MARQUARDT Medizintechnik

Angle Stable Distal Radial Plate System WINSTA-R

Priv.-Doz.Dr.med. Martin Walz
Dr. med. Felix Menzinger
Prof.Dr.med. Jürgen Rudigier

www.marquardt-medizintechnik.de

General

The problem posed by metaphyseal and intra-articular fractures lies in the fact that even though implants can be well-anchored in the distal section of the shaft, fixation stability is however limited in the spongiose bones of the fragment close to the joint. Multifragmentary, intra-articular fractures as well as senile osteoporosis exacerbate this problem. In relation to the long proximal shaft section, the lever arm of the short distal joint fragment mechanically unfavourable during functional treatment places high demands on the stability of the implant itself as well as on its fixation in the distal fragment. In contrast to conventional implants, angle stable ones enable early functional treatment (especially desirable in the case of fractures close to joints), which is of great importance for the rapid restoration of a joint's functional integrity. Adaptation of the plate form and of the direction of the distal angle stable plate screws or pins to the physiological articular surface axes and curvatures facilitates correct reposition as well as the ideal repositioning of the implant components, thus increasing postoperative fracture stability.

Product Characteristics

- High stability in the case of small implant dimensions.
- Anatomically correct form with volar bending to reconstruct the "palmar tilt", and secure support of the volar contour of the distal radius.
- The four distal plate holes are adjusted to the radioulnar curvature of the articular surface, and enable secure fixation of the distal radius even in the case of intra-articular fractures via subchondral positioning of the stabilization screws and pins.
- The given direction of the four angle stable screws or pins at the distal plate end corresponds to the physiological dorsovolar inclination of the articular surface, and enables the screws or pins to be placed in the ulnar fragment as well as in the styloid process of the radius.
- For fixation in the distal fragment, either self-cutting angle stable Ø 3.0 mm stabilization screws or angle stable Ø 2.0 mm stabilization pins are available.
- For fixation of the plate, self-cutting Ø 2.7mm corticalis screws are available. In the case of osteoporotic bones, angle stable Ø 3.0 stabilization screws can be used as an alternative.
- Precision drilling and length measurement for angle stable screws/pins via screw-in drill sleeve.
- For all screws and pins, only a Ø 2.0 mm drill is required.
- A cross-oval plate-hole enables reposition of intra-articular fragments as well as possible defect filling with spongiosa or bone substitute after plate fixation.
- The clearly laid-out instrumentarium facilitates handling.
- Various different plate lengths also suit the requirements of multiple metaphyseal fractures.
- Special surface treatment of plates and angle stable screws and pins by anodisation type II (DOTIZE®)
  Properties of processed products:
  - reduced tendency of cold welding of Titanium implants by screw in the angle stable pins and screws.
  - hardened Titanium surface.
  - increased fatigue resistance of implants.
  - significant reduction of AL and V release.

01

Reconstruction of the "palmar tilt"

02

Anatomical radioulnar curvature

> Indications

- Extra-articular fractures of AO-Type 23-A2 and A3
- Partial intra-articular fractures of AO-Type 23-B1 and B3
- Total intra-articular fractures of AO-Type 23-C1 to C3

03

Radiological Procedure, Case Study 1 *AO-TYP 23-A3*

04

Radiological Procedure, Case Study 2 *AO-TYP 23-C1*

05

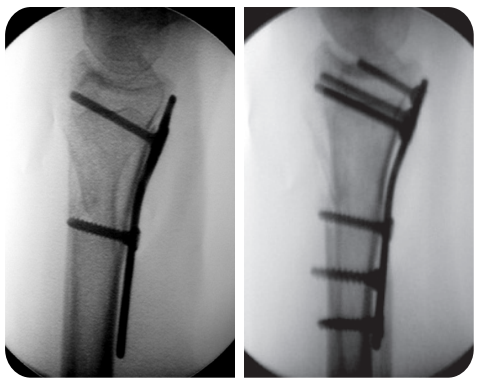
Radiological Procedure, Case Study 3 *AO-TYP 23-C3*

Operative Technique

Two different techniques of volar bone-plate osteosynthesis can be applied:

Possibility I:
Primary fixation of the plate on the radius shaft.
Reposition of the joint fragment on the distal plate section.

06



Possibility I

Possibility II:
Primary fixation of the plate on the joint fragment.
Reposition via fixation of plate onto radius shaft.

07

Possibility II

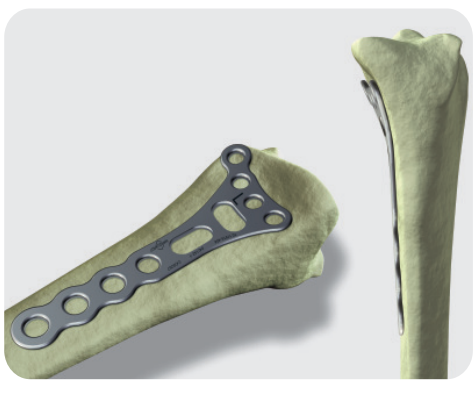
Access / Reposition of Fracture

After partial deprivation of blood supply to the upper arm, a straight, volar skin incision of 5 to 10 cm is made parallel to the flexor carpi radialis as far as the antebrachial fascia. The ensuing procedure can either be radial, along the flexor carpi radialis, or medial. Radially, the A. radialis must be protected, and medially the N. medianus. Detach the M. pronator quadratus on the radial side from the radius shaft. Note that the distal fragment should only be displayed in so far as it is necessary for attaching the plate. If the joint fragment is multifragmentary, the fragments should be left together to facilitate ligamentotaxis.
Then, reposition of the fracture, whereby the accident mechanism has to be repeated one more time. In the case of an extension fracture this results in extension at first, then in traction with transition to flexion; in the case of a flexion fracture, initial flexion is followed by traction with transition to extension. An image intensifier check of the reposition then results in two planes.

Positioning and Fixation of the Plate on the Radius Shaft

After allocation of the correct plate length and the respective plate side, the plate is placed centrally onto the radius shaft, with image intensifier check. Make sure here that the longitudinal axis of the radius shaft and the plate match each other. Now position the plate, with image intensifier check, in the proximal-distal direction under preliminary fracture reposition via extension and volar flexion of the wrist, in order to estimate the original length of the radius. Here, the distal plate-end should be placed only a few millimetres proximally to the volar radial labrum, in order to achieve optimal support of the articular surfaces via subchondral screw positioning.

08



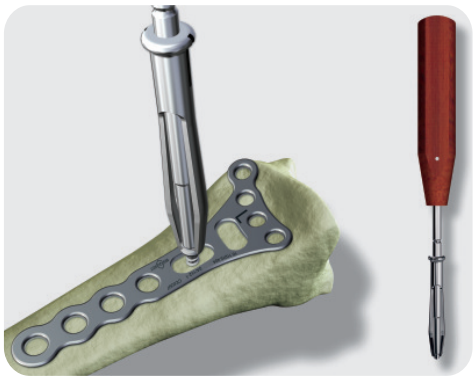
A Ø 2.7 mm corticalis screw is now placed into the oblong hole of the plate shaft.

This results in the following procedure:

- Central placement of the double drill bush (REF: 02.20060.027) in the oblong hole of the plate shaft.
- Using the Ø 2.0 mm twist drill (REF: 10.20010.020), drill the core hole through the double drill bush (REF: 02.20060.027)
- Determine screw length by means of depth gauge (03.20100.060)
- Screw in the Ø 2.7 mm corticalis screw with the 2.5 mm hexagonal screwdriver. (REF: 03.20040.025)

Note here that the screw must not yet be tightened completely, so that the plate position can still be adjusted distally and proximally. Check again, and correct the plate position if necessary, with image intensifier check. Once the plate is correctly positioned, tighten the screw, thus fixing the plate to the shaft of the radius. If definitive fixation of the plate to the radius shaft is now required, a screw can also be applied through the other screw-holes in the shaft area.

09



> Use of the Distal Plate-Holes

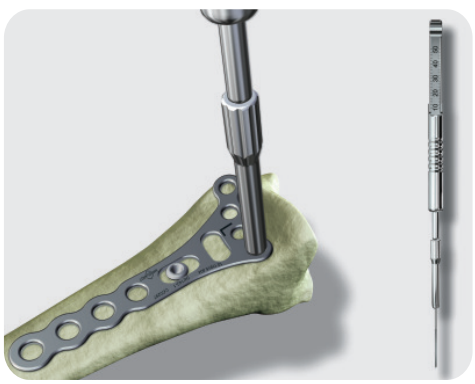
By means of pulling at the fingers and volar flexion of the wrist, the fracture is reduced until the joint fragment lies on the distal plate-end. In the case of a dorsal fracture zone it can be helpful to dorsally exert pressure with a finger on this zone while using the distal plate-holes, in order to secure the retention of these fragments in anatomical position by means of the applied stabilization screws or pins. It is recommended to begin by using the marginal ulnar plate-hole. This fixes the ulnar bone fragment and guarantees the congruence of the distal radioulnar joint.

This results in the following procedure:

- Screw the drill sleeve (REF: 10.20060.046) into the marginal ulnar plate-hole.
- Using a Ø 2.0 mm twist drill (REF: 10.20010.020), drill the core hole through the drill sleeve (REF: 10.20060.046), during optimal reposition.
- Determine screw length by means of depth gauge (REF:10.20100.050) through the screwed-on drill sleeve (REF: 10.20060.046).
- Screw in the angle stable stabilization screw or pin with the 2.5 mm hexagonal screwdriver (REF: 03.20040.025) during optimal reposition.

With an image intensifier check, check the implant location in two planes as well as the reposition result. If necessary, and if no definite fixation of the plate on the radius shaft has been undertaken, correction of plate location and re-position can be carried out by loosening the screw in the oblong plate-hole.

10

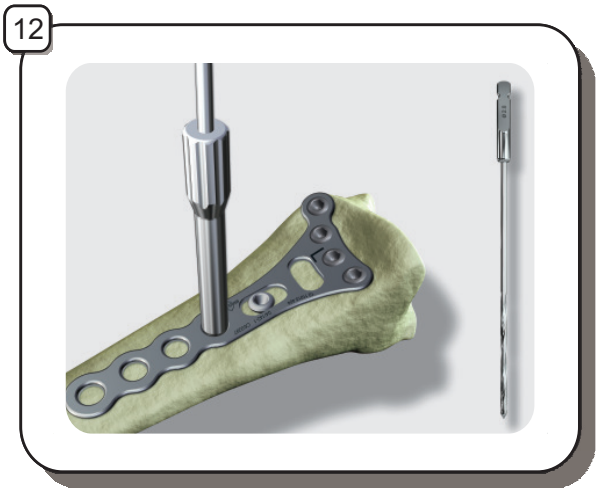


The recommended next step is to make use of the terminal radial plate-hole. This generally means that the distal joint fragment is adequately fixed, so that the fingers no longer need to be pulled. One now has the choice of using either stabilization screws or pins in the two central plate-holes. As a result of this depending on the type of fracture a further stabilization of intermediate fragments can be achieved, if necessary by repositioning them separately, via the cross-oval plate-hole. Defect filling can also be carried out through this if necessary. Follow with an image intensifier check in two planes.

11

The remaining holes in the shaft region now have to be filled if this has not occurred already with Ø 2.7 mm corticalis screws. However there is also a possibility, especially in the case of bad bones, to use angle stable corticalis screws in the remaining holes. This is left to the surgeon to decide, on the basis of the respective bone quality.

12



Follow with an image intensifier check in two planes, plus a function check with regard to free mesial rotation of the forearm, upward turning of the palm, extension and flexion. Now bathe the operating site thoroughly, if necessary adding wound drainage proximally to the skin incision, and follow with subcutaneous and cutaneous sutures. Any required immobilization in plaster needs to be decided in individual cases. As a rule this is unnecessary, both because of the degree of stability achieved and because of any intended postoperative functional therapy. During the first few days, an elastic pressure bandage above cotton-wool padding is frequently all the protection that is required.

13

> Additional Information

In the case of a very broad distal radius, use the form of the intra-articular fracture components to ascertain whether the plate position should be more radial or more ulnar, in order to guarantee retention either of an ulnar bone fragment or a fractured styloid process of the radius. Here the correspondence between the longitudinal axes of the radius shaft and the plate shaft should be retained, in order not to change the screw direction adapted to the anatomical form especially where the marginal radial and ulnar plate-holes are involved.
In the case of a very narrow distal radius, by screwing in each drill sleeve onto the terminal radial and ulnar plate-hole and using image intensification with orthograde focus, check to see whether the relevant screw or stabilization pin is lying in a secure intra-ossal position. Should this not be the case, one of the marginal plate-holes can remain unused.

Angle stable supporting pins Ø 2.0 mm

Article number	Screw length
10.03520.016	16 mm
10.03520.018	18 mm
10.03520.020	20 mm
10.03520.022	22 mm
10.03520.024	24 mm
10.03520.026	26 mm
10.03520.028	28 mm
10.03520.030	30 mm

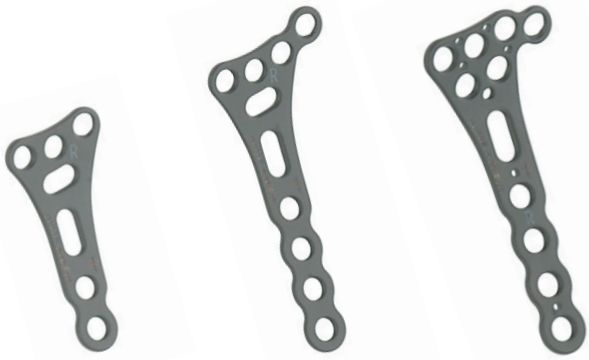
Corticalis screws Ø 2.7 mm,
self-cutting

Article number	Screw length
03.03527.010	10 mm
03.03527.012	12 mm
03.03527.014	14 mm
03.03527.016	16 mm
03.03527.018	18 mm
03.03527.020	20 mm
03.03527.022	22 mm
03.03527.024	24 mm

Angle stable cortical screws Ø 3.0mm,
self-cutting

Article number	Screw length
10.03530.012	12 mm
10.03530.014	14 mm
10.03530.016	16 mm
10.03530.018	18 mm
10.03530.020	20 mm
10.03530.022	22 mm
10.03530.024	24 mm
10.03530.026	26 mm
10.03530.028	28 mm
10.03530.030	30 mm

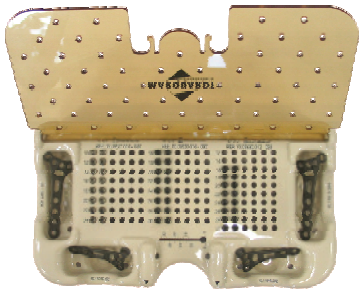
Angle stable radial plates right / left

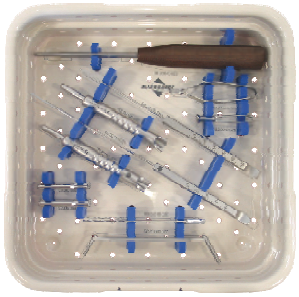


Article number	No. of holes in head (without oblong hole)	No. of holes in shaft (without oblong hole)	
10.11915.102	3	2	Right
10.11915.202	3	2	Left
10.11915.104	3	4	Right
10.11915.204	3	4	Left
10.11915.302	4	2	Right
10.11915.402	4	2	Left
10.11915.304	4	4	Right
10.11915.404	4	4	Left
10.11915.308	4	8	Right
10.11915.408	4	8	Left
10.11915.702	6	2	Left
10.11915.802	6	2	Right
10.11915.704	6	4	Left
10.11915.804	6	4	Right

Angle Stable Distal Radial Plate System WINSTA-R

GRAPHICS CASSETTE

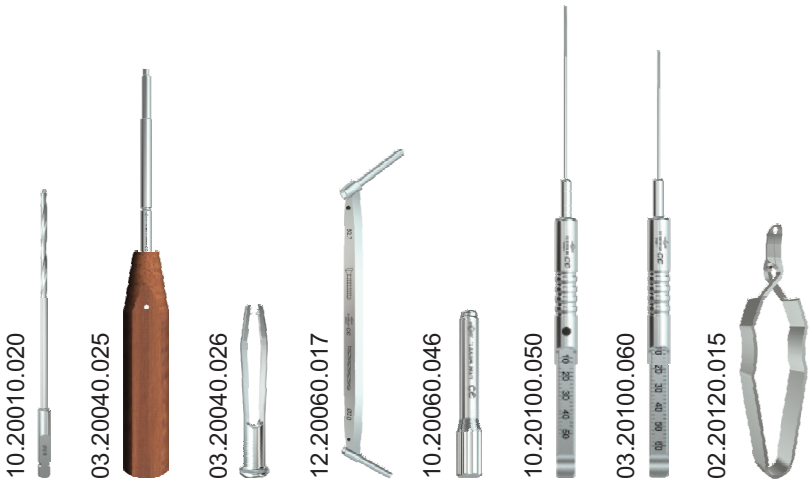




Item description	Article number
Graphics cassette + implant rack empty	10.22130.000
Graphics cassette + implant rack with contents	10.22130.005
Implant rack empty	10.22130.002
Container, only, empty	10.22130.001
Lid for container	10.22130.003

INSTRUMENTS IN SET

Item description	Article number	Quantity
Twist drill Ø 2.0 mm, 112 mm	10.20010.020	1
Screwdriver 2.5 mm hexagonal	03.20040.025	1
Screw holding sleeve	03.20040.026	1
Double drill sleeve 1.7 mm / 2.0 mm	12.20060.017	1
Drill sleeve	10.20060.046	2
Depth gauge 50 mm	10.20100.050	1
Depth gauge 60 mm	03.20100.060	1
Screw-retaining forceps	02.20120.015	1



Dieter Marquardt Medizintechnik GmbH
Robert-Bosch-Str.1 ● 78549 Spaichingen
Telephone: +49 (0) 7424 / 95810 ● Telefax: +49 (0) 7424 / 501441
info@marquardt-medizintechnik.de
www.marquardt-medizintechnik.de

Date: 08.09.2008 Rev. C