



## **FlowerPlate**

For Mediocarpal Partial Arthrodeses



In the field of hand surgery we not only offer you solutions for standard restorations, but also products for unusual and difficult situations. We therefore regard ourselves as being a true highly specialized partner in all matters relating to hand surgery with our intelligent system solutions.

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## **FlowerPlate**

### For Mediocarpal Partial Arthrodeses

Mediocarpal partial arthrodeses with Kirschner wires and the resulting plaster cast immobilization of the hand for a period of several weeks represent a considerable limitation for active patients.

Increased expectancy on the part of affected patients calls for the possibility of early mobilization with rapid restoration of normal function so patients are rehabilitated and can resume everyday life and work as soon as possible.

The FlowerPlate, an alternative method of performing medio-carpal partial arthrodeses, satisfies this expectancy and meets the requirements in every respect.

Due to its small size and delicate shape, which is ideally matched to the carpal bones, it enables optimal placement below bone level in order to avoid impingement at the dorsal edge of the radial bone. The free combinability of standard screws and multidirectional locking screws ensures optimal fixation and hence a stable connection with the bones – an ideal scenario for early mobilization and rapid rehabilitation.


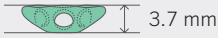
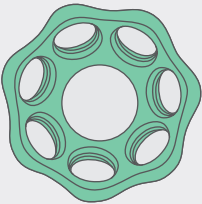
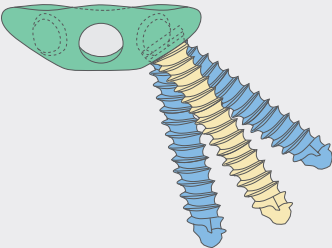
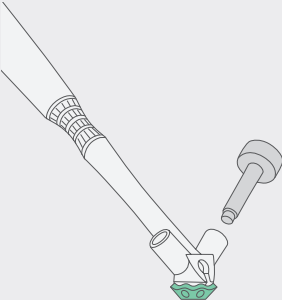
## Feature, Function and Benefit



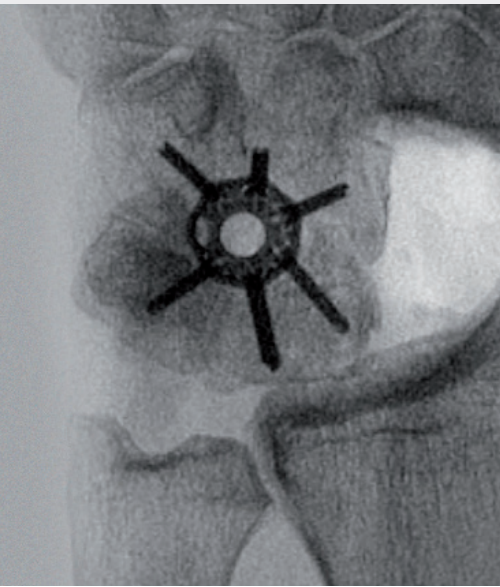
The FlowerPlate is impressive particularly because of its small size and delicate shape, which is ideally matched to the carpal bones. The two properties enable not only optimal placement of the plate but also positioning below bone level and minimization of the amount of bone to be removed – an ideal scenario to avoid painful impingement injuries at the dorsal edge of the radial bone.

Free use of standard screws and multidirectional locking screws in each plate hole also offers optimal fixation options to ensure a stable connection with the bones and hence promising prospects of regeneration.

# FlowerPlate

	Feature	Benefit
 <p>Scale 1:1</p>	<ul style="list-style-type: none"> <li>Small plate size and delicate, concave shape</li> </ul>	<ul style="list-style-type: none"> <li>Prevents impingement at the dorsal edge of the radial bone</li> <li>Can be positioned below bone level</li> </ul>
 <p>Scale 1:1</p>	<ul style="list-style-type: none"> <li>Low plate profile</li> </ul>	<ul style="list-style-type: none"> <li>Reduces the amount of bone to be removed</li> </ul>
	<ul style="list-style-type: none"> <li>Anatomical pre-shaped plate design</li> <li>Rounded, atraumatic plate contour</li> <li>Integrated center hole</li> </ul>	<ul style="list-style-type: none"> <li>Ideally matched to the carpal bones, thus enabling accurate positioning</li> <li>Optimal embedding in soft tissue with maximum preservation</li> <li>Enables the introduction of additional cancellous bone</li> </ul>
	<ul style="list-style-type: none"> <li>Multidirectional locking plate holes</li> </ul>	<ul style="list-style-type: none"> <li>Free combinability of standard screws and multidirectional locking screws in diameters 2.0 mm and 2.3 mm</li> <li>High intraoperative flexibility</li> <li>Optimal fixation with +/- 20° degree of angulation</li> <li>Stable connection with the bones</li> <li>Enables early mobilization and rapid rehabilitation</li> </ul>
	<ul style="list-style-type: none"> <li>Practical sterile kit including positioning instrument</li> </ul>	<ul style="list-style-type: none"> <li>Enables easy positioning and orientation of the plate</li> <li>Simplifies placement of the first two screws in lunate and capitate (FCF fusion)</li> <li>Enables drilling, determination of screw length, and introduction of the screw via integrated guides</li> </ul>

## Feature, Function and Benefit



The FlowerPlate can be fixated both with standard screws and with multidirectional locking screws in diameters 2.0 mm and 2.3 mm. The free combinability ensures optimal management and a stable connection with the bones so it provides an ideal scenario for early mobilization, rapid rehabilitation, and a painfree everyday life with maximum freedom of movement.

Clear identification of diameters is ensured with color-coded single clips.

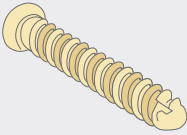
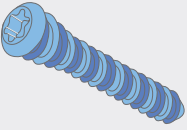
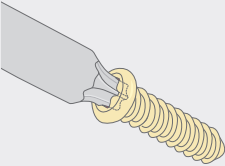
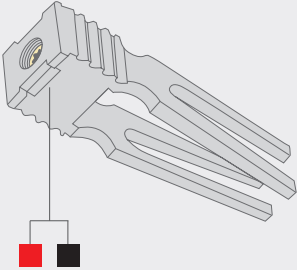
Color code	Screw diameter
Red	2.0 mm
Black	2.3 mm

Color-coded screws mean instant identification between standard and multidirectional locking screws, even when stored in the clip.

Color code	Screw	Diameter
Gold	Standard screw	2.0 mm / 2.3 mm
Blue	Locking screw	2.0 mm / 2.3 mm



## smartDrive® Screws

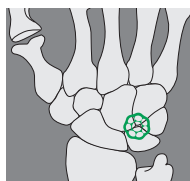
	Feature	Benefit
	<ul style="list-style-type: none"> <li>▪ Screw head and tip of atraumatic design</li> <li>▪ Double, self-tapping thread</li> </ul>	<ul style="list-style-type: none"> <li>▪ Secure and soft-tissue-friendly bicortical anchorage in the bone</li> <li>▪ Reduces screwing-in time by 50% and keeps the required effort to a minimum</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Multidirectional locking screws in diameters 2.0 mm and 2.3 mm</li> </ul>	<ul style="list-style-type: none"> <li>▪ Secure, multidirectional locking of the screw in the plate (+/- 20°)</li> <li>▪ Maximum deflection without soft tissue irritation</li> </ul>
	<ul style="list-style-type: none"> <li>▪ T6 with self-retaining function</li> </ul>	<ul style="list-style-type: none"> <li>▪ Easy pick-up, insertion, tightening or removal of the screw</li> <li>▪ Direct force transfer from the screwdriver blade to the screw</li> <li>▪ Optimal synergy of handling and force transfer</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Color-coded single clip</li> </ul>	<ul style="list-style-type: none"> <li>▪ Clear assignment of the appropriate screw diameter</li> <li>▪ Direct, swift and application-oriented access</li> <li>▪ 100% batch traceability</li> <li>▪ Chargeable individually</li> <li>▪ Easy recording of all implant data</li> </ul>

## Step by Step to Optimal Fixation

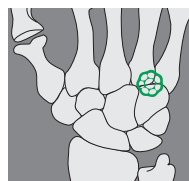
### Fields of Use

The FlowerPlate is used for the treatment of degenerative or posttraumatic carpal arthroses that has arisen due to instability or carpal collapse following scaphoid pseudarthrosis (SNAC wrist) or following rupture of the scapholunate ligament (SLAC wrist).

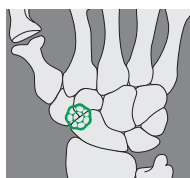
It can also be used following failed partial arthrodeses (using K-wires) and for complex fractures in the intercarpal region.



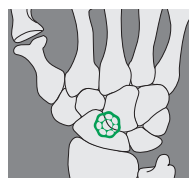
FCF fusion



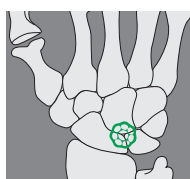
CMC fusion



STT fusion



SC fusion



SLC fusion

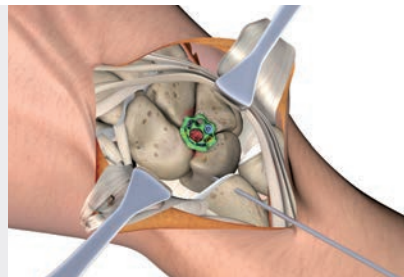


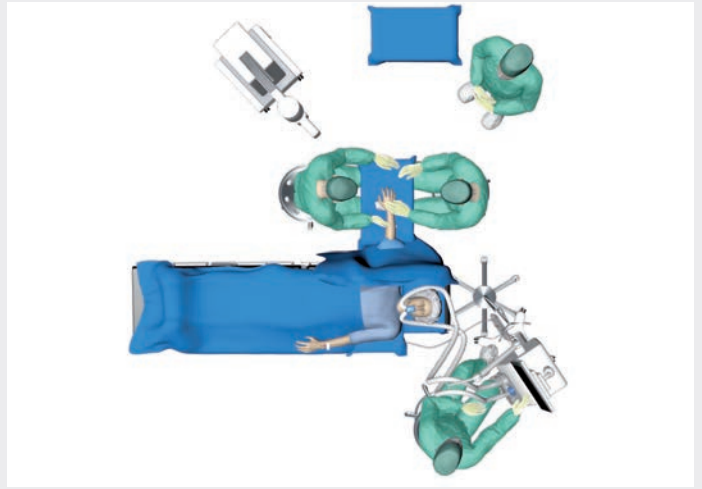
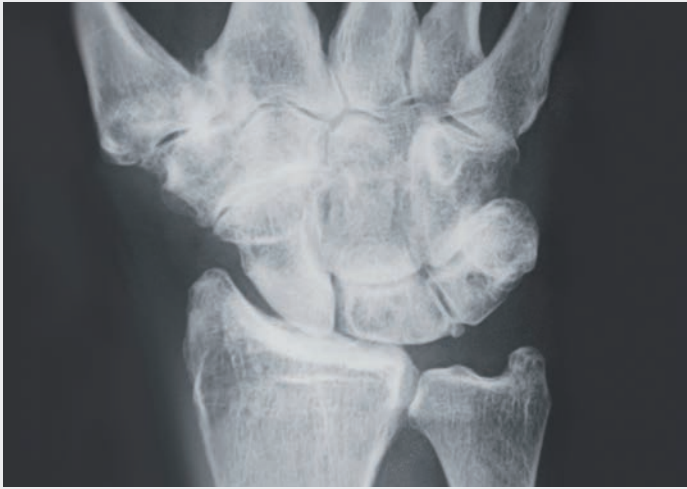
## Surgical Technique

### **Four Corner Fusion**

Treatment with the FlowerPlate  
Prof. H. Krimmer

Pages 12 - 21





### Preoperative planning

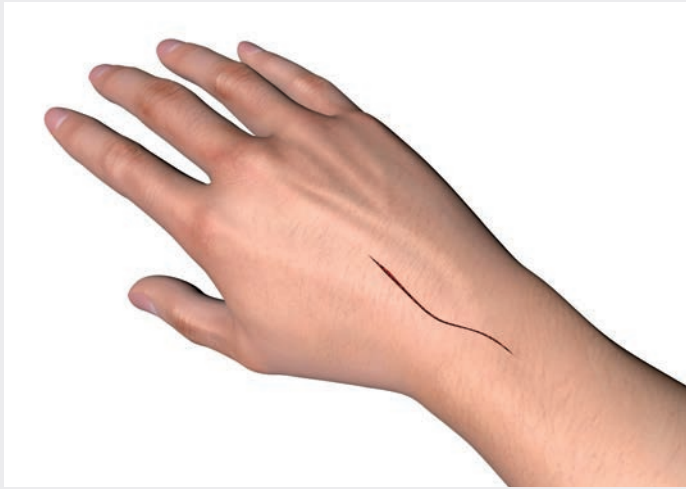
Standard exposures are made of the wrist in the neutral position with an A/P and lateral beam.

*Note:*

*The technique involves removal of the scaphoid and arthrodesis of lunate, capitate, hamate, and triquetrum. With this operation special attention must be paid to exact reduction of capitate and lunate in order to ensure proper wrist alignment and bone consolidation.*

### Patient positioning

The patient is placed in the supine position on the operating table. The hand to be operated on is placed in the pronation position of the lower arm on the hand side table, with complete deprivation of blood in the upper arm. The wrist is supported with a rolled-up towel.



### 1. Approach

Opening is performed by making a slightly curved incision, about 6 cm long, above the dorsal wrist.



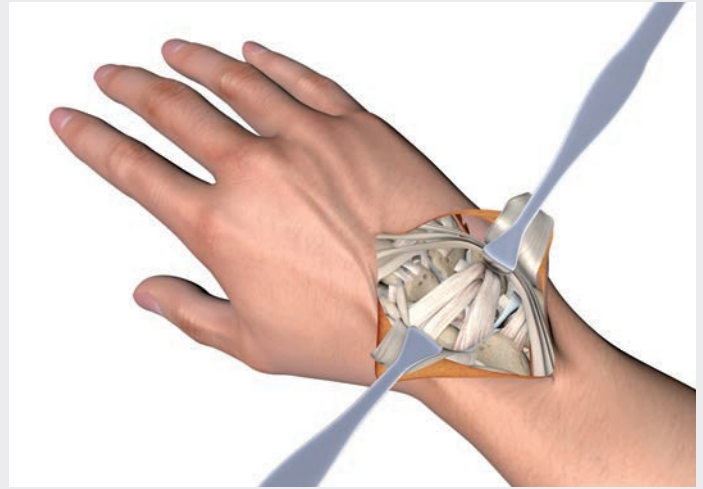
### 2. Exposure of the extensor tendon retinaculum

After skin incision the extensor tendon retinaculum is exposed.



### 3. Opening of the extensor tendon compartments

After release of the retinaculum the third extensor tendon compartment is opened toward radial and ulnar. The second and fourth extensor tendon compartment are also exposed.



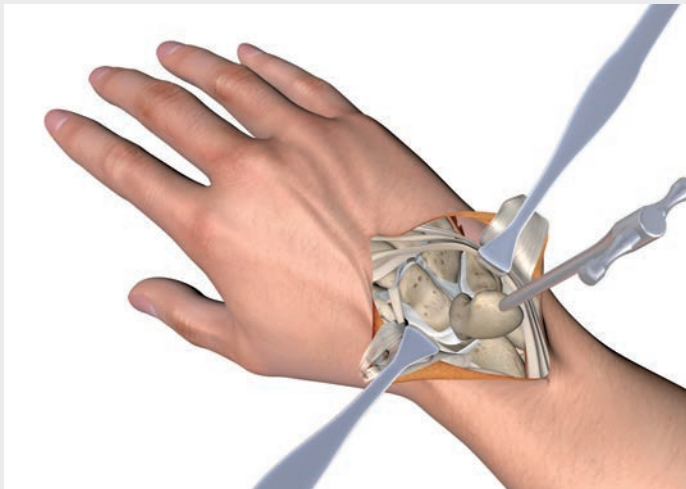
### 4. Opening of the wrist capsule

The second extensor tendon compartment is held aside toward radial and the fourth extensor tendon compartment is held aside toward ulnar.

The dorsal interosseous nerve is exposed and extensively resected.

The wrist capsule is opened transversely in the direction of the dorsal ligaments, preferably through the pedunculated capsular ligamentous flaps according to Bishop and Berger.

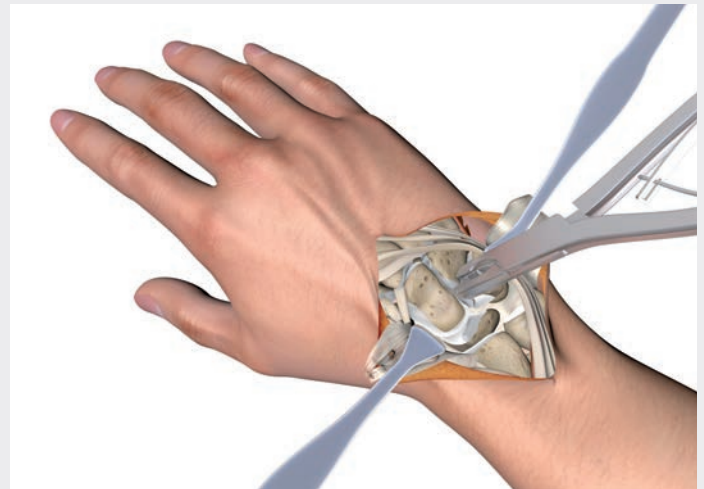




### 5. Excision of the scaphoid

The scaphoid is exposed and removed in its entirety. In doing so, injury of the palmar ligaments must be prevented.

Removal of the scaphoid can optionally be performed with the aid of the CarpalStick, which, like a corkscrew, grips deeply into the structure of the bone. In this way high forces can be transferred to the threads of the instrument via the T-handle during removal.

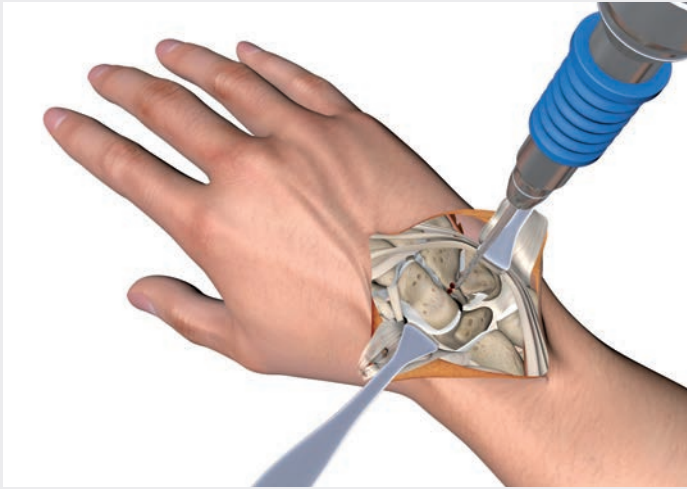


### 6. Cartilage removal

The four bones to be fused, lunate, capitate, hamate, and triquetrum, are exposed. To enable them to grow together optimally, cartilage is removed from the individual articular surfaces using a Luer rongeur until the cancellous structures are reached.



CarpalStick

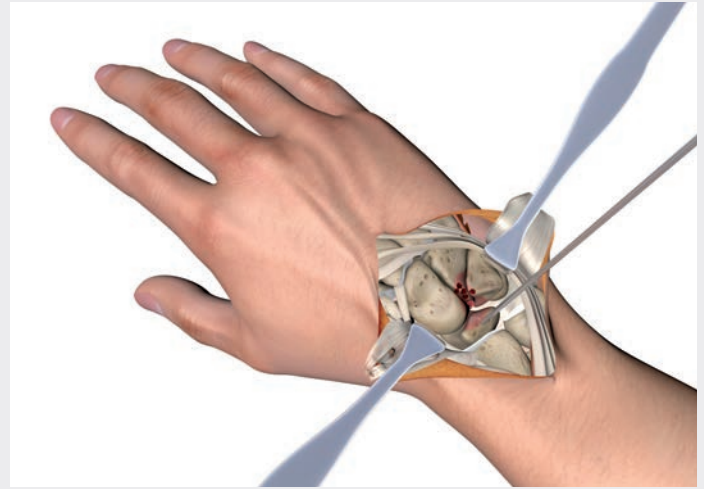


### 7. Preparation of the bone bed

When all the cartilage has been removed, the bony structures are freshened slightly. For this purpose a 1.5 mm diameter core hole drill can be used.

The base of the four bones to be fused is filled up with cancellous bone removed from the distal radius.

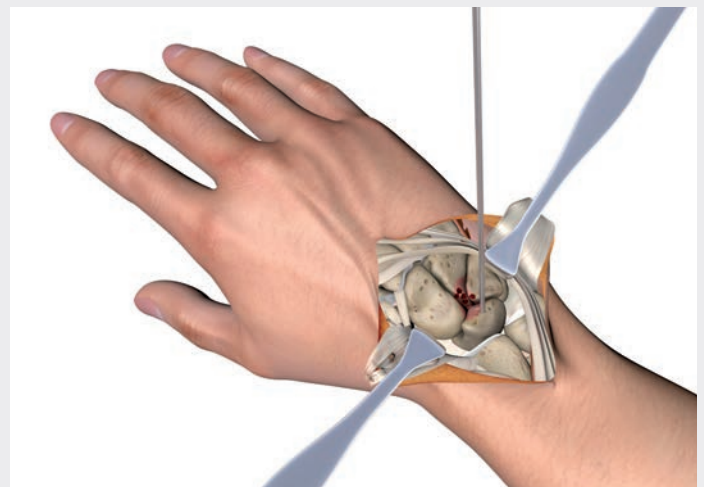
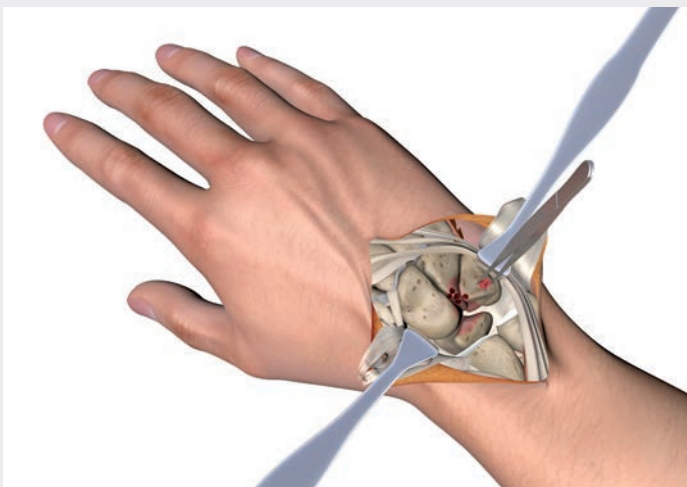
Alternatively, it is also possible to use cancellous bone harvested from the scaphoid or iliac crest.



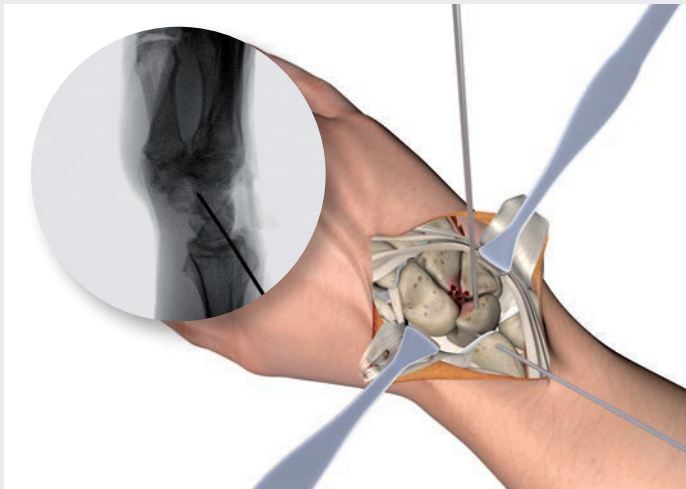
### 8. Reduction of rotational deformities

Existing deformities, such as instability-related rotation of the individual carpal bones, are reduced. Alignment of the lunate is particularly important.

If necessary, the bones can be aligned by introducing a K-wire according to the joystick method.







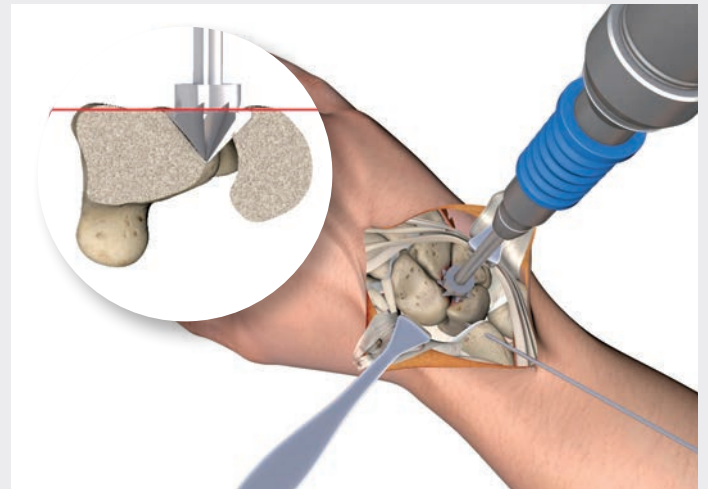
### 9. Temporary fixation

Under x-ray control, the radius, lunate, and capitate are fixated temporarily using a Kirschner wire. Care must be taken to ensure that the Kirschner wire is placed as palmar as possible in order to avoid hindrances when reaming.

Alternatively, capitate and lunate can be fixated percutaneously from distal.

*Note:*

*Temporary fixation reduces displacement when reaming. In addition, the resistance for the reamer is higher so a uniform, circular implant bed can be created.*



### 10. Reaming of the implant bed

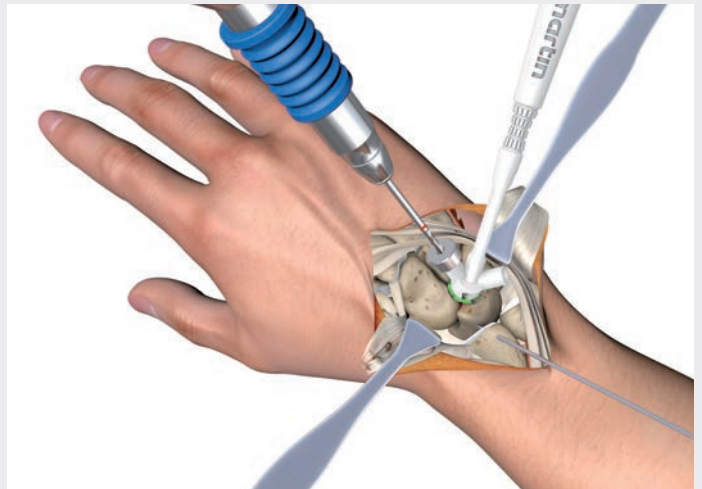
The self-centering reamer is placed over the four carpal bones to be fused, lunate, capitate, hamate, and triquetral. Ideally, the position is selected slightly distal in order to avoid impingement at the dorsal edge of the radial bone during extension of the wrist.

If necessary, the 1.5 mm diameter core hole drill can be used to pre-drill a minimum grit size for the tip of the reamer (2 mm max.) in order to facilitate correct placement of the reamer.

The bone surface is prepared with the reamer until the edge of the reamer is flush with the dorsal bone surface. The FlowerPlate is inserted for a trial in order to check the depth of the implant bed. This ensures that the plate can be positioned below bone level.



Reamer



### 11. Placement of the FlowerPlate

The FlowerPlate is introduced using the positioning instrument and aligned in such a way that one screw can be placed in the lunate and one in the capitate.

*Note:*

*For optimal screw placement there are two screws in the lunate, one screw in the triquetral, two screws in the capitate, and one screw in the hamate.*

*The standard length is usually 10 -16 mm.*

### 12. Drilling the first core hole

For the drilling procedure the drill sleeve is first inserted in the drill guide of the positioning instrument leading to the lunate. The core hole drill is introduced via the opening of the drill sleeve and placed on the bone.

That is followed by monocortical pre-drilling. After drilling, the drill sleeve is removed.



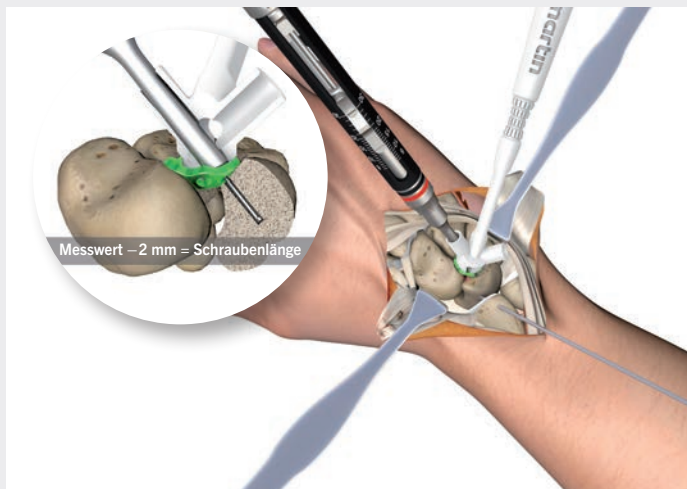
FlowerPlate sterile kit



FlowerPlate



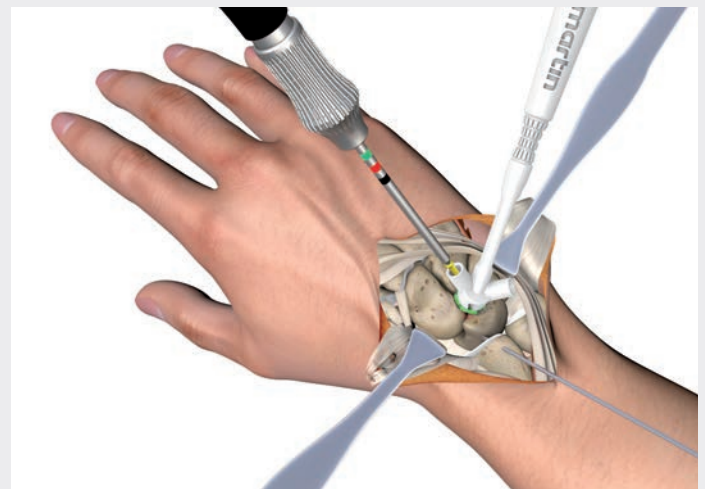
Core hole drill Ø 1.5 mm



### 13. Determination of screw length

Correct screw length is determined with the depth gauge, which is used for screw diameters 2.0 mm and 2.3 mm. The depth gauge is introduced via the opening in the drill guide.

The screw selected must be 2 mm shorter than the value measured with the depth gauge.



### 14. Placement of the first screw

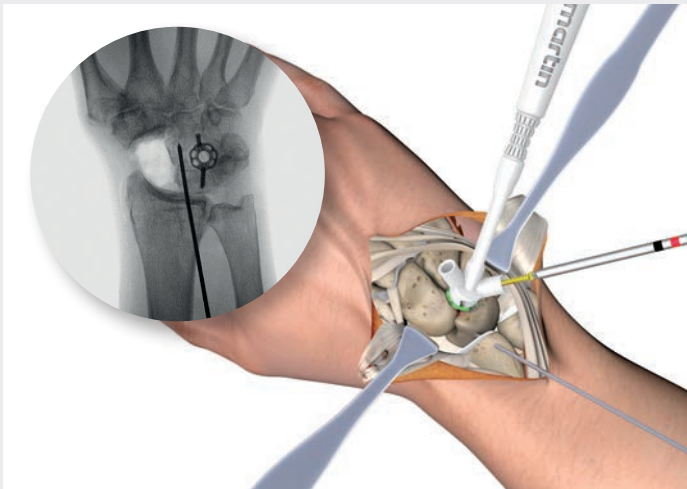
The plate is first fixated in the lunate with a standard screw. For this purpose the screw is picked up with the color-coded screwdriver, which is used for the two diameters 2.0 mm and 2.3 mm, and driven into the bone via the opening in the drill guide.



Depth gauge 2.0 mm, 2.3 mm

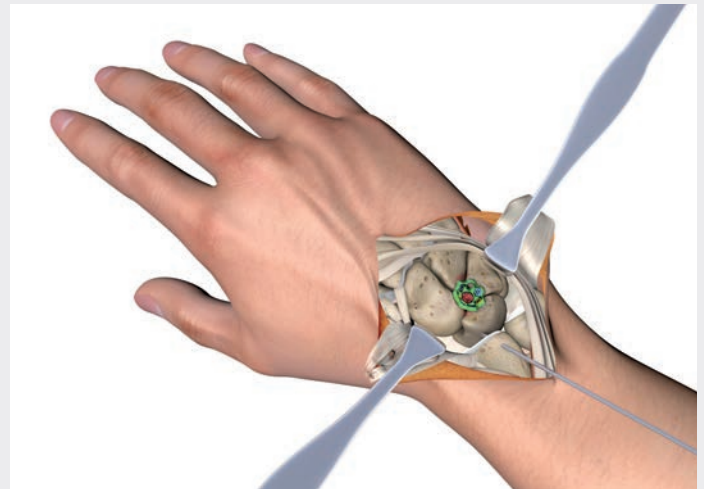


T6 screwdriver



### 15. Placement of the second screw

Successful implantation of the first screw in the lunate is followed by fixation of the plate in the capitate. For this purpose the drill sleeve is first inserted in the drill guide leading to the capitate. The second standard screw is then placed by means of the technique described in steps 12-14. At this point it is advisable to subject the plate to a radiological and functional check. Following a successful check and secure fixation of the two first screws the positioning instrument is removed.

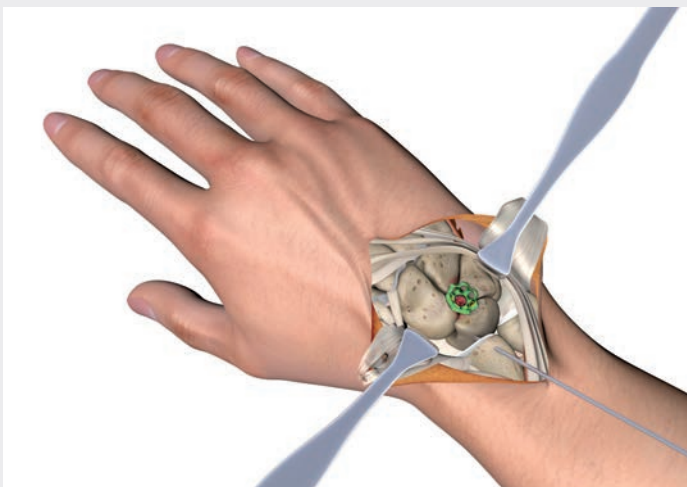


### 16. Placement of further screws

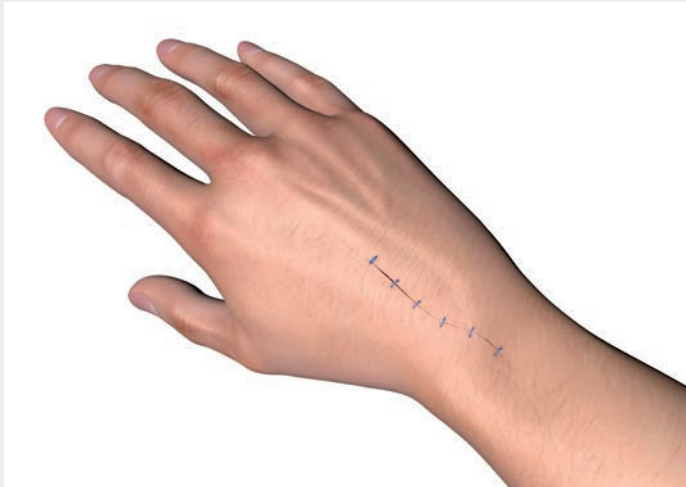
To achieve adequate stability more plate holes are filled with screws. Optionally, multidirectional locking screws can be used to increase stability. The procedure for this is described in steps 12-14, although the drilling is performed without the drill guide or drill sleeve.

If necessary, the two standard screws can also be replaced by multidirectional locking screws.

As required, more cancellous bone can be introduced via the circular opening at the center of the plate.



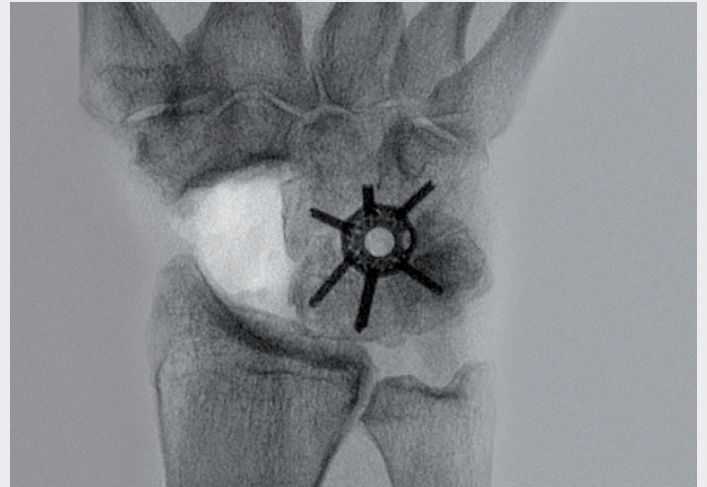
T6 screwdriver



### 17. Wound closure

After irrigation and cleaning of the wound the capsular and ligamentous structures are carefully restored.

That is followed by skin suture.



### 18. After-treatment

After skin closure a final x-ray image is made.

Following surgery, the patient should wear, for protection, a forearm splint that allows active finger movement, for about 4 weeks. Physical therapy can commence 2 weeks after surgery, wearing the splint.

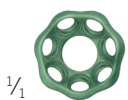
With regular x-ray exposures the progress of desired fusion is checked prior to the resumption of normal activities.

## FlowerPlate Implantats

FlowerPlate  
7-hole  
Profile height 3.7 mm

FlowerPlate sterile kit  
consisting of:

- FlowerPlate
- Positioning instrument
- Drill sleeve



1/1

26-130-07-09

26-130-07-71

STERILE | R



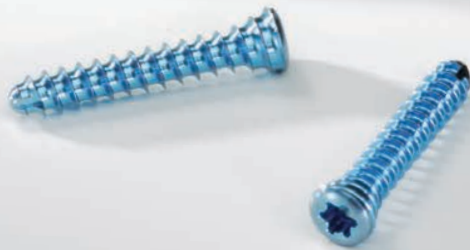
= 1.2 mm








1/2

26-130-17-71




STERILE | R






Explanation of icons

-  Screw diameter 2.0 mm
-  Screw diameter 2.3 mm
-  Titanium
-  T-Drive
-  Packaging unit

**STERILE R** Sterile packaged implants

Ø2.0 mm Standard screw		Multidirectional locking screw		
  1/1		 1/1		
Length	Item No.	STERILE R	Item No.	STERILE R
8 mm	26-020-08-91	26-020-08-71	26-019-08-91	26-019-08-71
10 mm	26-020-10-91	26-020-10-71	26-019-10-91	26-019-10-71
12 mm	26-020-12-91	26-020-12-71	26-019-12-91	26-019-12-71
14 mm	26-020-14-91	26-020-14-71	26-019-14-91	26-019-14-71
16 mm	26-020-16-91	26-020-16-71	26-019-16-91	26-019-16-71
18 mm	26-020-18-91	26-020-18-71	26-019-18-91	26-019-18-71
20 mm	26-020-20-91	26-020-20-71	26-019-20-91	26-019-20-71

Ø2.3 mm Standard screw		Multidirectional locking screw		
  1/1		 1/1		
Length	Item No.	STERILE R	Item No.	STERILE R
8 mm	26-023-08-91	26-023-08-71	26-022-08-91	26-022-08-71
10 mm	26-023-10-91	26-023-10-71	26-022-10-91	26-022-10-71
12 mm	26-023-12-91	26-023-12-71	26-022-12-91	26-022-12-71
14 mm	26-023-14-91	26-023-14-71	26-022-14-91	26-022-14-71
16 mm	26-023-16-91	26-023-16-71	26-022-16-91	26-022-16-71
18 mm	26-023-18-91	26-023-18-71	26-022-18-91	26-022-18-71
20 mm	26-023-20-91	26-023-20-71	26-022-20-91	26-022-20-71

**Note:** The screw modules can each store a total of 60 screw clips in screw lengths 8, 10, 12, 14, 16, 18, 20 mm, with 4 standard screws and 4 locking screws per indicated length.

You will find all the intermediate lengths in the brochure "Linos Hand Fracture System".

## FlowerPlate Instruments

### Standard instrumentation



1/2

26-130-18-07  
K-wire dispenser  
Ø 1.6 mm  
18 cm

St 1



1/2

22-626-16-05  
K-wires  
Ø 1.6 mm  
12 cm

St 10  
units



1/2

26-130-13-07  
Reamer  
Ø 13 mm  
AO attachment

St 1



1/2

26-153-16-07  
26-153-16-71  
Core hole drill  
Ø 1.5 mm

St 1

STERILE R



1/2

26-153-18-07  
26-153-18-71  
Core hole drill  
Ø 1,8 mm









St 1

STERILE R





Explanation of icons

-  Screw diameter 2.0 mm
-  Screw diameter 2.3 mm
-  Steel
-  Silicone
-  T-Drive
-  Dental attachment
-  AO attachment
-  Packaging unit

**STERILE | R** Sterile packaged instruments

Optional instruments



1/2

26-975-30-07  
Depth gauge  
Ø 2,0/2.3 mm  
One-handed design



1/2

26-975-36-07  
Screwdriver  
T6  
Short, rotatable



1/1

26-975-02-04  
Screw measurement clip  
Length and diameter



1/2

**23-192-00-71**  
CarpalStick  
8 cm



## FlowerPlate Storage

The storage system is impressive not only because of its easy, well-conceived handling, for example with the instruments arranged according to their sequence of use during surgery, but also because of its optimized reprocessing capability, in order to equally serve the needs of everyone involved.

In the storage basket all the instruments required for an operation can be stored individually next to each other. It is also possible to accommodate multiple FlowerPlate implants.

Every screw module can accommodate a total of 60 screws in lengths ranging from 8 to 20 mm, all stored in single clips. The clips, which are labeled with screw length and diameter, article number, and batch number, permit not only easy recording of all the relevant implant data but also seamless patient-related documentation.

Apart from the option of conventional storage, the FlowerPlate system is also available with sterile packaged implants throughout.



**55-910-81-04 Instrument storage complete, comprised of:**

- 55-910-89-04 Storage cage
- 55-910-59-04 Lid



55-910-89-04  
Storage cage



55-910-59-04  
Lid

**Screw module combination\***

- 55-910-82-04 Screw module, combination of standard screws/locking screws, Ø 2.0 mm
- 55-910-83-04 Screw module, combination of standard screws/locking screws, Ø 2.3 mm



55-910-82-04  
Screw module, standard screws/locking screws, Ø 2.0 mm



55-910-83-04  
Screw module, standard screws/locking screws, Ø 2.3 mm

\* **Note:** The screw modules can each store a total of 60 screw clips in screw lengths 8, 10, 12, 14, 16, 18, 20 mm, with 4 standard screws and 4 locking screws per indicated length.

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