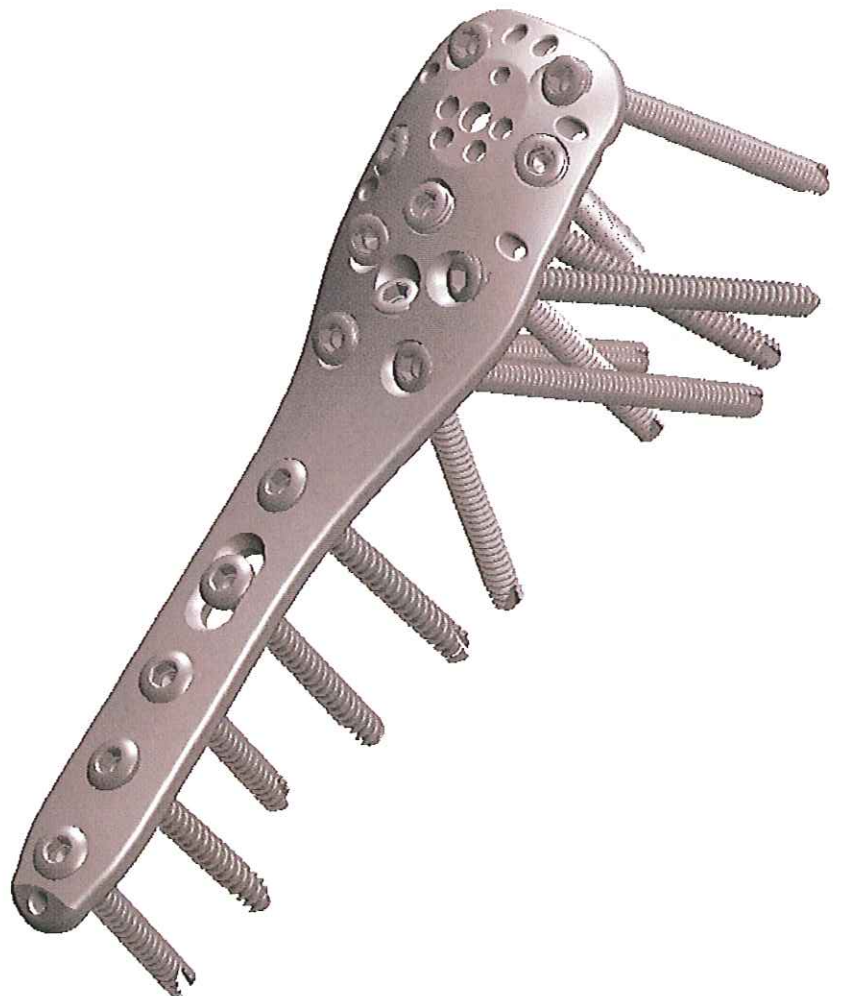


Angle-stable, proximal humerus plate system **WINSTA-PH**

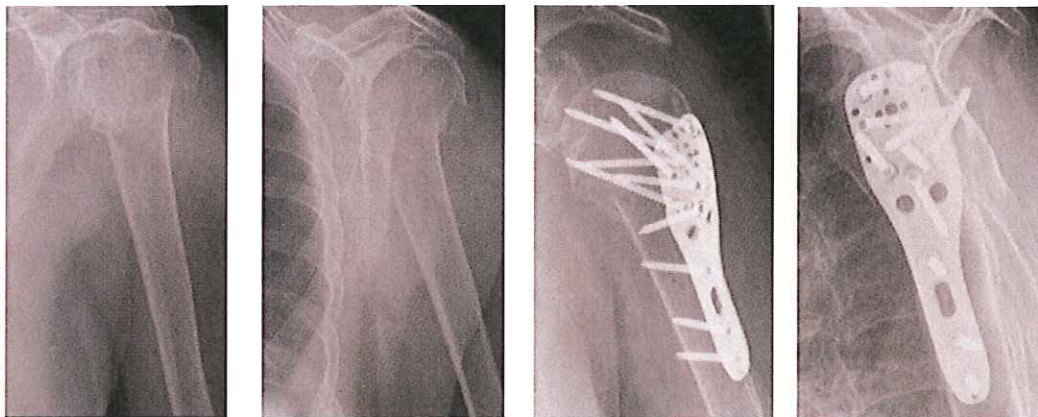
Prof.Dr.med. Rupert Ketterl
Dr.med. Stephan Elenz



> Indications

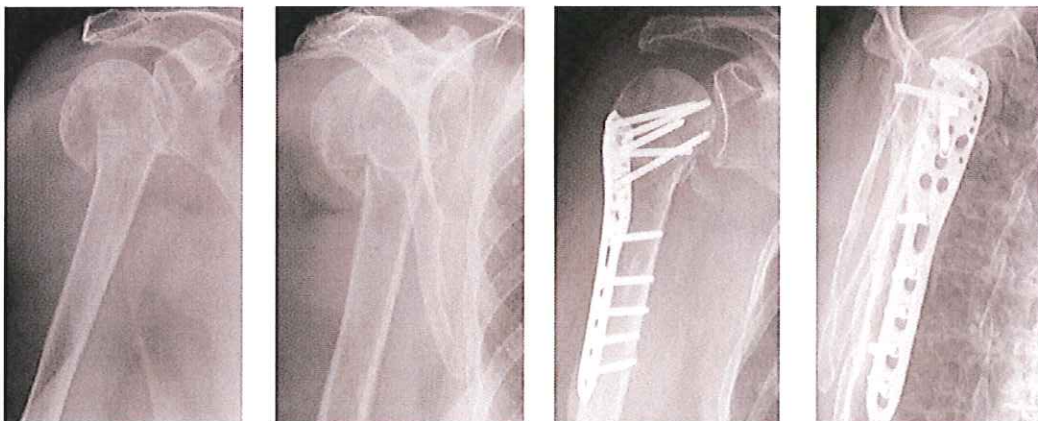
- 2, 3, and 4 fragment fractures
- Reconstructable calotte fractures
- Pathological fractures
- Special indications such as pseudarthrosis and correcting osteotomy

01



Radiological progression, sample case 1: 4 fragment fracture

02

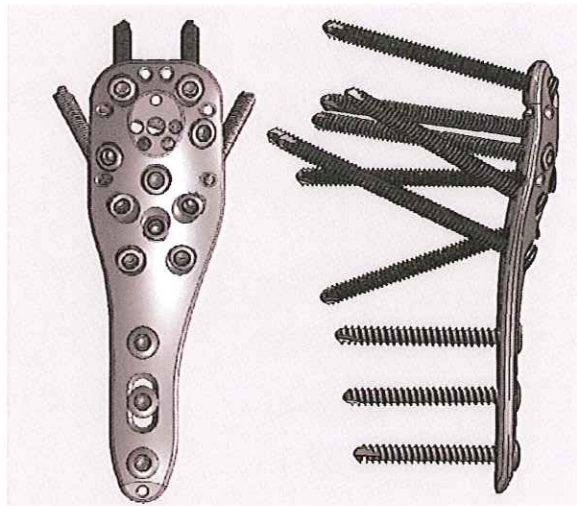


Radiological progression, sample case 2: 4 fragment fracture

> Product characteristics

- High stability with low implant dimensions.
- Anatomically adapted design with asymmetric dorsal widening for secure fixation of the tuberculum majus.
- Drill hole running in a distal direction in the transition zone for the stabilisation of fractures near the neck.
- 6 strongly rounded angled drill holes in the edge area of the proximal plate end for optimal suture fixation. The dorsal lateral localisation of the fixation holes permits the introduction of the suture material after the osteosynthesis is completed.
- Diverging and converging screw arrangement in the proximal plate section increases stability in osteoporotic bone.
- Optimal fixation of complex fractures due to individually usable screw positions in the humerus head.
- Angle-stable and conventional screws (Ø 3.5 mm), usable both in shaft and in head.
- Use of a torque key not required, due to the special surface treatment.
- Special surface treatment with type II anodisation (Dotize®) of the plates and angle-stable screws.
This means:
 - Reduced tendency to cold weld when the screws are turned into the plates.
 - Hardened titanium surface.
 - Improved fatigue strength of the implants.
 - Significant reduction of release of Al and V.
- The screw design allows the use of one drill both for angle-stable and for conventional screws.
- Simple instrument set with an easy overview.

03



> Surgical technique

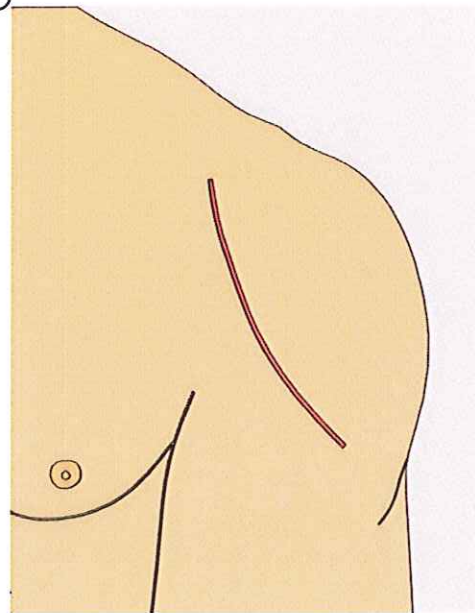
● 1. Positioning the patient

The surgery is done with the patient prone in the beach chair position. The shoulder receiving surgery is positioned so far out that in the intraoperative image transformer controls, both the a.p. and the axial x-rays can be done. Positioning on a special shoulder table has proven itself in this process.

● 2. Access

The deltoid pectoral access is suitable for complex reconstructions, particularly when an open repositioning procedure is required (*Fig. 4*).

04



● 3. Repositioning the fracture

The preliminary repositioning of the main fragments takes place by placing the calotte fragment upright and folding in the tuberculum parts, using the image transformer. Temporary fixation of the repositioning results takes place by means of Kirschner wires, wherein care must be taken to ensure their proper positioning with regard to the plate length which is later selected (3, 5 or 7 hole plate). *Fig. 5* shows a corresponding trauma image.

05



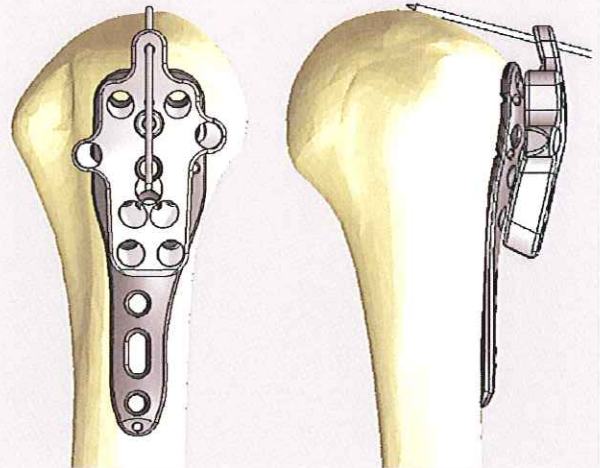
> Surgical technique

● 4. Plate position, positioning the plate over the target block

The ideal position of the plate is just dorsally from the sulcus bicipitalis and approx. 6 to 8 mm below the rotator cuff base on the tuberculum majus. The anatomical pre-forming simplifies the placement of the plate. The corresponding right or left version of the plate must be selected in order to utilise the asymmetric part of the proximal plate end for better fixation of the tuberculum majus.

After screwing in the screw for the target block (REF: 14.20010.041), the target block (REF: 14.20010.040) is screwed onto the plate. Now the right plate position can be determined using a Kirschner wire with a diameter of 1.6 mm (REF: 11.90016.150). For this purpose, the Kirschner wire is pushed through the proximal hole in the target block. The correct height of the plate is reached when the Kirschner wire lies against the humerus head. (Fig. 06)

06

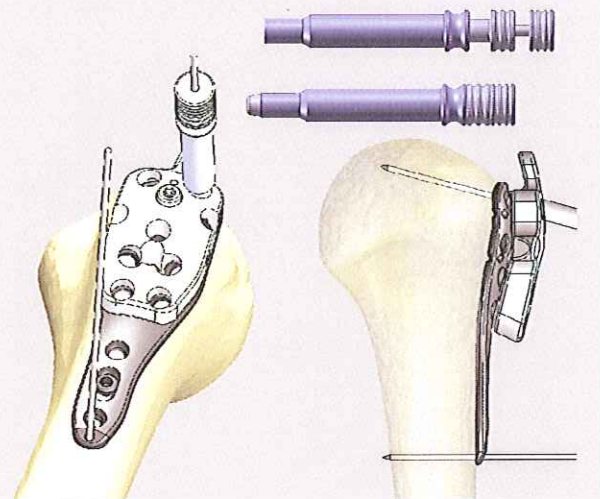


● 5. Fixation of the plate using Kirschner wires

After inserting the drill guide dia. 2.5 mm (REF: 14.20010.010) into the drill sleeve dia. 6.0 mm (REF: 14.20010.070) screw in the assembled sleeves through the targeting block (REF: 14.20010.040) into the selected plate hole. Subsequently, inserting the guide sleeve for K-Wire (REF: 14.20010.020) into the drill guide dia. 2.5 mm (REF: 14.20010.010), initial fixation of the plate (generally takes place proximally) with a Kirschner wire diameter 1.6 mm (REF: 11.90016.150). Then, after orienting the distal plate end on the upper arm shaft, distal fixation of the plate end takes place with another Kirschner wire with a diameter of 1.6 mm (Fig. 7). Both the repositioning of the fracture and the precise position of the plate are now verified on 2 planes with the image transformer.

Note: Depending on the extent of the fracture, the 3, 5 or 7 hole plate should be selected for the osteosynthesis.

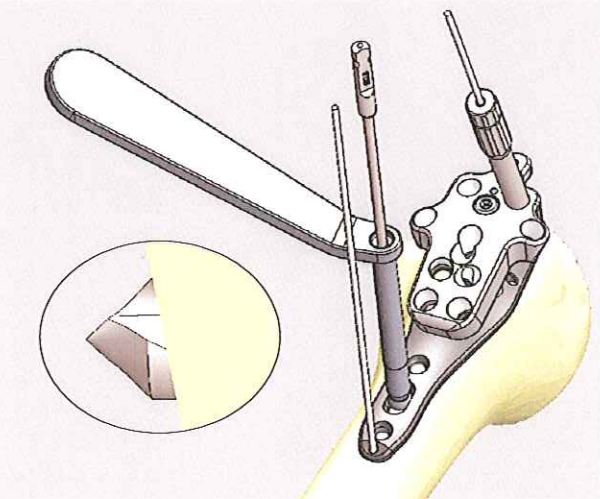
07



● 6. Screw positioning

The plate hole that is first occupied depends on the fracture type. Generally, the oval plate hole in the shaft region is occupied first, since it is then still possible to shift the plate in its longitudinal direction. For this purpose, the targeting sleeve (REF: 14.20010.030) is placed on the long hole, and the thread core hole is bi-cortically pre-drilled with the 2.5 mm diameter drill (REF: 03.20010.425). (Fig. 8)

08



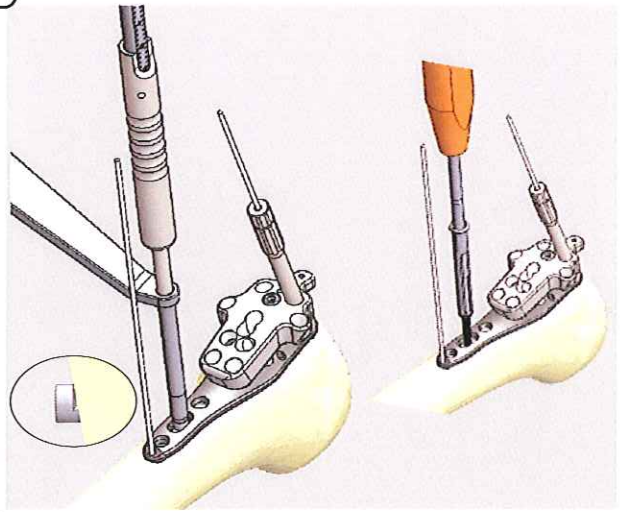
> Surgical technique

• 7. Length measurement

The suitable screw length is measured using the screw length measuring device (REF: 14.20100.060) through the guide sleeve.

Then, a self cutting cortical screw with a diameter of 3.5 mm is turned in with the hexagon screwdriver SW 2.5 mm (REF: 03.20040.025). (Fig. 9)

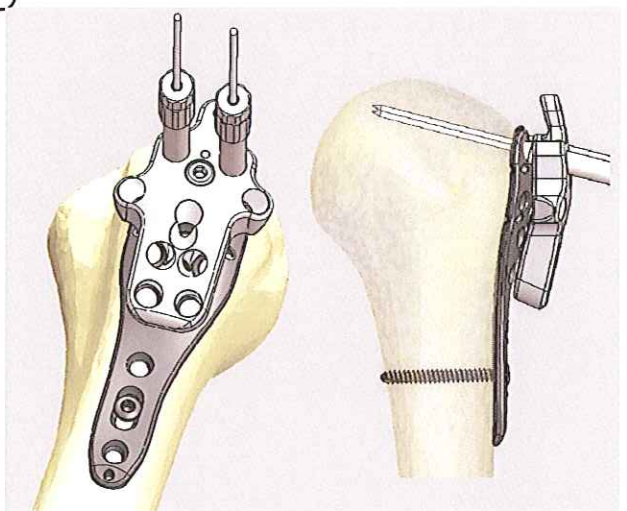
09



• 8. Humerus head screws

The screw holes that are occupied in the humerus head region depend on the fracture type. Assemble the drill guide dia. 2.5mm (REF: 14.20010.010) with the drill sleeve dia. 6.0 mm (REF: 14.20010.070). Afterwards, screw in the assembled sleeves through the targeting block (REF: 14.20010.040) into the selected plate hole. Prior to pre-drilling, the expected screw position can be verified with the Kirschner wire diameter 1.6 mm. For this purpose, the guide sleeve for K-Wire (REF: 14.20010.020) is pushed into the drill guide dia. 2.5 mm (REF: 14.20010.010). Then the Kirschner wire is placed in the humerus head through the guide sleeve. (Fig. 10)

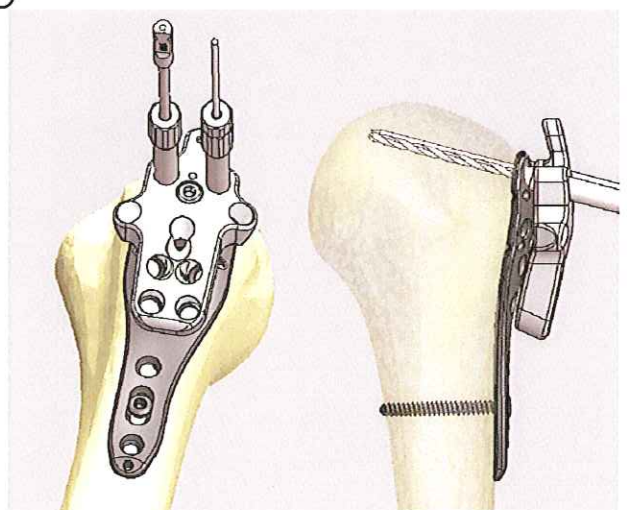
10



• 9. Drilling the thread core hole

After the removal of the Kirschner wire and the guide sleeve, the thread core hole is drilled with the 2.5 mm spiral drill (REF: 03.20010.425) through the drill guide barely to the subchondral area. (Fig. 11)

11

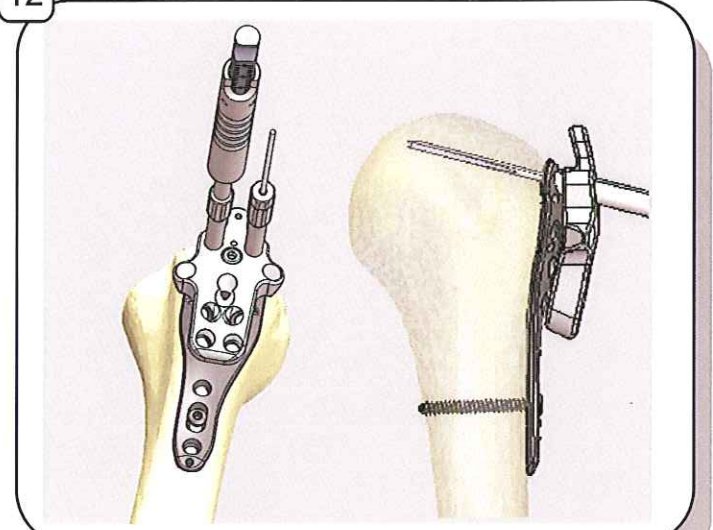


> Surgical technique

10. Determination of the screw length

Subsequently, the screw length is determined. This is measured using the screw length measuring device (REF: 14.20100.060) via the drill sleeve. (Fig. 12)
In order to avoid perforating the joint cartilage of the humerus head fragment, approx. 2 mm should be subtracted from the measured value.

12

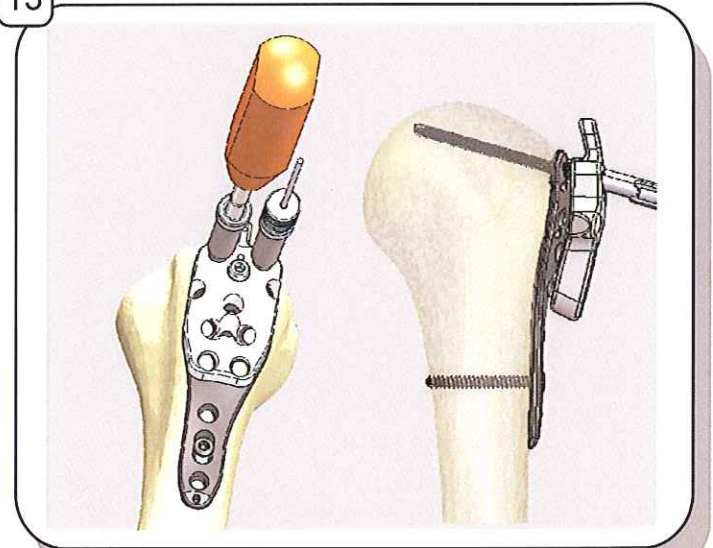


11. Insertion of the angle-stable screw

After the removal of the drill guide dia. 2.5 mm (REF:14.20010.010), the first angle-stable screw is screwed in through the drill sleeve dia. 6.0 mm (REF:14.20010.070) by using the hexagon screwdriver SW 2.5 mm (REF: 03.20040.025). (Fig. 13)

The direction of the screws, which can be placed partly diverging, partly converging as well as upwards or downwards, increases the stability of the angle-stable construction. In the upper arm head area, 10 different angle-stable screws can be inserted. It is recommended to place at least 5 - 6 angle-stable

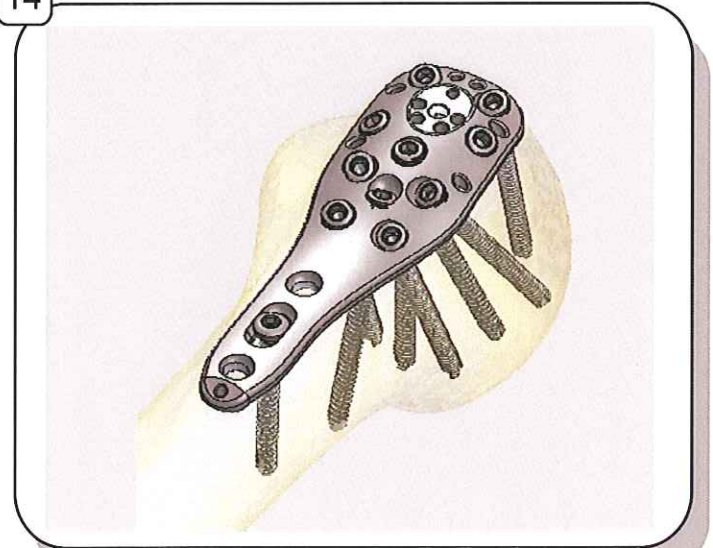
13



12. Insertion of further screws

After selecting the screw holes to be occupied, further screws are introduced into the humerus head one at a time. The procedure is carried out as described in paras. 8 to 11. (Fig. 14)

14



13. Plate fixation in the shaft region

After the osteosynthesis is completed in the humerus head region, loosening the 3.5 mm diameter corticis screw in the shaft will allow shifting of the plate as well as correction / optimisation of the height of the humerus head. After tightening the 3.5 mm diameter corticis screw, fixation to the proximal humerus shaft optionally takes place with angle-stable screws or with conventional cortical screws.

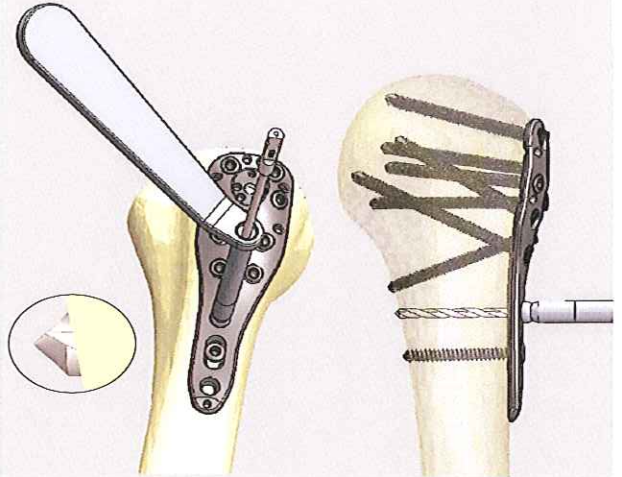
> Surgical technique

• 14. Drilling for shaft screw

If a conventional corticallis screw is used in the shaft region, the drill hole is bi-cortically pre-drilled through the targeting sleeve (REF: 14.20010.030) with the spiral drill 2.5 mm (REF: 03.20010.425). (Fig. 15)

Note: If angle-stable screws are used, pre-drilling must take place through the drill guide (REF: 14.20010.010).

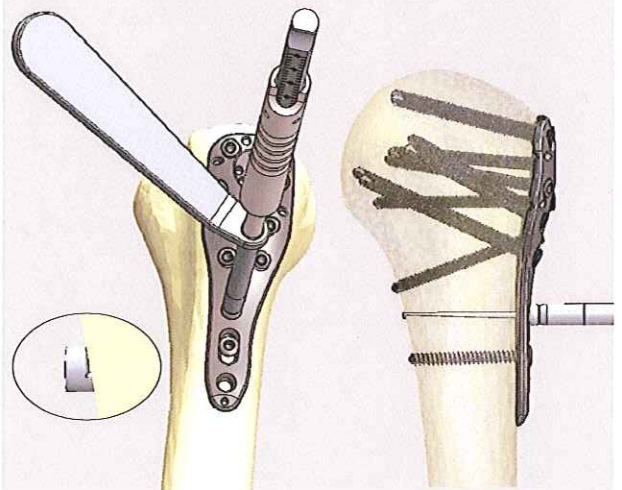
15



• 15. Determination of the screw length

Subsequently, the screw length is determined via the guide / drill collar, using the screw length measuring device (REF: 14.20100.060). (Fig. 16)

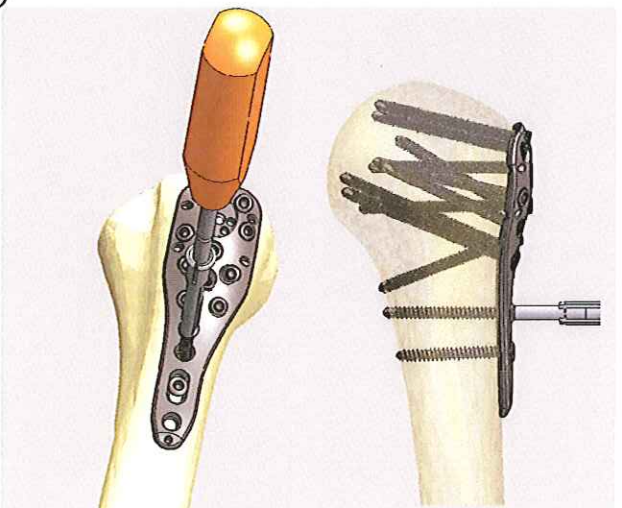
16



• 16. Insertion of the screw

Now the selected screw is turned into the bone shaft with the hexagon screwdriver SW2.5 mm (REF: 03.20040.025). (Fig. 17)

17



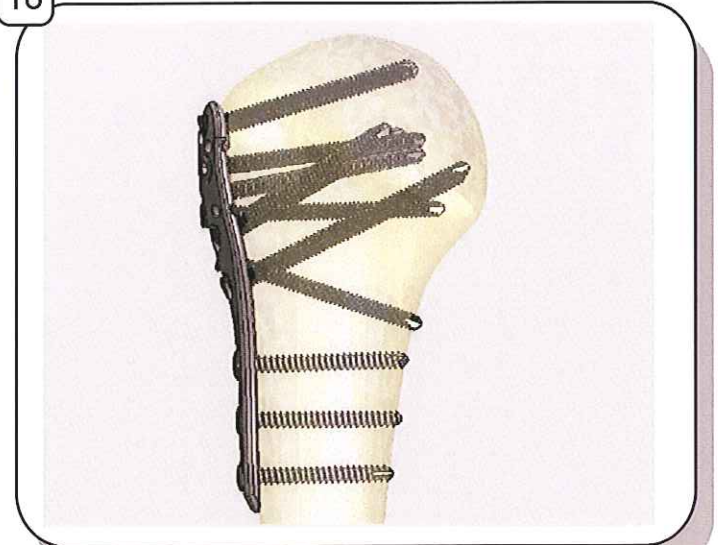
> Surgical technique

● 17. Insertion of further screws

Subsequently, further screws are turned into the bone shaft. Please note the procedure from paras. 14 to 16 for this purpose (Fig. 18).

Which screw holes are occupied by which screw types is at the surgeon's discretion.

18

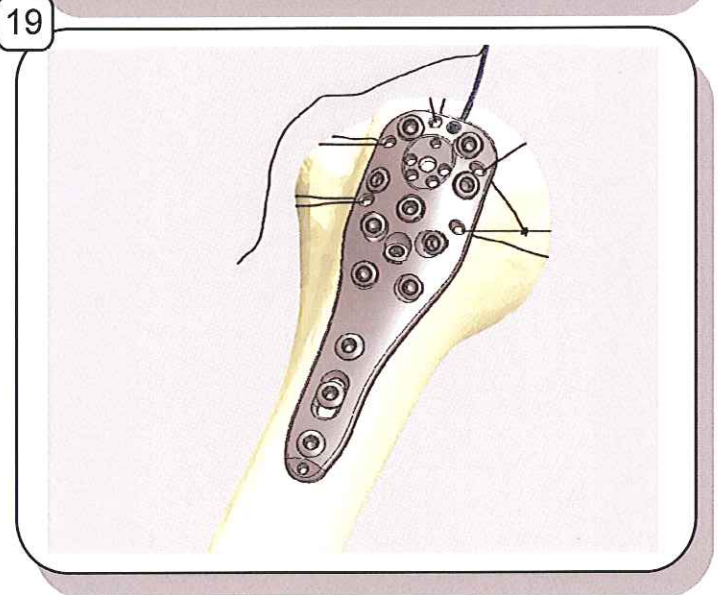


● 18. Suture fixation of the rotator cuff

To improve stability, dynamic fixation of the rotator cuff to the WINSTA-PH plate is possible. The special positioning of the drill holes permits suture fixation (generally with non-resorbable suture material) even after the osteosynthesis is completed. The fixation threads of the rotator cuff can easily be threaded into the plate subsequently. Fixation holes are provided ventrally for the subscapularis tendon, cranially for the supraspinatus tendon, and dorsally for the infraspinatus tendon (Fig. 19).

Depending on the fracture, completion of the osteosynthesis can also take place with isolated fixation screws outside the plate.

19



> Follow-up treatment

● 19. Follow-up treatment

Depending on the secure fixation of the fragments, particularly the tubercula, and the dynamic fixation of the rotator cuff, movement therapy can generally be initiated starting on the first post-op day. Here, we initially carry out passive movement therapy on the motor movement chair. The treatment is then complemented step by step with active and passive physiotherapeutic exercises without restriction of the range of movement, except for avoidance of outside rotation exercises in the four segment fracture. If applicable, however, the surgeon may specify further restrictions, depending on the stability of the osteosynthesis.

> Material removal

● 20. Material removal

Depending on the age of the patients receiving treatment and the function achieved, material removal may be feasible. When removing the materials, all screws are first loosened. Only then are they turned out gradually.

> Implants of WINSTA-PH

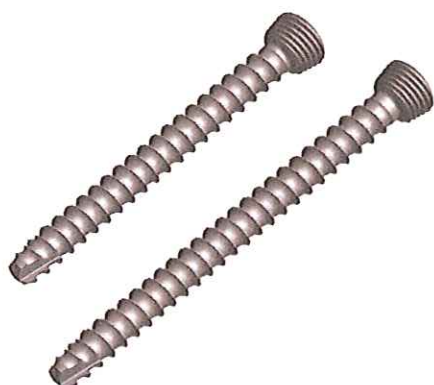
Angle-stable humerus plates



Article number Number of holes in
shaft with long hole

14.11133.003	3	Right
14.11133.005	5	Right
14.11133.007	7	Right
14.11133.010	10	Right
14.11133.012	12	Right
14.11133.014	14	Right
14.11133.103	3	Left
14.11133.105	5	Left
14.11133.107	7	Left
14.11133.110	10	Left
14.11133.112	12	Left
14.11133.114	14	Left

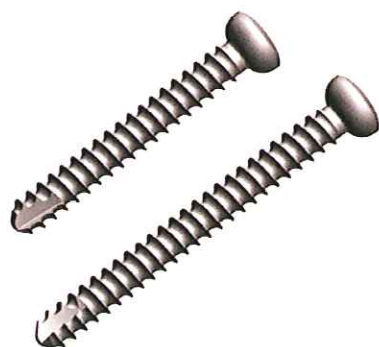
Angle-stable cortical screws Ø 3.5mm, self tapping



Article number Screw length

14.03355.020	20 mm
14.03355.022	22 mm
14.03355.024	24 mm
14.03355.026	26 mm
14.03355.028	28 mm
14.03355.030	30 mm
14.03355.032	32 mm
14.03355.034	34 mm
14.03355.036	36 mm
14.03355.038	38 mm
14.03355.040	40 mm
14.03355.042	42 mm
14.03355.044	44 mm
14.03355.046	46 mm
14.03355.048	48 mm
14.03355.050	50 mm
14.03355.052	52 mm
14.03355.054	54 mm
14.03355.056	56 mm
14.03355.058	58 mm
14.03355.060	60 mm

Cortical screws Ø 3.5mm, self tapping

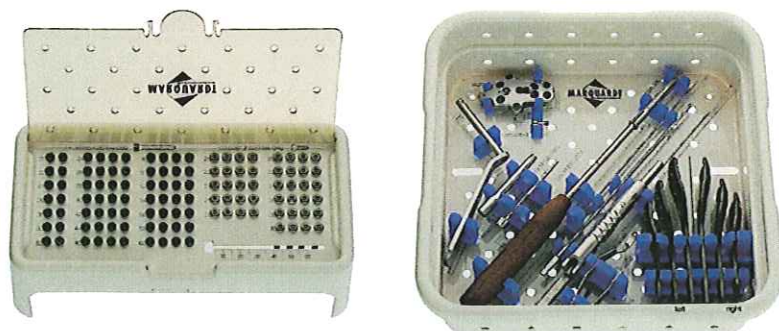


Article number Screw length

03.03612.020	20 mm
03.03612.022	22 mm
03.03612.024	24 mm
03.03612.026	26 mm
03.03612.028	28 mm
03.03612.030	30 mm
03.03612.032	32 mm
03.03612.034	34 mm
03.03612.036	36 mm
03.03612.038	38 mm
03.03612.040	40 mm

Angle-stable humerus plate system WINSTA-PH

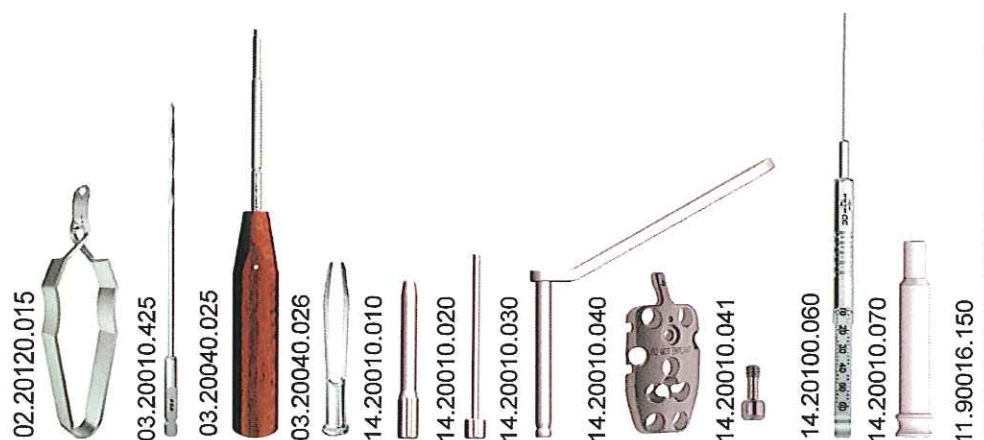
GRAPHICS CASSETTE



Description	Article number
Graphics cassette & implant rack with cover, empty	14.22130.000
Graphics cassette & implant rack with cover, including contents	14.22130.005
Implant rack, empty	14.22130.002
Graphics cassette without implant rack, without cover, empty	14.22130.001
Cover for graphics cassette	14.22130.003

INSTRUMENTS IN THE SET

Description	REF number	Quantity
Screw holding forceps	02.20120.015	1
Drill bit Ø 2.5 mm	03.20010.425	1
Screw driver 2.5 mm hexagon	03.20040.025	1
Screw holding sleeve	03.20040.026	1
Drill guide Ø 2.5 mm	14.20010.010	2
Guide sleeve for K-Wire	14.20010.020	2
Targeting sleeve Ø 2.5 mm	14.20010.030	1
Target block	14.20010.040	1
Fixation screw for target block	14.20010.041	1
Drill sleeve Ø 6.0 mm	14.20010.070	2
Screw length measuring device	14.20100.060	1
K-Wire Ø1,6 x 150 mm; Trocar; round	11.90016.150	5



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Issue date: 28/01/08 /Rev.B