Restorative Manual
Ball Abutment System

Restorative options with Ball Abutments

Ball Abutments are used in attachment-retained, tissue-supported restorations where the patient is fully edentulous in the arch to be restored. The extra-coronal type of attachment mechanism consists of a one-piece abutment with a superior ball projection secured to the implant. A metal housing [CAH] and retentive nylon liner [CAN] mechanically retained within the metal housing collectively referred to as the Cap Attachment [CA], is fixed within the patient's denture. The inner receptacle of the nylon liner acts as the 360 degree universal rotational connection between the denture and the abutment/implant assembly and allows for only slight compressive vertical movement. These abutments can be processed into the denture either in a chairside pick-up technique or a laboratory technique. Both techniques will be discussed in this section.

This type of restoration requires sufficient depth of the posterior vestibule to protect the abutment/implant assembly from excessive lateral/horizontal force during mastication (Fig 1a-c). It is recommended to use implants with a length in excess of 12mm and abutment heights should be kept to a minimum to maintain an acceptable implant/abutment height ratio. Therefore single arch fully edentulous patients with excessive resorption of the edentulous ridge might not be candidates for a restoration inclusive of this type of abutment system.

In most cases the restoration is done utilizing two implants with corresponding Ball Abutments placed in the canine area creating a fulcrum around which the attached denture will rotate (Fig. 1d). Absolute parallelism is not a prerequisite for success as the rotational aspect of the Cap Attachment on the ball component allows for adjustment of up to 28 degrees of relative divergence between implants. It should be noted that the long term stability and maintenance of the retentive connection is reliant on three dimensional alignment of the abutments and Cap Attachments (as shown below, Fig. 1e-1f) for increased longevity and success:

1) The implants should be placed anterior/posteriorly so that the fulcrum line through the center of the components is parallel to the mandibular hinge axis (Fig. 1e).
2) The implants should be placed vertically so that the tops of the metal housings are parallel to the occlusal plane of the patient's denture and corresponding opposing arch (Fig. 1f).
3) The implants should be parallel to each other along their long axis and perpendicular to the plane of occlusion to be in optimum position (Fig. 1g).


Fig. 1a


Fig. 1b


Fig. 1c

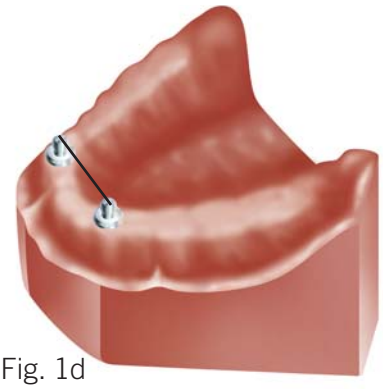


Fig. 1d

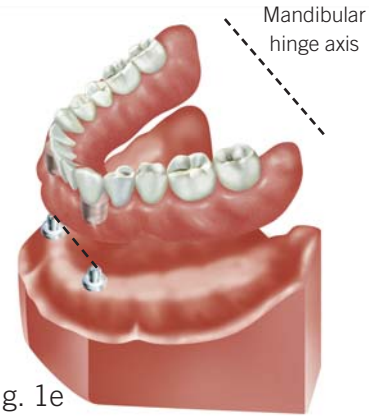


Fig. 1e

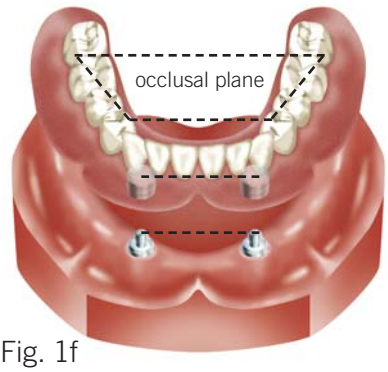


Fig. 1f

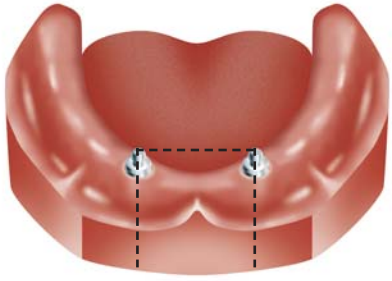


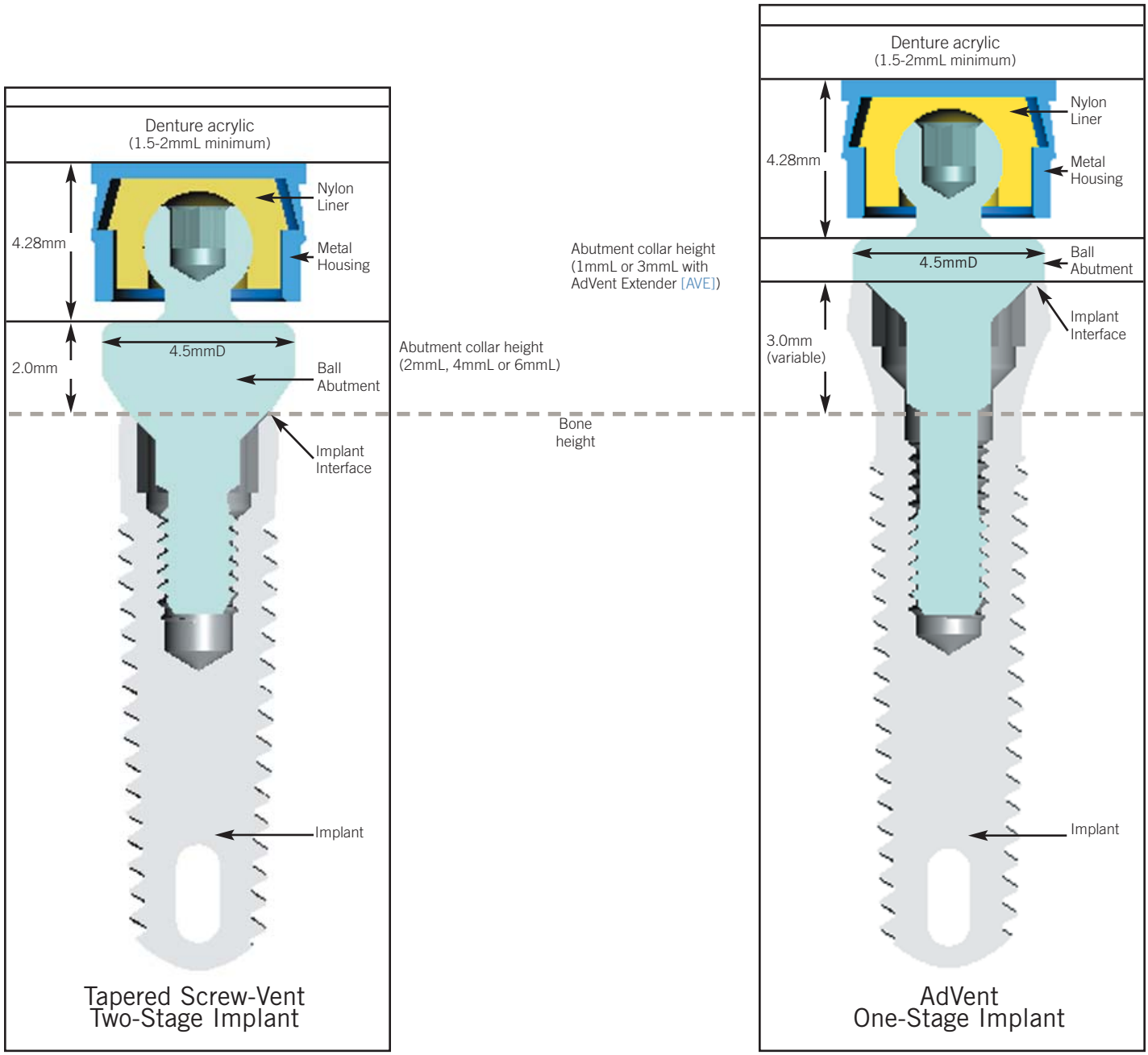
Fig. 1g

Vertical height requirements for Ball Abutments

Ball Abutment for Screw-Vent and Tapered Screw-Vent and AdVent implant systems

Ball Abutments are manufactured from titanium alloy and come packaged with the stainless steel Cap Attachment Housing [CAH] and Cap Attachment Nylon Liner [CAN]. The abutments for the Tapered and Straight Screw-Vent 3.5 and 4.5mmD platform implants are available in three collar heights (2mmL, 4mmL and 6mmL). The 5.7mmD platform Tapered Screw-Vent and AdVent implant abutments have collar heights of 2mm and 4mm only. The 4.5mmD platform AdVent implant system however has only one collar height (1mmL) which can be utilized with or without the AdVent Extender [AVE] to create variable heights depending on the depth of implant placement and surrounding soft tissue.

The Ball Abutment collar is regularly placed 1mm supra-gingival and has a coronal diameter of 4.5mm while the ball component itself is 2.5mmD. When assembled the vertical height of the Cap Attachment [CA] above the coronal aspect of the Ball Abutment collar is 4.28mm and its diameter is 5.00mm. Care should be taken to ensure sufficient denture acrylic surrounds the housing to prevent it from perforating the denture during function.



Components for Ball Abutment System

Ball Abutment Top

Laboratory technique

Chairside technique

This process cannot be utilized with the 5.7mmD platform implant systems

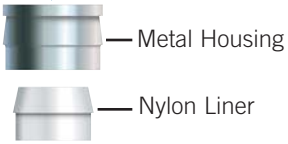
Ball Abutment Transfer [BAT]

Chairside Pick-up

Ball Abutment Replica [BAR]

Cap Attachment Transfer [CAT]

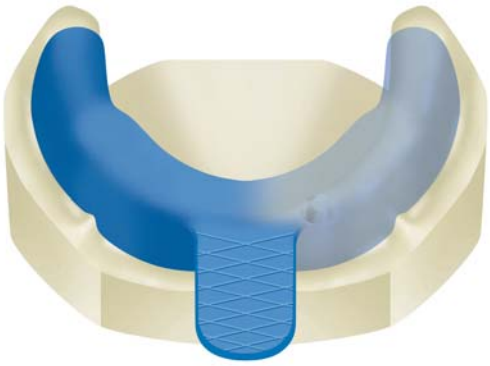
Cap Attachment [CA] (included with all Ball Abutments)



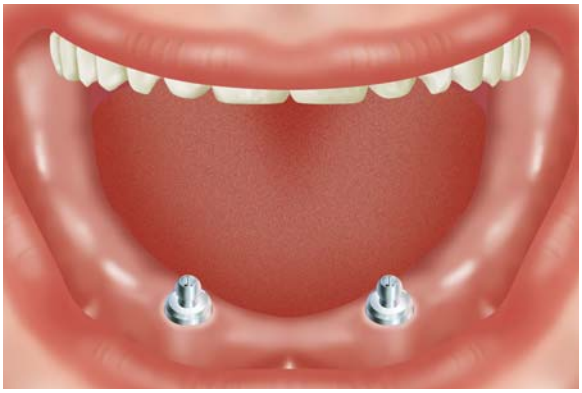
Cap Attachment [CA] assemblies are included with the Ball Abutment, and consist of a metal housing and retentive liner. Replacement housings [CAH] and Nylon Liners [CAN] are also available. A more rigid retentive liner is also available, [CAN-G].

Ball Abutment System: Laboratory Technique

Fabricating and utilizing a custom tray



Fabricating a custom tray
Prior to attaching the abutments, make a full arch, alginate impression of the Healing Collars and edentulous areas. Send the impression to the laboratory for fabrication of a working cast and an impression tray with a spacer to accommodate the Ball Abutment Transfers. Fabricate the custom tray with light-cured or autopolymerizing tray material. The patient's existing, modified overdenture can continue to be worn during the laboratory phase. Alternatively, select a stock tray to provide access for the transfers, and mold a border with greenstick compound material.



Attaching the ball components
Recall the patient when the custom tray is ready. Remove the Healing Collars or Surgical Cover Screws with the 1.25mmD Hex Tool. Select Ball Abutment components according to the implant type and transmucosal height requirements. Place the selected Ball Abutments into the implants and tighten with to 30 Ncm with a calibrated torque wrench.

Seating the transfers
Press the Ball Abutment Transfers [BAT] for all 4.5mmD collar components onto the Ball Abutments. This step cannot be done on the 5.7mmD platform implant systems.

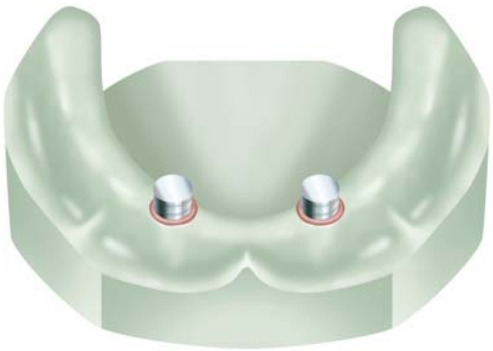
The transfer will engage the outer portion of the abutment beneath the ball for maximum stabilization. An elastomeric impression material is recommended, such as vinyl polysiloxane. Inject light body impression material around the Ball Abutments and fill the impression tray with heavier body impression material. Place the loaded tray into the patient's mouth and allow the impression material to set according to the manufacturer's recommendations. Remove the impression from the mouth.

Completing the transfer procedure
Remove the Ball Abutment Transfers from the Ball Abutments, press them onto the Ball Abutment Replicas [BAR], and insert them back into the impression holes. A double-click indicates that the transfers are fully seated. Make an opposing arch impression. Send all the materials to the laboratory for fabrication of a stabilized baseplate with occlusal registration rim.

Ball Abutment System: Laboratory Technique
Fabricating a stabilized baseplate and bite rim

Fabricating a stabilized baseplate and bite rim
Pour the impression in die stone. Remove the tray from the cast and the Ball Abutment Transfers from the Ball Abutment Replicas now incorporated within the working cast.

Press-fit the yellow Cap Attachment Transfers [CAT] onto the Ball Abutment Replicas in the working cast. Place the Cap Attachment Housings [CAH] (included with the Ball Abutments) onto the Cap Attachment Transfers.



Fabricating a stabilized baseplate and bite rim
Rotate the assembled housings and transfers up to 28° to create relative parallelism for a common path of draw. Block out the undercuts beneath the housing assemblies with an appropriate silicone or wax material.

Incorporating the housings into the baseplate
Place gel viscosity light-cure resin material on the metal housings and cure. Incorporate the housings into a stabilized baseplate made from light-cured baseplate resin. Create a wax occlusion registration rim on the stabilized baseplate. Place the assembly on the working cast and send it to the dentist for fabrication of a stabilized bite registration.

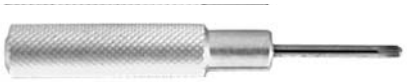
Making a stabilized bite registration
Snap the yellow Cap Attachment Transfers onto the Ball Abutments in the patient's mouth. Place the stabilized baseplate and occlusal registration rim into the patient's mouth and allow the transfers to insert into the metal housings in the baseplate. Make a bite registration with the stabilized baseplate and occlusion rim. Send the assembly to the laboratory for fabrication of a stabilized denture wax try-in.

Ball Abutment System: Laboratory Technique
Delivering the final prosthesis

Making a stabilized denture wax try-in
After the laboratory fabricates a stabilized denture wax-up, recall the patient for try-in. Snap the yellow Cap Attachment Transfers onto the Ball Abutments in the patient's mouth. Place the denture wax try-in into the patient's mouth and allow the transfers to insert into the metal housings in the baseplate. Evaluate esthetics and phonetics, and verify that the wax-up fits passively. If changes in tooth position are prescribed, schedule additional try-in appointments until acceptable tooth arrangement is verified and approved by dentist and the patient. Place the approved stabilized denture wax try-in on the working cast with the Cap Attachment Transfers and send it to the laboratory for final processing.

Cap Attachment Instruments [CAI]

Nylon Liner Insertion Tool



Nylon Liner Reaming Tool

Mandril for Castable Ball Pattern

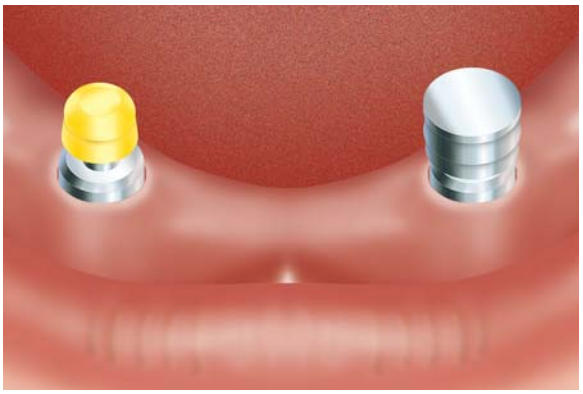
Cap attachment Instruments
a) Nylon Liner Insertion Tool: Used to carry and assist in the insertion of the Nylon Liner into the metal housing.
b) Reaming tool: When the Nylon Liner is too retentive for the respective patient, the Reaming Tool is inserted into the liner and rotated in a clockwise direction. This action reduces the amount of retention between the ball component and the Cap Attachment by reducing the dimension of the liner's inner walls. Care should be taken to do this in small increments so as not to eliminate the required retention levels of the Nylon Liner.
c) Paralleling Mandril: Used by the technician in combination with a surveyor to align the castable ball patterns in the correct position when fabricating a Ball Bar Overdenture.

Processing The Final Prosthesis
When the processed denture returns from the laboratory, retighten the Ball Abutments to 30 Ncm with a calibrated torque wrench. Place one Nylon Liner [CAN] from the Cap Attachments [CA] onto the end of the insertion tool. Use the Insertion Tool to press the Nylon Liner into one of the metal housings in the denture base. Check the retention of the liner by snapping the denture on and off the ball component in the patient's mouth. If necessary, use the reaming tool to decrease the retention of the nylon liner. When adequate retention has been achieved, process the second nylon liner in the same manner. Insert and adjust only one Nylon Liner at a time.

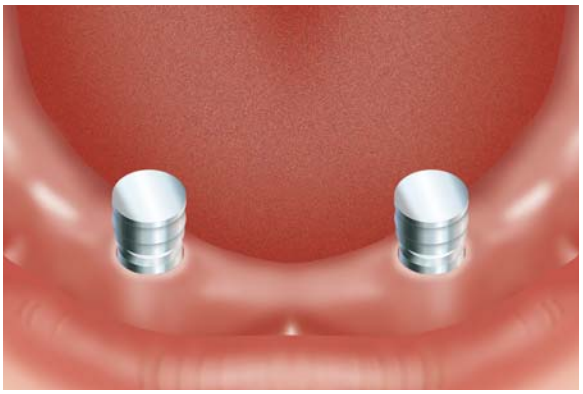
Delivering the Final Prosthesis
Insert the finished prosthesis into the patient's mouth and snap the incorporated Cap Attachments onto the Ball Abutments. Make final adjustments to the occlusion. Instruct the patient in the use and care of the prosthesis, and provide oral hygiene instructions. Caution the patient not to use bleach on the prosthesis, which can damage the nylon Cap Attachment liners. To prolong the use of the nylon liners, instruct the patient to insert and remove the overdenture by lifting the prosthesis vertically instead of laterally or by twisting. If the Nylon Liners lose retention, they can be easily replaced at a recall appointment. For patients who require stronger Cap Attachment retention, gray Nylon Liners [CAN-G] with a more rigid retention are also available.

Ball Abutment System: Chairside Technique
Adding Cap Attachments to an existing denture

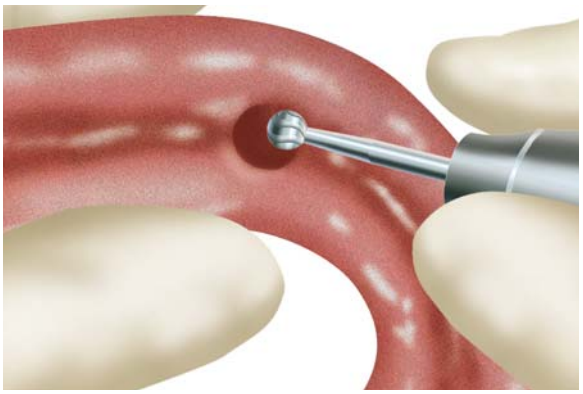
Attaching the ball components
Recall the patient when the custom tray is ready. Remove the Healing Collars or Surgical Cover Screws with the 1.25mmD Hex Tool. Select Ball Abutment Components according to the implant type and transmucosal height requirements. Place the selected ball components into the implants and tighten to 30 Ncm with a calibrated torque wrench.



Preparing the housings for pick-up
Snap the yellow Cap Attachment Transfers [CAT] onto the Ball Abutments. Place the Cap Attachment stainless steel housings [CAH] over the transfers.



Preparing the housings for pick-up
Rotate the assembled Cap Attachment Transfers [CAT] and metal housings [CAH] on the Ball Abutments up to 28º to create relative parallelism for a common path of draw. Try and ensure that the components are aligned taking into consideration the occlusal plane of the denture, this will help with the smooth rotation of the denture around the Ball Abutment.

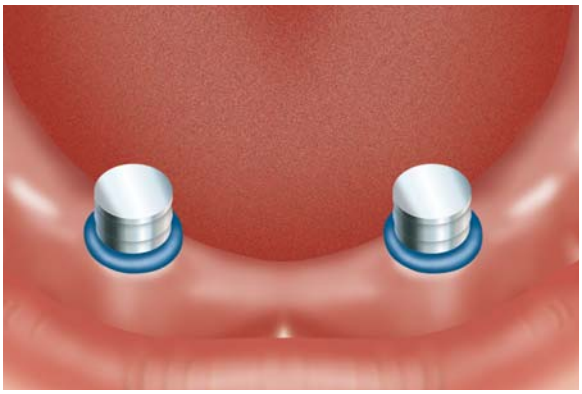


Preparing the denture for pick-up
Seat the denture into the patient's mouth to determine the locations of the metal housings relative to the tissue-bearing surface of the prosthesis. Remove the denture from the patient's mouth and mark the locations of the assembled housings on the bottom of the prosthesis. Relieve the areas over the housings with an acrylic bur until the denture can be fully seated in the patient's mouth without contacting the metal housings.

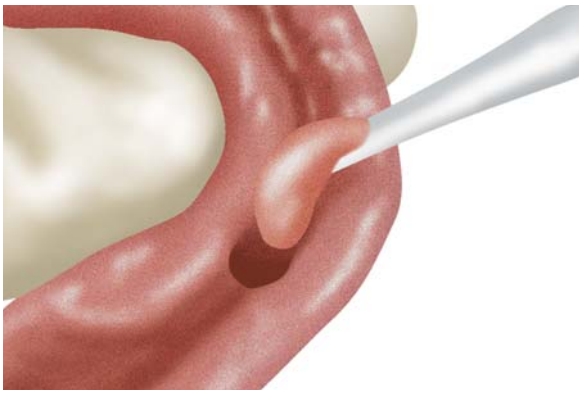
Small relief holes can be drilled through the top of the recess to allow excess acrylic to exude through.

Ball Abutment System: Chairside Technique

Adding Cap Attachments to an existing denture

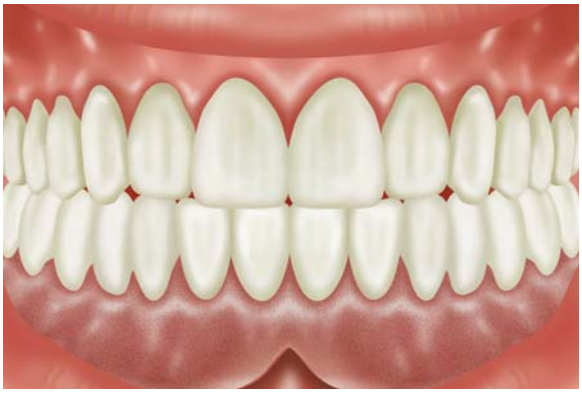


Preparing the housings for pick-up
Block out the undercuts beneath the housing assemblies with an appropriate silicone or wax material, taking care not to change the orientation of the housings on the Ball Abutment.



Processing the housings into the denture base
Autopolymerizing acrylic is recommended for the pick-up. It flows better than a light-cured resin and engages the undercuts on the outside of the metal housings [CAH] more efficiently. Place a small amount of autopolymerizing acrylic into the dry, relieved areas within the denture base. Also place a small amount of acrylic directly on the tops of the housings. Place the denture over the housings in the mouth and instruct the patient to bite lightly in centric occlusion.
Remove the denture after the acrylic sets. Fill in any voids remaining around the processed housings with additional autopolymerizing acrylic.

Processing the Nylon Liners into the denture base
Remove the yellow Cap Attachment Transfers from the Ball Abutments in the patient's mouth. Place one Nylon Liner [CAN] from the Cap Attachments [CA] onto the end of the insertion tool from the Cap Attachment Instruments [CAI]. Press a Nylon Liner into the metal housing in the denture base. Check the retention of the liner by snapping the denture on and off the ball component in the patient's mouth. If necessary, decrease the retention of the liner by inserting the reaming tool from the Cap Attachment Instruments into the liner and turning it clockwise to reduce the retention of the liner's inner walls. When adequate retention has been achieved, process the second liner in the same manner. Insert and adjust only one nylon liner at a time.



Delivering the final prosthesis
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