatment option (OD-3).

Patient Selection Criteria: OD-3

- Opposing arch is a maxillary denture.
- Anatomical conditions are moderate to excellent.
- Posterior ridge forms an inverted U shape.
- The patient's needs and desires require improved retention, support, and stability.
- Cost a moderate factor.
- The patient may have moderate force factors (e.g., parafunction).

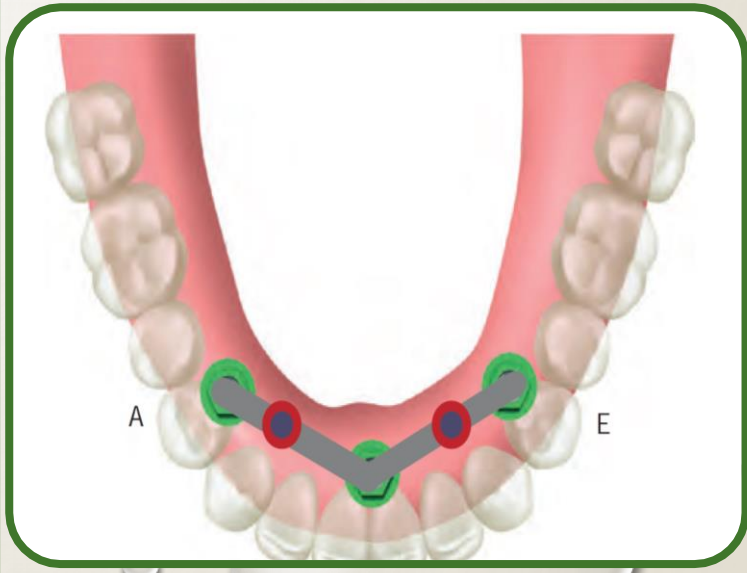
A superstructure bar connects the implants but with no distal cantilever.

It should be noted that when the posterior ridge form is poor (division C–h or D bone), the OD-3 is the lowest treatment option suggested. There are many advantages of splinting A, C, and E implants compared with implants in the B and D positions.



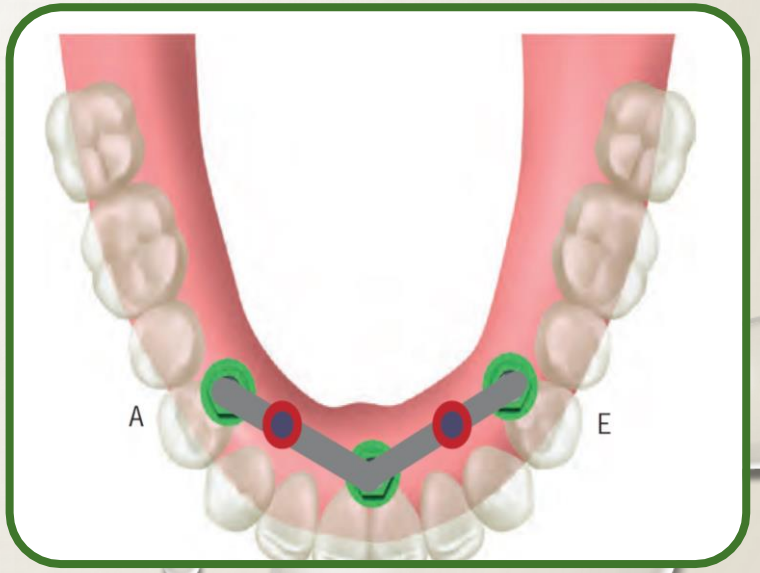
Advantages of Splinted A, C, and E Implants

- Six times less bar flexure compared with A and E positions
- Less screw loosening
- Less metal flexure
- Three implant abutments
- Less stress to each implant compared with A and E implants
- Greater surface area
- More implants
- Greater anteroposterior distance
- Half moment force compared with A and E implants
- Less prosthesis movement
- One implant failure still provides adequate abutment support



Overdenture Option 3

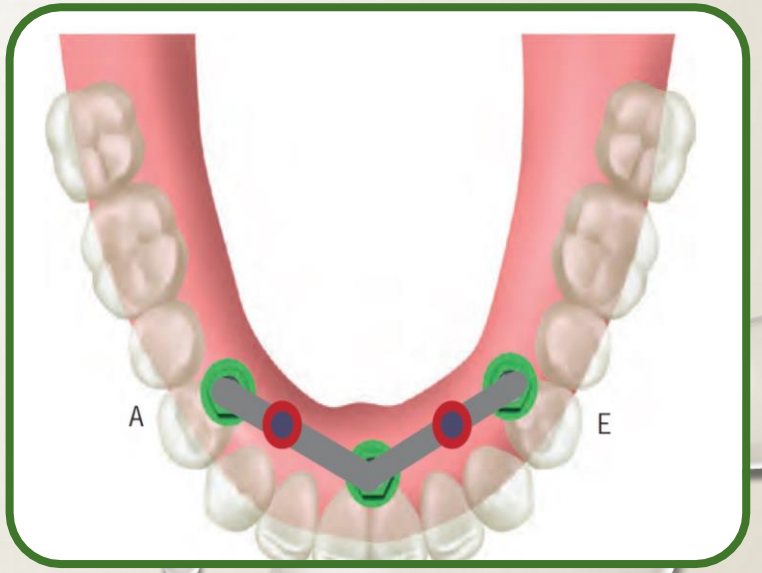
The implants splinted in the A, C, and E positions usually do not form a straight line. The C implant is most often anterior to the more distal A and E implants (in the premolar regions) and ideally directly under the cingulum position of the anterior incisor denture teeth. The restoration benefits from direct occlusal load to the implant support in the anterior arch, which reduces tipping and improves stability. As a consequence, when more than two implants are in the anterior mandible, a tripod support system may be established. To determine the amount of benefit of an A-P distance, the distal of the most posterior implants on each side are connected with a straight line. The distance from this line to the perpendicular position of the center implant is called the A-P spread. The greater this dimension, the more biomechanically stable the implants when splinted together. The greater the A-P spread of the A, C, and E implants, the greater the biomechanical advantage of the bar to reduce stress on the implants because they are splinted together.



Overdenture Option 3

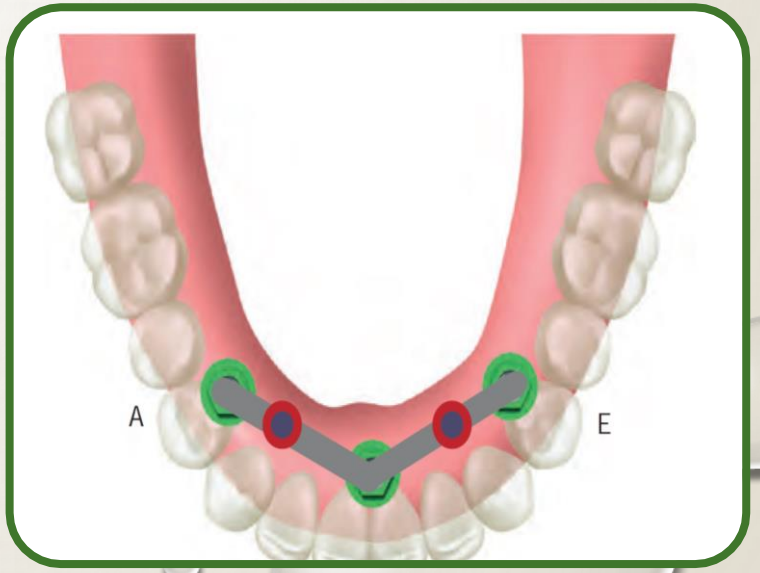
The splinted A–C–E implant and bar position is more stable than the B–D position for the prosthesis. The lateral stability of the overdenture system is improved because the implants are in the A and E positions and the attachments are in the B and D positions and more distal than OD-2. In addition, the connecting bar can be higher off the tissue when the vertical dimension permits, and the attachment-to–bone height dimension can be greater. As a result, rotation of the prosthesis is more limited compared with OD-1 and OD-2. Therefore, the third implant for OD-3 is a considerable advantage for a mandibular edentulous patient who is division C–h in available bone height.

The OD-3 treatment option is usually the first option presented to a patient with minimal complaints who is concerned primarily with retention and anterior stability of the IOD when cost is a moderate factor.



Overdenture Option 3

The posterior ridge form should be evaluated because it determines the posterior lingual flange extension of the denture, which limits lateral movement of the restoration in this treatment option. In the future, when the patient can afford additional implants to those in the A, C, and E positions, the next implant placement is in the B and D positions when the posterior bone is inadequate for implants (C–h). When posterior bone permits, the two new implants are positioned with one in a molar region and the other inserted in the contralateral B or D position. A new overdenture bar and prosthesis then permits a RP-4 (or fixed) restoration. When three or more implants are used for the overdenture system, passive screw-retained restorations are more difficult to achieve.



THANK YOU