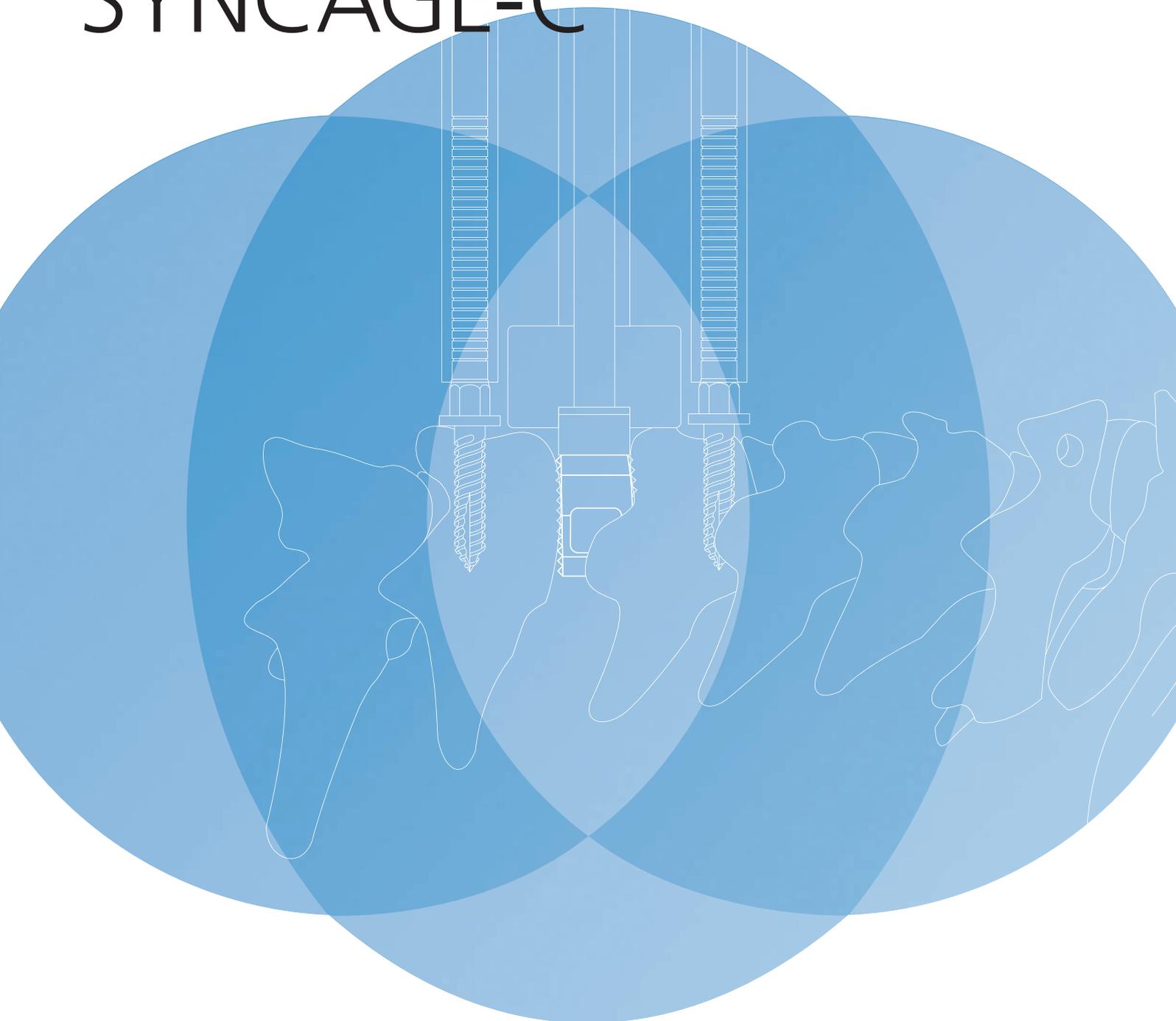


SYNCAGE-C



Instruments and implants approved by the AO Foundation.
This publication is not intended for distribution in the USA.

SURGICAL TECHNIQUE

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IMPLANTS

Implants

SynCage-C is a system of curved or wedge-shaped implants and instruments designed for anterior cervical interbody fusion (ACIF). The system was developed to achieve the following objectives:

- Distract the disc space and restore normal disc height and lordosis, thereby also widening the foramina
- Provide an optimal implant/endplate interface, thus considerably limiting the risk of subsidence into the adjacent vertebrae
- Stabilise the pathologically unstable segment
- Support bone growth through the implant



Curved cages



Wedge-shaped cages

INDICATIONS/CONTRA-INDICATIONS

Indications

Cervical pathologies for which segmental spondylodesis is indicated:

- Degenerative disc diseases and instabilities
- Pseudarthrosis or failed spondylodesis

Additional stabilisation with a plate is recommended for multisegmental fusions.

Contra-indications

- Severe osteoporosis
- Serious instabilities

SURGICAL TECHNIQUE

Preoperative planning

Prior to surgery, determine the desired surgical approach and estimate the appropriate height of the SynCage-C. Definitive information on the appropriate size is provided by checking the distracted disc space with the trial implants during the operation.

1

Exposure

Expose the disc and adjacent vertebral bodies through an anterolateral incision in the cervical spine.

2

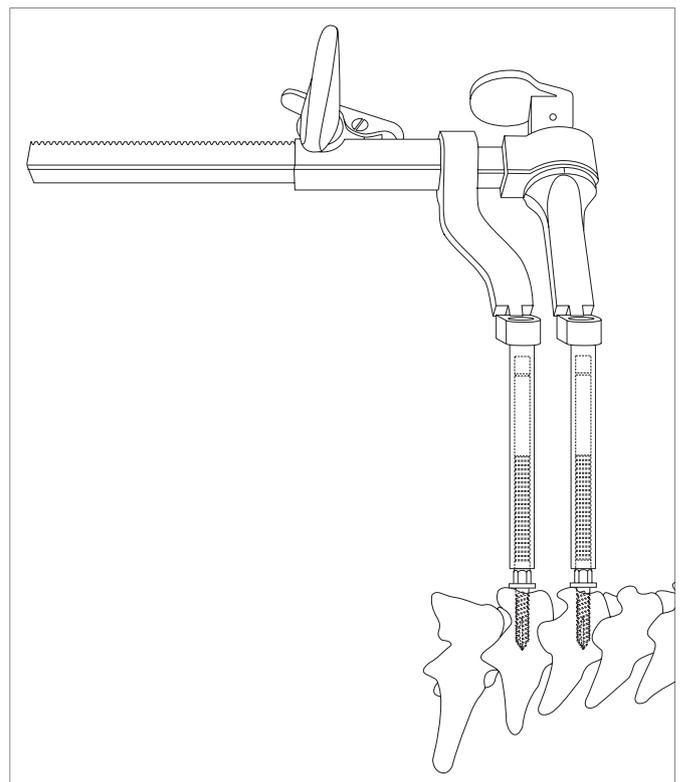
Prepare the disc space

Cut a rectangular window matching the width of the SynCage-C (15 mm) in the anterior longitudinal ligament and the annulus fibrosus. Preserve as much of these structures as possible since they are important for the stability of the operated segment. Use rongeurs to remove the disc material through this window.

3

Distract the segment

Distract the segment. Distraction of the segment is essential for restoration of disc height and for providing good access to the intervertebral space for subsequent optimal preparation of the endplates. A Cervical Distractor (396.395/396) is recommended for the distraction.



4

Prepare the vertebral body endplates

The selected preparation technique will depend on the surgeon's own preference and experience.

1. The first technique preserves the cortical bone beneath the cartilaginous layer and the natural shape of the bone, thereby increasing resistance to subsidence into the adjacent vertebrae. Remove the cartilaginous layers from the surface of the vertebral endplates using a ring curette until bleeding bone is attained. Clean the endplate. Adequate cleaning of the endplate is important for the vascular supply to the bone graft. Excessive cleaning, however, may weaken the endplate due to removal of the denser bone of the endplate.

Both the curved and wedge-shaped versions of SynCage-C may be used for this technique depending on the anatomical shape of the endplate.

2. The second technique involves removal of the cartilaginous layer and part of the cortical bone to produce flat surfaces and thus provide the optimum surface contact area between the bone structure and the implant. Use an osteotome or drill to remove the cartilaginous layer.

The use of wedge-shaped SynCage-C implants is recommended for this technique.

In both cases the removal of any osteophytes is very important for achieving complete decompression of the neural structures and for avoiding the risk of partial compression after implant insertion.

5

Determine the type and size of the implant

Selection of the trial implant will be based on the height of the intervertebral space determined preoperatively, the preparation technique and the patient's anatomy. Choose a curved or wedge-shaped implant of the appropriate height subject to the above considerations.

The trial implants are colour-coded. The corresponding implant of the same size will always be the same colour (see page 6, step 9).

The height of the trial implant is 0.7 mm less than that of the corresponding implant so as to take account of the subsidence of the teeth of the SynCage-C into the vertebrae.

Height	Colour	Curved trial implant Art. No.	Wedge-shaped trial implant Art. No.
4.5 mm	light-blue	396.983	396.974
5.5 mm	gold	396.984	396.975
7.0 mm	blue	396.985	396.976
8.5 mm	violet	396.986	396.977
10.0 mm	green	396.987	396.978

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Mount Trial Implant on the Holder

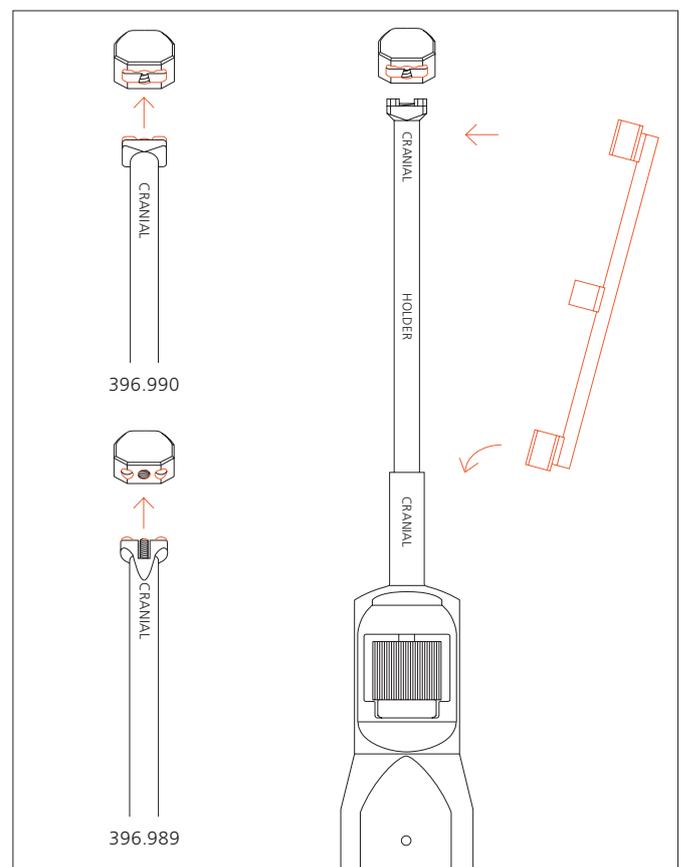
Screw the Holder (396.990), marked "CRANIAL" and "CAUDAL", onto the trial implant so that the cranial side of the holder matches the cranial side of the trial implant. Turn the trial implant 180° to make the coupling fit, if necessary.

Use the special Holder (396.989) for trial implant height 4.5 mm and 5.5 mm.

7

Attach Depth Limitor to the Holder (optional)

The Depth Limitor (396.993) can be attached to the side of the holder and prevents the trial implant from being inserted more than 2 mm behind the anterior edge of the vertebral body.



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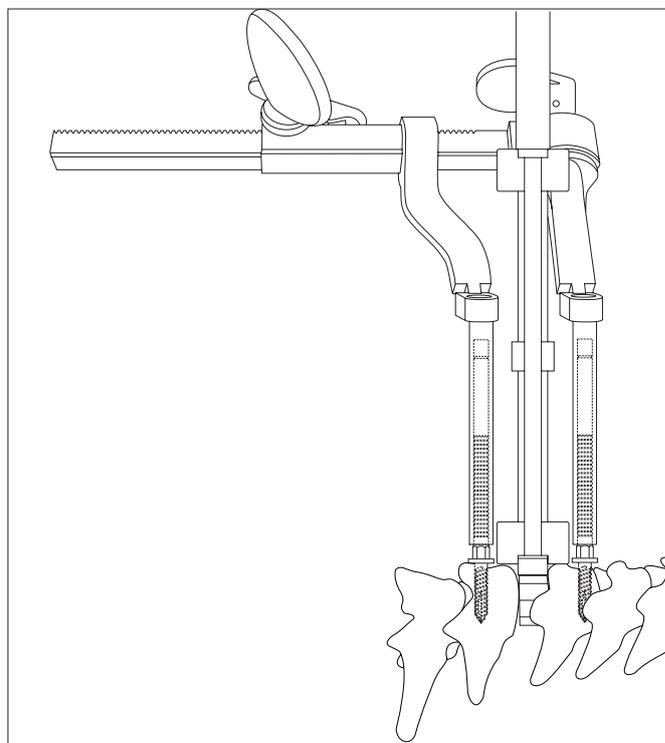
Trial for implant size

Position the holder in the correct cranial/caudal alignment and carefully insert the trial implant into the disc space. Check the position of the trial implant under the image intensifier.

With the segment fully distracted, the trial implant must fit tightly and accurately between the endplates. The disc height must be preserved when the distractor is removed. Use the largest possible trial implant so as to maximise segment stability through tension in the longitudinal ligament and the annulus fibrosus.

If the trial implant does not completely fill the intervertebral space, try the next larger size. If the trial implant cannot be inserted, try the next smaller size.

Note: The trial implants are not for implantation and must be removed before insertion of the SynCage-C.



9

Select and mount SynCage-C implant

Mount the curved or wedge-shaped SynCage-C implant corresponding to the trial implant on the holder so that the cranial side of the holder matches the cranial side of the implant. If necessary, turn SynCage-C 180° to make the coupling fit.

Use the special holder (396.989) for size 4.5 mm and 5.5 mm implants.

Like the trial implants, the SynCage-C implants are colourcoded.

Start removing bone graft from the iliac crest.

Curved cages		Wedge-shaped cages	
10.0 mm (495.304) green		10.0 mm (495.338) green	
8.5 mm (495.303) violet		8.5 mm (495.337) violet	
7.0 mm (495.302) blue		7.0 mm (495.336) blue	
5.5 mm (495.301) gold		5.5 mm (495.335) gold	
4.5 mm (495.300) light-blue		4.5 mm (495.334) light-blue	

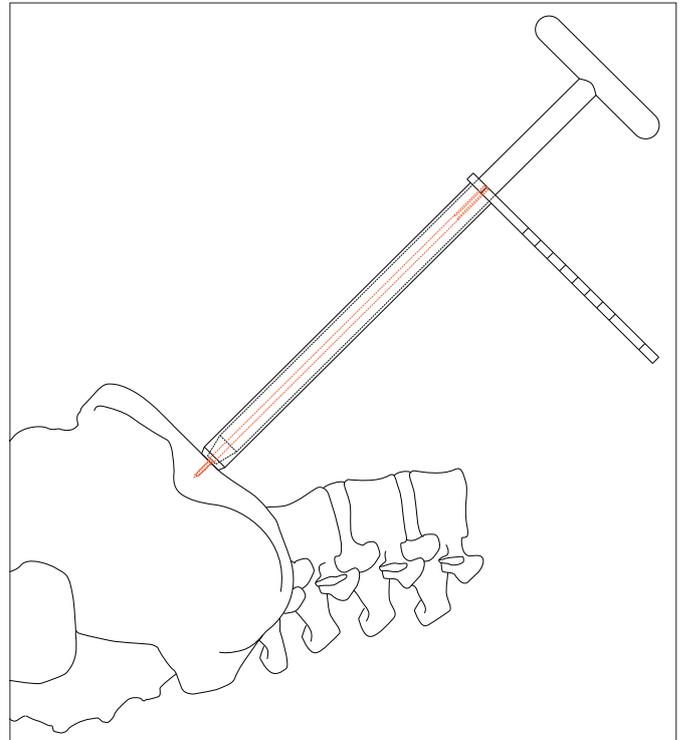
10

Insert guide wire and protection sleeve

Harvest the bone graft through a percutaneous, minimally invasive approach to the iliac crest using the special instruments.

Attach the T-Handle (395.380) to the Guide Wire (292.681). Insert the guide wire into the iliac crest deep enough to secure a stable hold. Check position and orientation under the image intensifier. Remove the handle.

- 1 Insert the Trocar (387.002) into the Protection Sleeve (396.995). Slide the trocar and protection sleeve over the guide wire down to the iliac crest in the operation field.



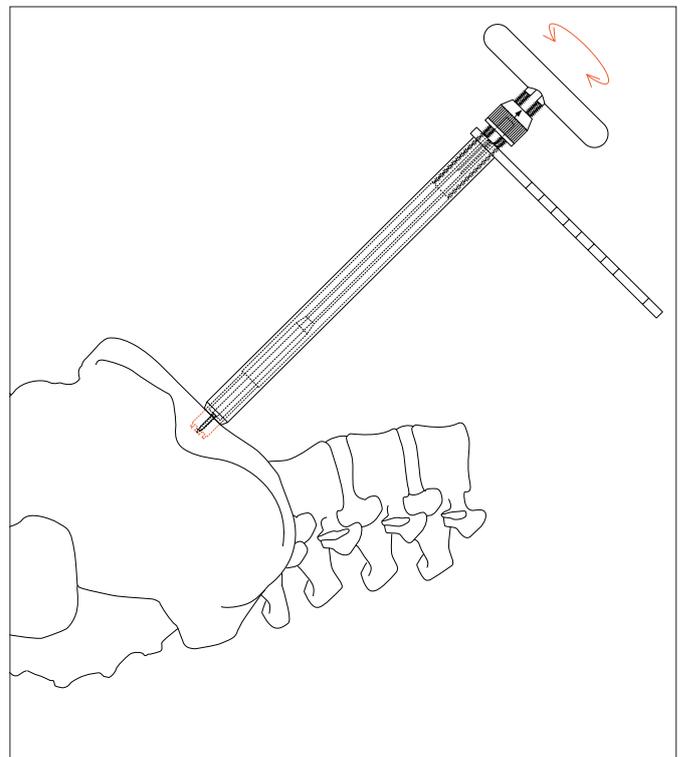
11

Drilling

Remove the trocar and push the Centering Pin (387.005), with the wider end first, over the guide wire into the protection sleeve.

Adjust the desired drilling depth on the Hollow Drill (396.994) by turning the knurled nut on the extractor. As a general rule, a drilling depth corresponding to twice the implant height will provide sufficient bone volume.

Push the hollow drill over the centering pin into the protection sleeve. Drill with rotary or oscillating movements until the knurled nut reaches the top of the protection sleeve. Remove the drill.



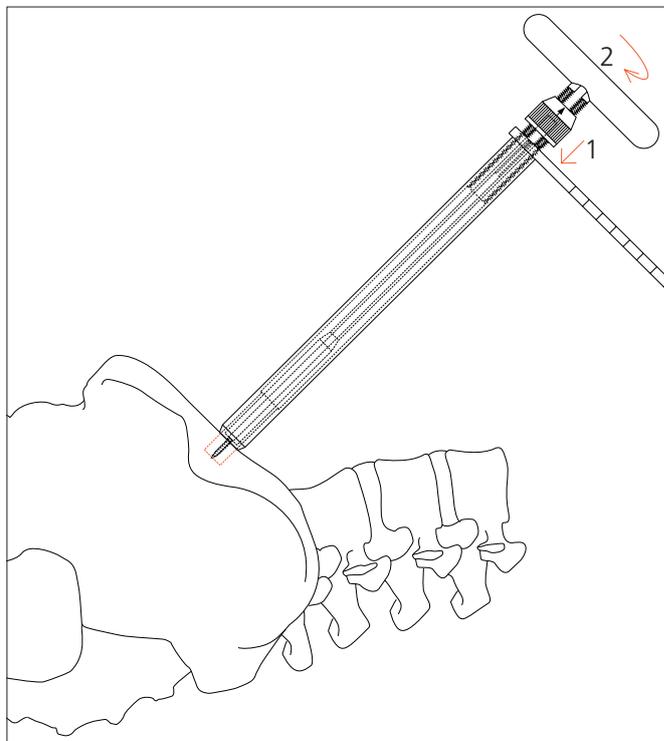
12

Extract bone graft

The Extractor (387.003) is used to remove the cylinder of bone from the iliac crest. Readjust the previously selected drilling depth by turning the knurled nut on the extractor. Guide the extractor over the centering pin and, without turning, push downwards until the stop is reached (1). Break off the bone cylinder by turning the extractor (2).

Remove the extractor and knock out the bone cylinder with the Tappet (387.001).

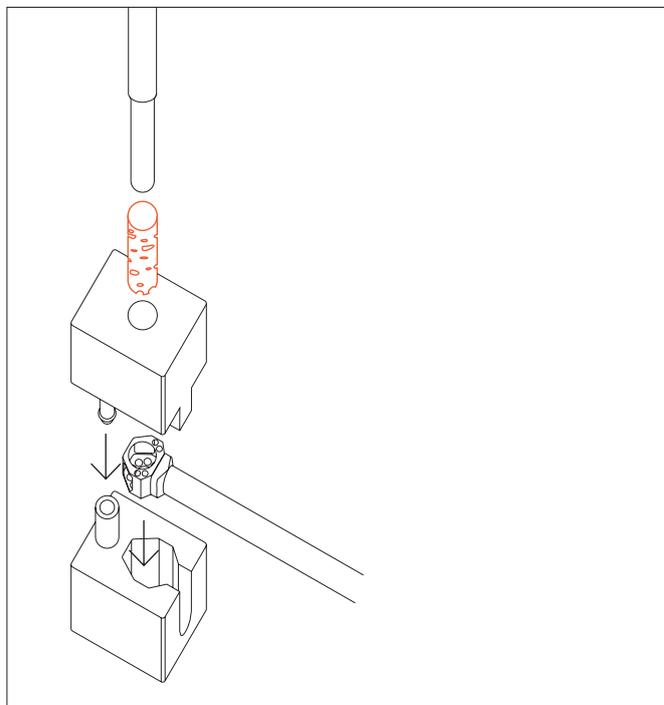
Note: Before packing the SynCage-C, remove the cortical bone layer from the bone cylinder.



13

Pack implant with bone graft

Remove the depth limiter from the implant holder. Insert the implant, attached to the holder, into the Packing Block (396.991). Close the packing block lid and fill the packing block with cancellous bone through the lid opening. Using the Cancellous Bone Impactor (396.992) fill the implant completely with cancellous bone. For optimal contact with the intact structures, the bone material should protrude from the implant holes.



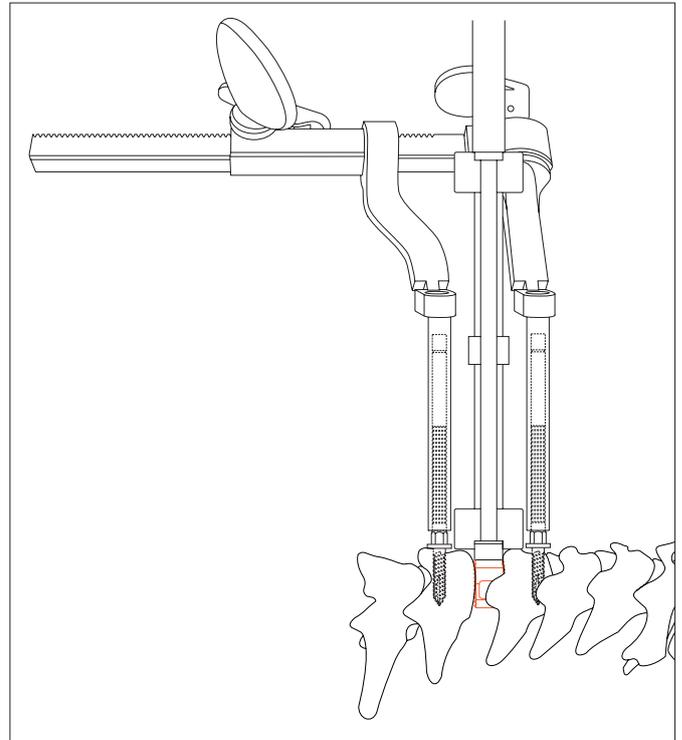
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Implant SynCage-C

If desired, attach the depth limiter to the side of the holder. Position the implant and holder in the correct cranial/caudal alignment and carefully insert into the distracted segment. If necessary, lightly hammer the implant fully into the disc space.

Pack the spaces around the implant with additional bone material.

Undo the distractor and remove the holder.



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Verify placement

The optimal position for the SynCage-C is centered within the periphery of the vertebral endplates. Depending on the size of the vertebrae, the front edge of the SynCage-C will be approximately 2 mm behind the anterior edge of the adjacent vertebrae.

- Verify the position of the SynCage-C in relation to the vertebral bodies under the image intensifier.

