Spring Plates 3.5. Reduction and fixation of small bone fragments.

Surgical Technique

This publication is not intended for distribution in the USA.

Instruments and implants approved by the AO Foundation.

DePuy Synthes

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Image intensifier control

This description alone does not provide sufficient background for direct use of DePuy Synthes products. Instruction by a surgeon experienced in handling these products is highly recommended.

Processing, Reprocessing, Care and Maintenance
For general guidelines, function control and dismantling of multi-part instruments, as well as processing guidelines for implants, please contact your local sales representative or refer to:
http://emea.depuysynthes.com/hcp/reprocessing-care-maintenance
For general information about reprocessing, care and maintenance of Synthes reusable devices, instrument trays and cases, as well as processing of Synthes non-sterile implants, please consult the Important Information leaflet (SE_023827) or refer to:
http://emea.depuysynthes.com/hcp/reprocessing-care-maintenance

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Spring Plates 3.5

Description
In pelvic and acetabular surgery, it is often difficult to reduce and fix small bone fragments. The Spring Plates 3.5 are intended to reduce and stabilize bone fragments that are too small for screws. They can be used individually or in conjunction with a 3.5 mm reconstruction plate.

Features

– **Two sharp spikes on the bottom surface**
Sharp spikes on the bottom surface capture small fragments.

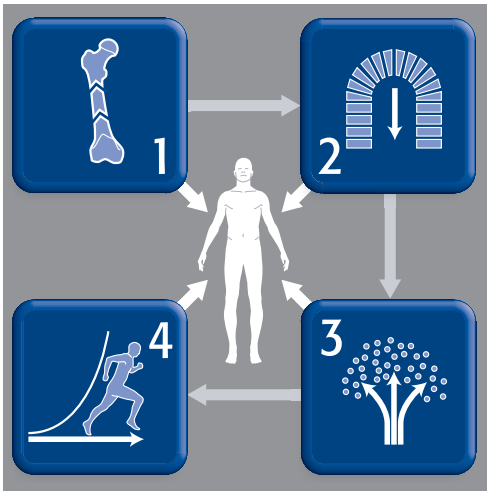
– **Pre-bent convex plate shape**
The insertion of screws into the preloaded plate reduces and compresses the fragments.

AO Principles

In 1958, the AO formulated four basic principles, which have become the guidelines for internal fixation[1,2].

Anatomic reduction
Fracture reduction and fixation to restore anatomical relationships.

Early, active mobilization
Early and safe mobilization and rehabilitation of the injured part and the patient as a whole.



Stable fixation
Fracture fixation providing absolute or relative stability, as required by the patient, the injury, and the personality of the fracture.

Preservation of blood supply
Preservation of the blood supply to soft tissues and bone by gentle reduction techniques and careful handling.

[1] Müller ME, Allgöwer M, Schneider R, Willenegger H. Manual of Internal Fixation. 3rd ed. Berlin, Heidelberg, New York: Springer. 1991.
[2] Rüedi TP, Buckley RE, Moran CG. AO Principles of Fracture Management. 2nd ed. Stuttgart, New York: Thieme. 2007.

Intended Use, Indications, Contraindications

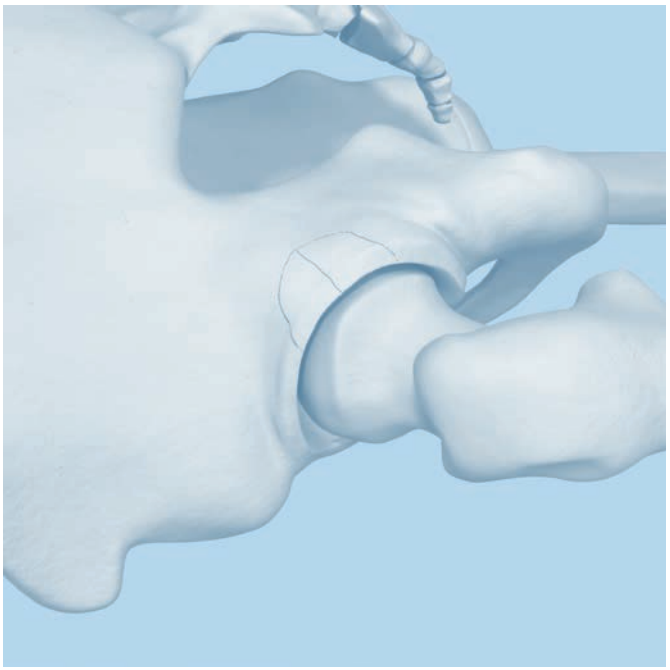
Intended use
Pelvic implants are intended for temporary fixation, correction or stabilization of bones in the pelvis.

Indications
The Synthes 3.5 mm Spring Plate is intended for pelvic and acetabular reconstructive surgery.

Contraindications
No specific contraindications.

Clinical Problem and Preoperative Planning

Clinical problem
This image represents an example of a posterior wall fracture of the acetabulum with two small fracture fragments for which the Spring Plate would be recommended.



Preoperative planning
Implantation of the Spring Plate can be performed using one of the four following sets:

01.100.013	Low Profile 3.5 Pelvic Instrument Set
181.600	Basic Pelvic Instrument Set
182.415	LCP Compact Small Fragment Instrument Set
182.456	Instrument Set LC-DCP

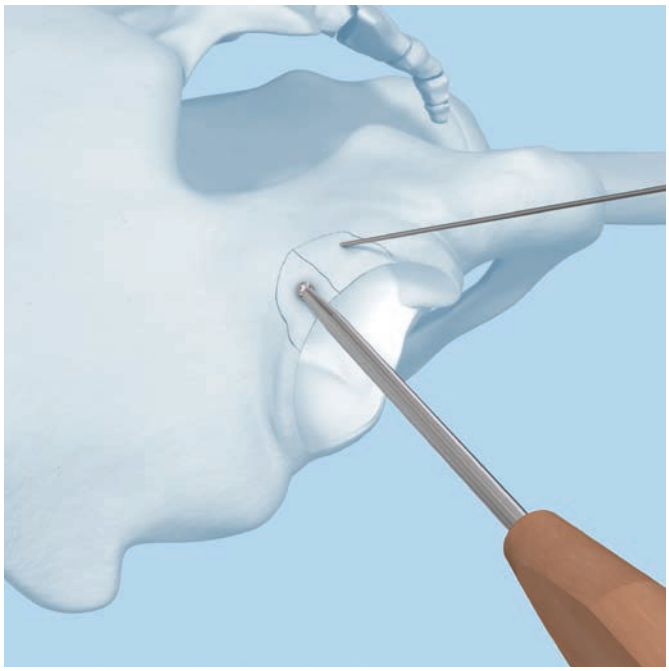
Precautions:
- Instruments and screws may have sharp edges or moving joints that may pinch or tear user's glove or skin.
- Handle devices with care and dispose worn bone cutting instruments in an approved sharps container.

1
Temporary fixation

Instruments	
292.160	Kirschner Wire ∅ 1.6 mm with trocar tip
03.100.018	Ball Spike

Reduce and fix the fracture fragment with Kirschner wires or an appropriate reduction instrument with pointed ball tips, such as a ball spike.

Precaution: While placing the Kirschner wires, pay attention that they will not interfere with the Spring Plate later.



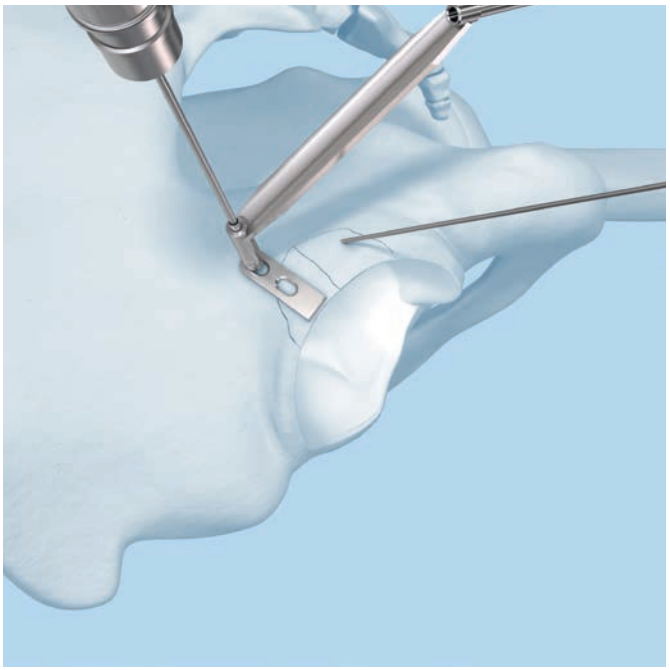
2
Place Spring Plate

Place a Spring Plate of appropriate length so that the spikes engage in the fracture fragment. Check plate placement by holding the plate or fracture fragment with an appropriate reduction instrument with pointed ball tips.

3
Drill screw hole

Instruments	
315.920 or 324.210 or 397.342	Drill bit, ∅ 2.5 mm
323.360	Universal drill guide

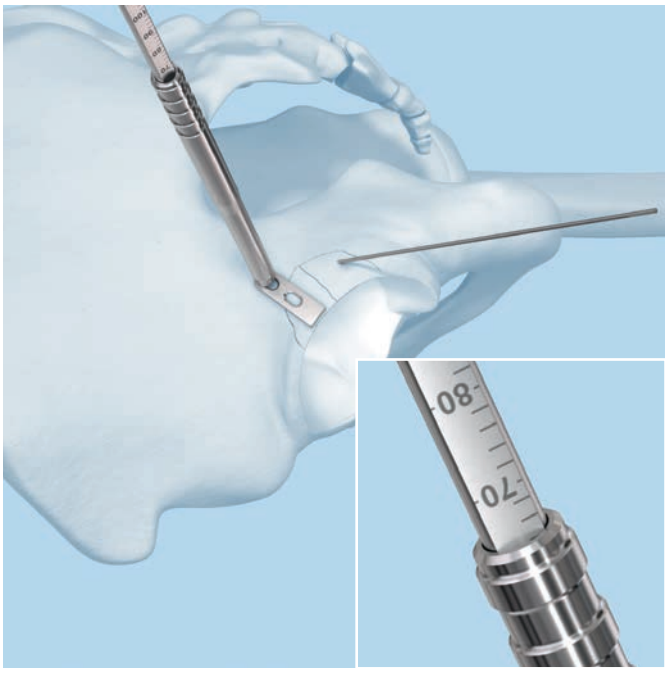
Drill a hole for a 3.5 mm cortex, a 3.5 mm pelvic cortex or a 4.0 mm cancellous bone screw using a 2.5 mm drill bit in combination with the universal drill guide.



4
Determine screw length

Instrument	
319.091 or 319.010	Depth Gauge

Use depth gauge to determine the correct screw length.

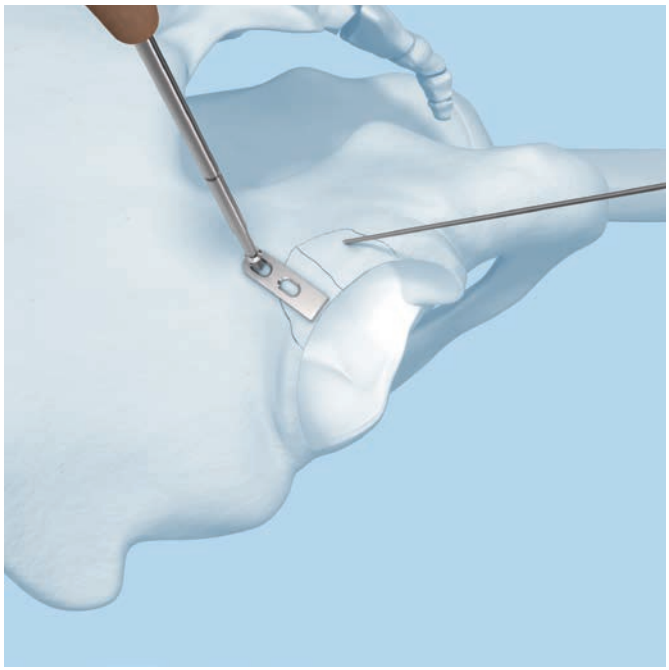


5
Insert screw

Instrument	
314.570	Screwdriver, hexagonal, small, ∅ 2.5 mm, length 270 mm

Insert a 3.5 mm cortex, a 3.5 mm pelvic cortex or a 4.0 mm cancellous bone screw of appropriate length. The "spring" effect of the plate may help to achieve the desired compression via spikes on the small fracture fragment.

Precaution: Check appropriate length and position of screw under image intensifier control.



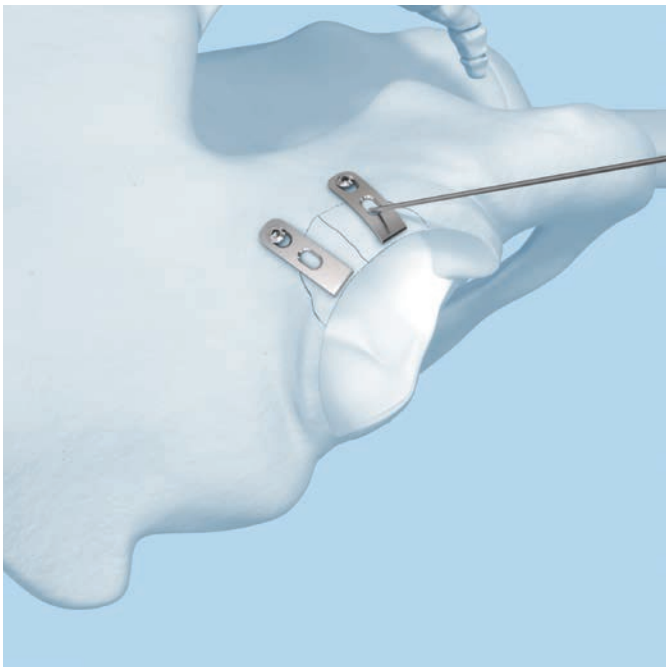
6

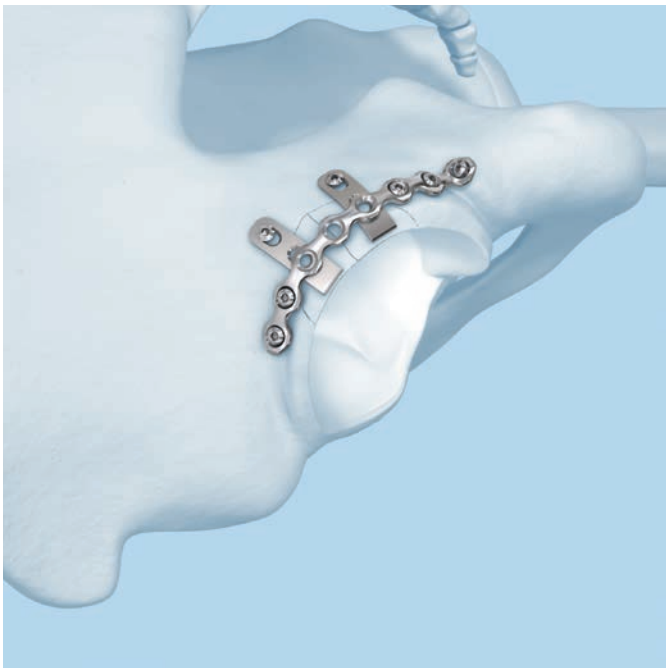
Option: Insert additional Spring Plate

If needed, a second Spring Plate can be placed. Repeat steps 1 to 5.

For further stability and additional compression to the construct, insert a reconstruction plate on top of the Spring Plates.

Note: This represents only one possible configuration for the placement of two 2-hole spring plates in a specific clinical situation.





Implant Removal

Unlock all screws from the plate, then remove the screws completely from the bone. This prevents simultaneous rotation of the plate when unlocking the last locking screw.

For details regarding implant removal, refer to the Surgical Technique "Screw Extraction Set" DSEM/TRM/0614/0104.

Implants

3.5 Spring Plates

– only available in stainless steel
– for sterile implants add suffix "S" to the article number

Art. No.	Description
02.100.301	Spring Plate 3.5, 1 hole, length 19.5 mm
02.100.302	Spring Plate 3.5, 2 holes, length 31.5 mm
02.100.303	Spring Plate 3.5, 3 holes, length 43.5 mm

Screws

The 3.5 Spring Plate can be used with 3.5 mm cortex screws, 3.5 mm pelvic cortex screws and 4.0 mm cancellous bone screws.

Art. No.	Description
204.810 – 204.848	Cortex Screws ∅ 3.5 mm, self-tapping, 10 – 48 mm (2 mm increments)
204.845 – 204.910	Cortex Screws ∅ 3.5 mm, self-tapping, 45 –110 mm (5 mm increments)
204.640 – 204.750	Pelvic Cortex Screws ∅ 3.5 mm, self-tapping, 40 –150 mm (5 mm increments)
206.010 – 206.060	Cancellous Bone Screws ∅ 4.0 mm, fully threaded, 10 – 60 mm

Kirschner wire

292.160	Kirschner Wire ∅ 1.6 mm with trocar tip

Instruments

314.570	Screwdriver, hexagonal, small, ∅ 2.5 mm, length 270 mm	
315.920 or 324.210 or 397.342	Drill bit, ∅ 2.5 mm	
319.091 or 319.010	Depth Gauge	
323.360	Universal drill guide	
03.100.018	Ball Spike	

Sets

Implantation of the Spring Plate can be performed using one of the four following sets:

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182.456	Instrument Set LC-DCP

Bibliography

Richter H, Hutson and Zych G (2004) The Use of Spring Plates in the Internal Fixation of Acetabular Fractures. J Orthop Trauma 2004. 18:179 –181.

Goulet J, Rouleau J, Mason D and Goldstein S. Comminuted Fractures of the Posterior Wall of the Acetabulum. A Biomechanical Evaluation of Fixation Methods. J Bone Joint Surg Am, Volume 76 - A(10), October 1994, pp 1457–1463.

MRI Information

Torque, Displacement and Image Artifacts according to ASTM F 2213-06, ASTM F 2052-06e1 and ASTM F 2119-07

Non-clinical testing of worst case scenario in a 3 T MRI system did not reveal any relevant torque or displacement of the construct for an experimentally measured local spatial gradient of the magnetic field of 3.69 T/m. The largest image artifact extended approximately 169 mm from the construct when scanned using the Gradient Echo (GE). Testing was conducted on a 3 T MRI system.

Radio-Frequency-(RF-)induced heating according to ASTM F 2182-11a

Non-clinical electromagnetic and thermal testing of worst case scenario lead to peak temperature rise of 9.5 °C with an average temperature rise of 6.6 °C (1.5 T) and a peak temperature rise of 5.9 °C (3 T) under MRI Conditions using RF Coils (whole body averaged specific absorption rate [SAR] of 2 W/kg for 6 minutes [1.5 T] and for 15 minutes [3 T]).

Precautions: The above mentioned test relies on non-clinical testing. The actual temperature rise in the patient will depend on a variety of factors beyond the SAR and time of RF application. Thus, it is recommended to pay particular attention to the following points:

- It is recommended to thoroughly monitor patients undergoing MR scanning for perceived temperature and/or pain sensations.
- Patients with impaired thermoregulation or temperature sensation should be excluded from MR scanning procedures.
- Generally, it is recommended to use a MR system with low field strength in the presence of conductive implants. The employed specific absorption rate (SAR) should be reduced as far as possible.
- Using the ventilation system may further contribute to reduce temperature increase in the body.

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