Pangea Perforated. The versatile augmentable pedicle screw.

Technique Guide

SYNTHERS® Instruments and Implants approved by the AO Foundation
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**Pangea Perforated.** The versatile augmentable pedicle screw.

**Improved anchoring and shear stability in osteoporotic bone**

**Perforated, dual-core pedicle screw**
- Cylindrical large core with low and broad thread flanks for higher strength in dense cortical bone shell of pedicle
- Cylindrical small core with high and thin thread flanks for cancellous bone in vertebral body
- Six radial openings for 360° cement distribution and optimal screw anchoring
- Large cannulation diameter for low cement injection resistance
- Kirschner wire cannulation for guided screw insertion over 1.6 mm Kirschner wire
- Minimal cement outflow from screw tip
Option

Option 1: Simple adapter for perforated pedicle screws
- Tactile feedback of recess connection
- Direct application of cement
- Applied volume readable on syringe

Option 2: Needle Adapter Kit
- Easy handling, manœuvre through soft tissue
- Can be connected prior to attaching the syringe, independent of cement preparation
- Same screw recess interface as simple adapter
- Extra guidance over Kirschner wire

Option 3: Guide Sleeve for Augmentation and Locking Needle Adapter Kit
- Guide sleeve connects to Pangea Perforated 3D head
- Alignment of guide sleeve to screw, retraction of soft tissue if necessary
- Firm connection to screw recess, minimized risk of cement leakage
- Assembly of guide sleeve for Pangea augmentation and locking needle adapter independent of cement preparation
- Same interface as simple and needle adapter
AO Principles

In 1958, the AO formulated four basic principles\(^1\), which have become the guidelines for internal fixation. They are:

- Anatomical reduction
- Stable internal fixation
- Preservation of blood supply
- Early, active pain-free mobilization

The fundamental aims of fracture treatment in the limbs and fusion of the spine are the same. A specific goal in the spine is returning as much function as possible to the injured neural elements\(^2\).

AO Principles as Applied to the Spine\(^3\)

**Anatomical reduction**
Restoration of normal spinal alignment to improve the biomechanics of the spine.

**Stable internal fixation**
Stabilization of the spinal segment to promote bony fusion.

**Preservation of blood supply**
Creation of an optimal environment for fusion.

**Early, active pain-free mobilization**
Minimization of damage to the spinal vasculature, dura, and neural elements, which may contribute to pain reduction and improved function for the patient.

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Indications and Contraindications

The Pangea Spine System is a posterior pedicle screw and hook fixation system (T1–S2) designed to provide precise and segmental stabilization of the spine in skeletally mature patients. The Pangea Perforated screws are cannulated. However, they may be inserted like standard solid Pangea screws (see Pangea Degenerative technique guide 036.000.445) or like Cannulated Pangea screws by means of Kirschner wire guidance (see Cannulated Pangea technique guide 036.000.941).

Indications
- Degenerative disc disease
- Spondylolisthesis
- Trauma (i.e., fracture or dislocation)
- Tumor
- Stenosis
- Pseudoarthrosis
- Failed previous fusion
- Deformities (i.e. scoliosis, kyphosis and/or lordosis)
- Osteoporosis when used concurrent with Vertecem or Vertecem V+

Note: For deformity corrections, polyaxial screws can only be used in conjunction with monoaxial screws.

Contraindications
- Fractures and tumors with loss of anterior support
- Osteoporosis when used without cement augmentation
- Severe osteoporosis

Contraindications related to Vertecem and Vertecem V+
- Infections
- Patients with clotting disorders
- Patients with severe cardiac and / or pulmonary insufficiency
- Patients with known hypersensitivity or allergy to any of the components of Vertecem or Vertecem V+ Bone Cement (see Composition of Cement)
- Vertebra plana or if safe percutaneous access to the vertebra is not guaranteed
- Unstable vertebral fractures with involvement of the posterior wall in stand alone vertebral augmentation procedures (e.g. vertebroplasty)
- Previous damage to the pedicle wall (transpedicular access)
- Fractures or neoplasia with narrowing of the spinal canal (more than 20%) and myelopathy
- Retropulsing vertebral fragments with myelopathy
- A satisfactory response to conservative treatment
- Asymptomatic stable vertebral fractures
- Vertecem V+ Bone Cement must not be used in arthroplasty procedures
Preoperative Planning

Preoperative planning includes evaluation and assessment of the patient with regard to the specifications of the bone cement used for augmenting Pangea Perforated screws (see Vertecem Vertebroplasty System technique guide 036.000.557).

Proper imaging equipment must be used to determine correct implant dimensions in relation to the anatomy.

The decision whether or not to augment Pangea Perforated screws can be taken intraoperatively, based on tactile feedback upon pedicle preparation and screw insertion. If screws are augmented, bilateral screw augmentation is recommended.

**Note:** Do not reinforce more than six vertebrae with bone cement in one session. The injected cement pushes bone marrow into the blood circulation and can cause fat embolism. The amount of cement that is injected in one session should therefore be limited to about 25 ml or even less if a patient shows severely compromised cardiopulmonary function.

**Note:** Handling knowledge of Vertecem and the Viscosafe is required. Image intensifier control is highly recommended while injecting cement.
General Recommendations on Kirschner Wire Handling

- Ensure the Kirschner wires remain securely in position throughout the entire duration of the procedure. The tip of the Kirschner wire should be monitored under image intensification to ensure it does not penetrate the anterior wall of the vertebral body and damages the vessels situated in front.
- Ensure the Kirschner wires do not slip out before the screws are inserted. The Kirschner wires are long enough to be held in place by hand during pedicle preparation and soft tissue dilation.
- Insert the screw until the tip of the screw is beyond the posterior wall of the vertebral body and remove the Kirschner wire in order to avoid uncontrolled further advancing.

Recommendation for positioning the Kirschner wire
- When inserting the Kirschner wires, be mindful to position them as parallel as possible to one another. This will ensure there is enough space for screw insertion with SpiRIT instruments. When operating on L5/S1, position the Kirschner wires in relation to the green colored Kirschner wire as illustrated.

Technique tip: Bi-planar fluoroscopy with two C-arms facilitates a safer, easier and quicker radiographic assessment during the surgical procedure.
Open Approach

This surgical technique contains supplementary instructions on handling Perforated Pangea pedicle screws. For handling standard Pangea pedicle screws please refer to the Pangea Degenerative Spine System technique guide (036.000.445) and the technique guide on Cannulated Pangea (036.000.941).

1

Prepare pedicles and insert screws

Open and prepare pedicles and insert screws as defined in chapter screw insertion, steps 1–3 of the Pangea Degenerative Spine System technique guide (036.000.445).

Instruments

<table>
<thead>
<tr>
<th>Code</th>
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<tr>
<td>105.078</td>
<td>Instrument Set for Pedicle Preparation Set, in Vario Case</td>
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<td>01.622.021</td>
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<td>Pangea Basic Instruments (part 2) in Vario Case</td>
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Optional Instrument

<table>
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<tbody>
<tr>
<td>01.624.103</td>
<td>Cannulated Instruments for Pedicle Preparation in Vario Case</td>
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</table>
2
Assess proper screw placement

Assess the cortical shell for perforations.

Note: In case of any perforation, special caution is required when bone cement is applied. Cement leakage and its related risks may compromise the physical condition of the patient.

Select appropriate screw lengths. Choose screws with the maximum possible diameter and length to achieve maximum stability.

The Pangea Perforated screw must enter in approximately 80% of the vertebral body.

Notes
- If the screws are too short, the bone cement might be injected too close to the pedicle. It is required that the screw perforations are located in the vertebral body, close to the anterior cortical wall. For this reason 35 mm screws should be placed in the sacrum only.
- If the screws are too long, or placed bi-cortically, the anterior cortical wall may be penetrated and cement leakage might occur.

Instrument

02.648.001 Cleaning Stylet for perforated Pedicle Screws

Use the cleaning stylet to clear the cannula for proper cement injection. Visualize the stylet position under image intensifier control.

Note: Optionally, a Kirschner wire of 2.0 mm diameter can be used.
Option A: Cement handling with Vertecem

3a Prepare Vertecem cement

Instrument

07.702.010 Vertecem Mixing Kit

Hold the mixing device upright. Gently tap the top of the mixing device with a finger tip in order to ensure that no cement powder sticks to the top of the cartridge and mixing device lid.

Pull back the handle of the mixing device as far as possible.

Open the glass ampoule by snapping off the plastic cap at the neck.

Remove the lid of the mixing device.

Pour all of the monomer from the glass ampoule over the cement powder.

Securely refasten the lid of the mixing device.

Mix Vertecem by moving the blue plunger back and forth from stop to stop for about 15–20 times. Perform the first mixing strokes slowly with oscillating-rotating movements.

Subsequently, pull back the plunger as far as possible in preparation to fill the syringes.
4a
Fill syringes

**Instruments**

- 07.702.210 Viscosafe Injection kit
- 07.702.216.02S Simple Adapter for perforated Pedicle Screws, with Luer-Lock, 2 pieces, sterile

**Optional Instruments**

- 03.702.224.02S Needle Adapter Kit for perforated Pedicle Screws, with Luer-Lock, sterile
- 03.631.020 Guide Sleeve for Pangea Augmentation
- 07.702.217.02S Locking Needle Adapter Kit for perforated Pedicle Screws, with Luer-Lock, sterile

Connect up to five syringes (1 ml or 3 ml) to the ports of the manifold. One of the five syringes must be the one with the red plunger marked “TEST”.

Open the small white plug of the mixing device and connect the mixing device to the manifold.
Gently turn the handle of the mixing device clockwise. The piston advances in the transparent cartridge and a steady flow of cement enters the manifold (1).

**Note:** Ensure that the plunger is pulled fully back before starting to turn the handle.

Once all the air has been evacuated out of the manifold (cement reaches the far end of the manifold), turn the upper most three-way valve to the closed position (“OFF” marking appears along the manifold tube) (2). This prevents the cement from extruding out of the manifold.

The syringes will then be filled with cement.

After each individual syringe is filled, turn the respective manifold valve to the closed position (“OFF” marking points in the same direction as the syringes).

When all the syringes are filled with cement, replace them with new syringes and continue filling syringes until all the cement is pushed out of the mixing device.

Disconnect the syringes from the manifold and attach adapters to all syringes apart from the red one. Do not inject any cement into the pedicle screw or bone at this point. For ease of injection, fix the attachable wings to the syringes.

**Note:** After filling the syringes, store them on a side table. Do not expose them to any heat source such as overhead lights, the heat from OR staff (e.g. hands), or the patient’s soft tissues. While testing the cement viscosity, ensure that the cement contained in the syringes is exposed to the same environmental temperature as the cement contained in the measuring cup of the Viscosafe Viscometer (see step 5).
5a
Test cement viscosity

Instrument

03.702.010        Viscosafe Viscosimeter

The use of the Viscosafe Viscometer is highly recommended.

1. Press the “ON” button
2. Wait approximately 30 seconds for the initialization phase
3. Ring tone and blinking “START/STOP” indicate that the viscometer is ready to measure

Connect the measuring cup (cement recipient) to the Viscosafe Viscometer.

Evenly dispense the cement from the red 3 ml syringe (marked “TEST”) into the measuring cup.

Close the cup with the lid.
Press the green blinking “START/STOP” button to activate the viscosity measurement. During the measurement, the “START/STOP” button continues blinking with a green light.

The light chain is now activated and the first steady red light is illuminated. The red lights on the chain indicate a cement viscosity too low for injection.

As soon as the first green light appears and the acoustic signal is emitted, the Viscosafe Viscometer indicates that the cements’ viscosity is sufficient for injection.

**Note:** For a second measurement press the “OFF” button, remove the used cup and repeat the procedure.

Alternative: The correct injection phase can be estimated by following the table in the “Instructions for use” of the “Vertecem Mixing Kit”.

**Note:** For details about the operation and maintenance of the Viscosafe Viscometer refer to the Operating Instructions (036.000.826).

Place the C-Arm in a lateral position to monitor the extrusion of the cement into the vertebral body.

Additional image intensifier control in the AP projection is recommended.
Option B: Cement handling with Vertecem V+

3b
Prepare cement

Implant

07.702.016S  Vertecem V+ Cement Kit

Hold the Vertecem V+ Cement Kit upright and gently tap with the finger tip at the top of the mixing device in order to ensure no cement powder sticks to the cartridge and transportation lid.

Note: During preparation, mixing and injection make sure to always handle the mixing device by gripping the blue part located directly below the transparent cartridge. If the transparent part is used as gripping surface, the excess body heat provided by the users hand might result in a shorter working time than intended.

Open the glass ampoule by breaking off its neck with the plastic cap 1. Then remove the transportation lid (seen in picture above) from the mixing device and dispose of it. Pour the full content of the ampoule 2 into the mixer and close it tightly with the separate mixing and transfer lid 3. Make sure that both mixing lid and the small sealing plug on top of it are securely tightened.

Notes
– Entire content must always be mixed.
– Using only one part of the components is not permitted.
– See also the quick step preparation technique on the inner packaging of the Vertecem V+ Cement Kit.
Open Approach

Grip the mixer by the blue part 1. Start mixing the Vertecem V+ cement by pushing and pulling the handle 2 from endpoint to endpoint 3 for 20 seconds (1-2 strokes per second). Perform the first few mixing strokes slowly with an oscillating-rotating movement (4 and 5 combined). Once properly mixed, the handle 2 must be left in its outmost position.
Once cement has been mixed using the "Vertecem V+ Cement Kit" remove the sealing plug and connect the stop cock. Use the side without the funnel when connecting the stop-cock to the mixer.

The handle in the initial position is turned 90° away from the mixer and the "off" sign is on the opposite side from the funnel. Ensure a tight fit between the stop-cock and mixing device, but avoid breakage of the stop-cock due to the application of excessive torque.

First, the air has to be removed from the system. Hold the cement mixer in a vertical position and gently turn its handle clockwise.

**Note:** Turn the handle clockwise to extrude cement from the mixer, do not push.

You will see the piston of the mixer advancing in the translucent cartridge and a steady flow of cement moving into the stop-cock. As soon as the cement is visible at the funnel end of the stop-cock, close the stop-cock by turning the handle ("off") toward the mixer (90°).
Open Approach

Attach a syringe to the stop-cock (funnel side). We highly recommend using the 2 cc syringes first. Open the stop-cock by turning the handle (90° turn), back to its original position.

Use slow, controlled turning movements on the mixer handle to fill the syringe. As soon as the syringe is filled turn the valve of the stop-cock again (90°) towards the mixer. The “off” sign is directed toward the mixer, stopping the cement flow.

**Note:** To transfer cement, simply rotate the handle. Do not push.
Disconnect the full syringe and attach the next one. Continue until all syringes are filled. Always fill all syringes.

5b
Proceed to step 6
6
Injection sequence

Option a: Simple adapter Instrument

**Instrument**

07.702.216.02S  Simple Adapter for perforated Pedicle Screws, with Luer-Lock, 2 pieces, sterile

Attach simple adapter onto the syringes.

Connect the syringe to the screw. Make sure the adapter is fully introduced into screw recess. Apply cement.

**Note:** Care should be taken when replacing of syringes is necessary, as cement can be left in the Stardrive of the screw.

Option b: Needle adapter kit Instrument

**Instrument**

03.702.224.02S  Needle Adapter Kit for perforated Pedicle Screws, with Luer-Lock, sterile

Connect the needle adapter to the screws. Make sure the adapter is fully introduced into screw recess. Screw syringe onto the Luer-Lock and apply the cement.

**Note:** Additionally, the cement in the adapter can be utilized using the corresponding plunger.
### Option c: Guide Sleeve and Locking needle adapter

#### Instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>03.631.020</td>
<td>Guide Sleeve for Pangea Augmentation</td>
</tr>
<tr>
<td>07.702.217.02S</td>
<td>Locking Needle Adapter Kit for perforated Pedicle Screws, with Luer-Lock, sterile</td>
</tr>
<tr>
<td>02.648.001</td>
<td>Cleaning Stylet for perforated Pedicle Screws</td>
</tr>
</tbody>
</table>

#### Notes

- Only the Locking Needle Adapter Kit with Luer-Lock should be used with the MIS Guide Sleeve for Pangea augmentation.
- Additionally, the cement in the Locking Needle Adapter can be utilized using the corresponding plunger.
- Do not augment more than four screws at once.
Open Approach

Assemble the two parts of the guide sleeve for Pangea augmentation until the red line disappears. The inner part needs to slide freely inside the outer part (1).

Click on the guide sleeve onto the screw. Make sure the guide sleeve is firmly clicked onto the screw (2). Slide cleaning stylet into assembly to clean screw channel. Confirm with the image intensifier that the cleaning stylet is fully inserted into screw (3). With the cleaning stylet fully inserted, screw in the inner part completely to achieve a firm connection of the guide sleeve with the screw (4).

Remove the cleaning stylet and introduce the locking needle adapter into the guide sleeve, locking it with a clockwise turn (5)
1. As soon as the acoustic signal is emitted and the first green light is illuminated, connect the syringes with respective adapters (see option a, b and c) to the pedicle screws to be augmented.

2. Inject as much cement as required under image intensifier control until the cement slowly starts to extrude from the perforations.

**Note:** Ensure that no cement leakage occurs outside the intended area. Stop the injection immediately if leakage occurs.

3. Continue to add cement to each screw using continuous image intensifier control. A growing cloud pattern should form. If a spider web-like pattern forms, wait approximately 30 to 45 seconds or proceed with another screw and return to the present screw later.

4. If more cement is needed or the injection pressure is too high, switch to the 1 ml syringes. Start again with the first screw. Augmentation is complete when each screw has been augmented with a total cloud volume of approximately 2 to 3 ml.

5. After injection is made using the locking needle adapter or the needle adapter, the cleaning stylet should be used to create a cement backflow recess. Remove the syringe or plunger from the adapter and insert the cleaning stylet. Use image intensifier to confirm that the tip of the cleaning stylet protrudes through the tip of the adapter.

**Note:** Do not remove or replace syringes immediately after injection. This avoids cementing the screw drive and the patients’ soft tissue. The longer the syringe remains connected to the screw, the lower the risk is of undesired cement flow.
Warning: The cement flow follows the path of least resistance. Therefore it is mandatory during the whole injection procedure, to maintain real-time image intensifier control in the lateral projection. In case of unexpected cloud forming patterns or if the cement is not clearly visible, the injection must be stopped.

Warning: Any cement remaining in the screw drive must be removed with the cleaning stylet while it is still soft (or has not hardened yet). This will ensure that future revision surgeries remain possible.

Note: Wait until the cement has cured before removing adapters and continuing with the instrumentation (about 15 minutes after last injection).
Notes and Warnings

Cement leakage
A major risk performing screw augmentation is cement leakage. By respecting the steps of the surgical technique the complication rate is minimized.

Cement injection might cause fat embolism due to bone marrow being pushed into the blood circulation. Therefore, the amount of cement injected during surgery should be limited to approximately 25 ml and less if the patient shows severe compromised cardiovascular function. Furthermore, systemic reactions during cement injection can occur as a consequence of cement monomer release.

If significant leakage occurs, the procedure has to be stopped. Return the patient to the ward and assess the patients' neurological situation. In case of compromised neurological functions an emergency CT scan should be performed to assess the amount and location of the extravasation. If applicable, an open surgical decompression and cement removal may be performed as an emergency procedure.

Extravasation
In order to minimize the risk of extravasation, it is strongly recommended to follow the described surgical technique, i.e.:

– Use a Kirschner wire for pedicle screw placement
– Use a high-quality C-arm in lateral position
– Use Synthes' Vertecem cement only

Additionally, image intensifier control in the AP projection is recommended.

Leakage outside the vertebra
If leaking outside the vertebra is recognized, the injection has to be stopped immediately. Wait for 45 seconds. Slowly continue with the injection. Due to faster curing in the vertebral body, the cement occludes the small vessels and the filling can be accomplished. Amounts of cement of approximately 0.2 ml are recognizable. If filling cannot be performed as described, stop the procedure.
Notes and Warnings

**Leakage into the spinal canal**
Stop the injection. If the cement amount is very small, you may proceed as described in step 6.

**Fracture**
The risk of a fracture at adjacent levels appears to be increased after cement reinforcement. Patients and their doctors should therefore be made aware that if new pain occurs, a new fracture may have occurred. Radiological control should be performed and, if necessary, further reinforcement should be considered – in such cases also including the adjacent vertebrae. All patients with osteoporotic fractures should be evaluated and treated by an osteologist or their family doctor and, if applicable, receive systemic treatment with vitamin D and bisphosphonates.

**Pregnancy**
There is no safety data regarding the use of Vertecem in children, during pregnancy or during lactation. There is inadequate information to determine whether this material might affect fertility in humans or produce teratogenic or other adverse effects on the fetus.

**Screw size**
Preoperative planning and selection of the appropriate screw length and diameter is important. In the average lumbar spine ø 6.0 mm screws are recommended, as scientific papers report a higher rate of pedicle perforation using ø 7.0 mm screws.

**Placement of pedicle screw**
Pangea Perforated should be placed in approximately 80% of the vertebral body (see step 1).
Attach construct

Continue with chapter rod insertion, close construct and final tightening from the Pangea Degenerative Spine System technique guide (036.000.445).

**Note:** Prior to performing correction maneuvers ensure that the cement is fully hardened.

**Warning:** Distraction/compression might lead to loosening of the augmented screws resulting in construct failure.
Minimal Invasive Approach Using SpiRIT

Instruments

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<th>Code</th>
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<td>01.631.001</td>
<td>SpiRIT Set in Vario Case</td>
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<tr>
<td>01.631.004</td>
<td>MIS Rods, radius 200 mm, in Vario Case</td>
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<tr>
<td>01.631.005</td>
<td>SpiRIT Additional Instruments in Vario Case</td>
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<tr>
<td>01.624.103</td>
<td>Cannulated Instruments for Pedicle Preparation in Vario Case</td>
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<tr>
<td>07.702.210</td>
<td>Viscosafe Injection kit</td>
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<tr>
<td>03.702.010</td>
<td>Vertecem Mixing Kit</td>
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<td>03.631.020</td>
<td>Guide Sleeve for Pangea Augmentation</td>
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<tr>
<td>07.702.217.025</td>
<td>Locking Needle Adapter Kit for perforated Pedicle Screws, with Luer-Lock, sterile</td>
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</tbody>
</table>

Open/prepare pedicles and insert screws as defined in chapter Kirschner wire and screw insertion from the SpiRIT with Cannulated Pangea Polyaxial Screws technique guide (036.000.987). Please refer also to the general recommendations on Kirschner wire handling.

Continue with step 2–6 from the open approach using the guide sleeve for Pangea augmentation.
Instructions of use: Guide Sleeve for Pangea Augmentation and locking needle adapter.

Assemble the two parts of the guide sleeve for Pangea augmentation until the red line disappears. The inner part needs to slide freely inside the outer part (1).

Introduce the guide sleeve into the SpiRIT holding sleeve and click the guide sleeve into the screw head (2). Make sure the guide sleeve is firmly clicked onto the screw. Slide cleaning stylet with assembly to clean screw channel. Confirm with image intensifier that the cleaning stylet is fully inserted into screw. Screw in the inner part completely to achieve a firm connection of the guide sleeve to the screw.

Remove the cleaning stylet and introduce the locking needle adapter into the guide sleeve, locking it with a clockwise turn (3).

Attach the pre-filled syringe onto the Luer-Lock and inject the cement under image intensifier control (4).

**Note:** Additionally, the cement in the adapter can be utilized using the corresponding plunger.

After injection is made using the locking needle adapter, the cleaning stylet should be used to create a cement backflow recess. Remove the syringe or plunger from the adapter and insert the cleaning stylet (5). Use image intensifier to confirm that the tip of the cleaning stylet protrudes through the tip of the adapter (6).

After the cement has cured (approximately 15 minutes) continue with the step rod insertion, locking cap insertion and final tightening from the technique guide SpiRIT with Cannulated Pangea Polyaxial Screws (036.000.987).

**Note:** Prior to performing correction maneuvers ensure that the cement is fully hardened.

**Warning:** Distraction/compression might lead to loosening of the augmented screws resulting in construct failure.
## Implants

### Perforated Pangea pedicle screws, preassembled

<table>
<thead>
<tr>
<th>Art No.</th>
<th>Length (mm)</th>
<th>Description</th>
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<tbody>
<tr>
<td>04.648.535-555S</td>
<td>35–55</td>
<td>Pedicle Screw, Perforated Pangea Polyaxial Ø 5.0 mm, preassembled, Titanium Alloy (TAN), sterile</td>
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<td>04.648.635-665S</td>
<td>35–65</td>
<td>Pedicle Screw, Perforated Pangea Polyaxial Ø 6.0 mm, preassembled, Titanium Alloy (TAN), sterile</td>
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<tr>
<td>04.648.735-765S</td>
<td>35–65</td>
<td>Pedicle Screw, Perforated Pangea Polyaxial Ø 7.0 mm, preassembled, Titanium Alloy (TAN), sterile</td>
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All screw lengths available in 5 mm increments.

### Locking Cap Pangea Titanium Alloy (TAN)

<table>
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<tr>
<td>04.620.000</td>
<td>Lock-Cap, Pangea, Titanium Alloy (TAN)</td>
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### Rods, Titanium

<table>
<thead>
<tr>
<th>Ø 6.0 mm rods, curved, Pure Titanium</th>
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<tbody>
<tr>
<td>Lengths 35 mm to 85 mm in 5 mm increments reduce the need to contour or cut</td>
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### MIS Rods 6.0 mm, curved, normalized, Pure Titanium

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### Instruments

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<td>03.620.220</td>
<td>Screwdriver Shaft Stardrive, T25 cannulated with Hexagonal coupling, Ø 6.0 mm</td>
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<tr>
<td>03.631.020</td>
<td>Guide Sleeve for Pangea Augmentation</td>
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<td>02.648.001</td>
<td>Cleaning Stylet for perforated Pedicle Screws</td>
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### Augmentation Material for Vertecem

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<td>07.702.210</td>
<td>Viscosafe Injection Kit</td>
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<td>07.702.010</td>
<td>Vertecem Mixing Kit; including 1 × Vertecem Mixer, 1 × Monomer glass ampoule</td>
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<tr>
<td>03.702.010</td>
<td>Vertecem Mixing Kit</td>
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03.720.011  Printer for Viscosafe Viscometer

**Augmentation Material for Vertecem V+**

07.702.016S  Vertecem V+ Cement Kit
- Containing:
  - 1 × Vertecem V+ Mixer prefilled with cement powder
  - 1 × Monomer glass ampoule

07.702.215S  Vertecem V+ Syringe Kit
- Containing:
  - 8 × Blue 1 cc syringes
  - 5 × White 2 cc syringes
  - 1 × one-way stop cock

07.702.216.02S  Simple Adapter for perforated Pedicle Screws, with Luer-Lock, 2 pieces, sterile

07.702.224.02S  Needle Adapter Kit for perforated Pedicle Screws, with Luer-Lock, sterile

07.702.217.02S  Locking Needle Adapter Kit for perforated Pedicle Screws, with Luer-Lock, sterile
## Sets and Vario Cases

### Instruments Open Approach

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<td>105.078</td>
<td>Instrument Set for Pedicle Preparation Set, in Vario Case</td>
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<td>Pangea Basic Instruments (part 1) in Vario Case</td>
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### Optional Instruments

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<td>Pangea Basic Instruments in Vario Case</td>
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<td>01.624.103</td>
<td>Cannulated Instruments for Pedicle Preparation in Vario Case</td>
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<tr>
<td>01.622.005</td>
<td>Pangea Polyaxial Implants in Vario Case</td>
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<td>Instrument Set for perforated Pangea Pedicle Screws</td>
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### Instruments Minimal Invasive Approach using SpiRIT

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<td>SpiRIT Set in Vario Case</td>
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<td>01.631.004</td>
<td>MIS Rods, radius 200 mm, in Vario Case</td>
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<td>SpiRIT Additional Instruments in Vario Case</td>
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<tr>
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<td>Cannulated Instruments for Pedicle Preparation in Vario Case</td>
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Bibliography

Augmentation of pedicle screws
