SURGICAL TECHNIQUE

TITAN

ALP Titanium Proximal Humerus Plate (ProH-Lock 2)

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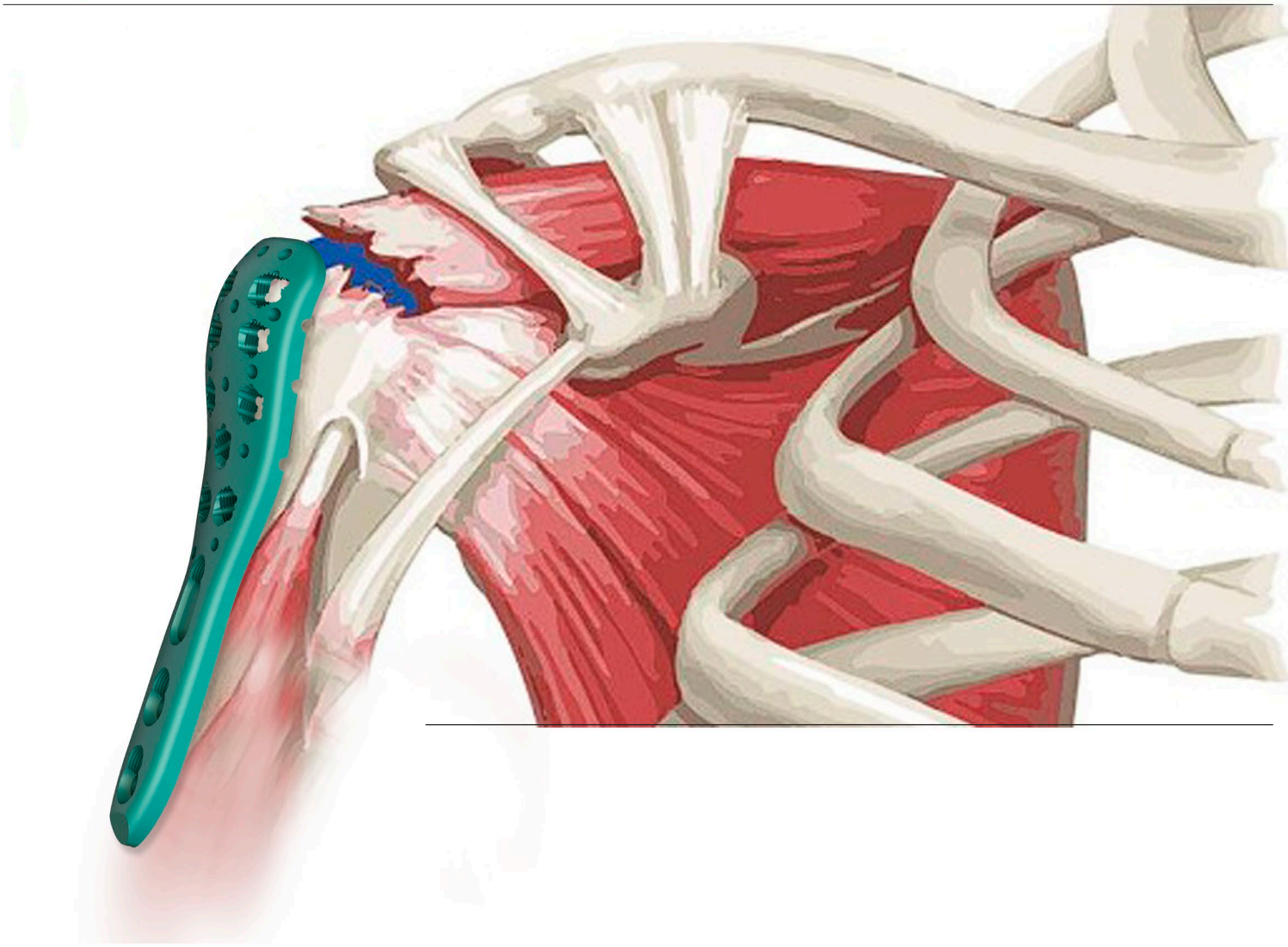
CONTENTS

TECHNOLOGICAL ADVANTAGES

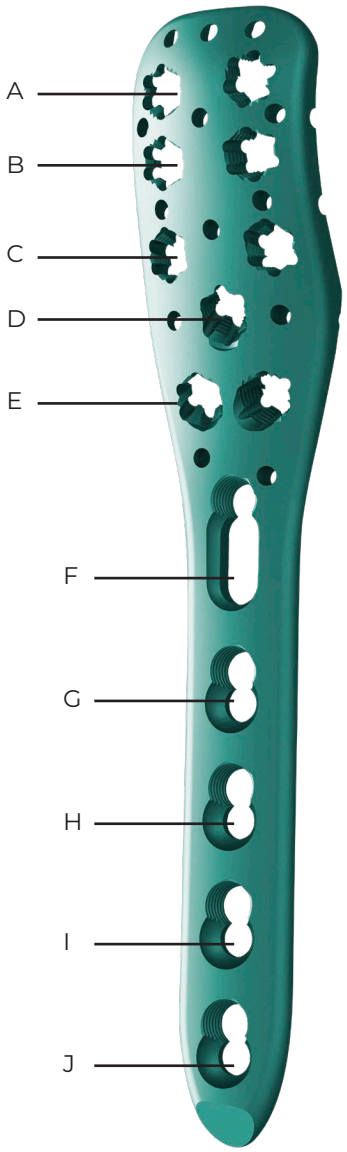
The Traufix proximal humerus internal fixation system for osteosynthesis combines the advantages of locking plates with the flexibility and benefits of traditional plates and screws. Utilizing both locking and conventional screws, **Traufix PROH LOCK 2** plates allow the creation of a structure that resists angular collapse and also functions as an effective fracture reduction aid.

The precise screw trajectory, anatomical contouring and locking capability of the proximal humerus plates provide a stable setup for reconstruction of complex humerus fractures



Description of the plates

- Proximal suture holes or for temporary fixation with K-wires to help maintain fracture reduction.
- Variable angle stability.
- Plate thickness in the proximal part: 1.2mm
- Fixation holes for Kirschner wires.
- The plates are made of titanium alloy (Ti6Al4V ELI).
- Rounded profile body.
- Proximal holes are polyfunctional where 3.5mm ALP screws are placed which makes it possible to increase the gripping area and to be able to cover multifragmentary fractures
- Combination holes for the use of normal or locking screws.
- Anatomic plate design for left (129L and 130L) and right (129R and 130R).
- Anatomical adjustment for the humeral head.



PROH LOCK 2

- 3-hole and 5-hole plates.
- Optimal screw placement.
- Body reinforced to 3.2mm.
- Proximal suture holes to help maintain fracture reduction.

PROH LOCK 2 LARGE

- 4-, 6, 8 and 10 hole plates.
- Body reinforced to 4.7 mm
- Long distal locking holes for maximum adaptability
- Plate length up to 240 mm (approx.)

Surgical indications

The ALP titanium proximal humerus plate is recommended for use in the following cases:

PROH LOCK 2
Displaced bifragmentary, trifragmentary or quadrifragmentary fractures of the proximal humerus, also in case of osteopenic bone.
Pseudarthrosis of the proximal humerus.
Osteotomies of the proximal humerus.

PROH LOCK 2 LARGE
Same indications as PROH LOCK 2, but also used for fractures extending through the diaphysis or fractures without medial support.

General contraindications:

Systematic inflammatory response syndrome (to be evaluated by the surgeon).
Septicemia.
Osteomyelitis.
Patient unable to comply with postoperative care.
Hypersensitivity to materials (titanium alloy 6Al-4V ELI).

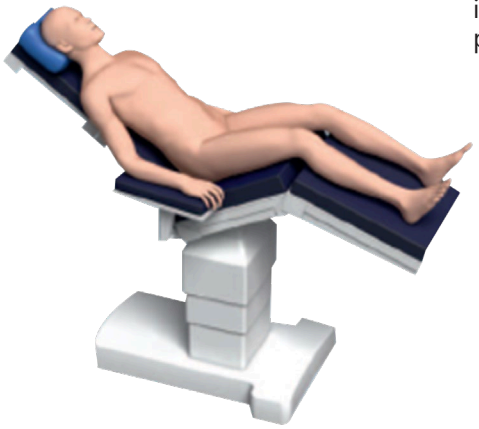
DESCRIPTION OF THE SURGICAL TECHNIQUE

1. Preoperative planning

It is strongly recommended that before proceeding to complete the preoperative radiographic evaluation and develop the preoperative plan in addition to determining plate length and screw position

Warning
This technique is proposed to describe the use of instruments and TRAUFIX implants, without the intention of interfering with the experience and decisions of the orthopedic surgeon, since the vast clinical and surgical experience supports him to determine which is the best proposal for each particular patient.

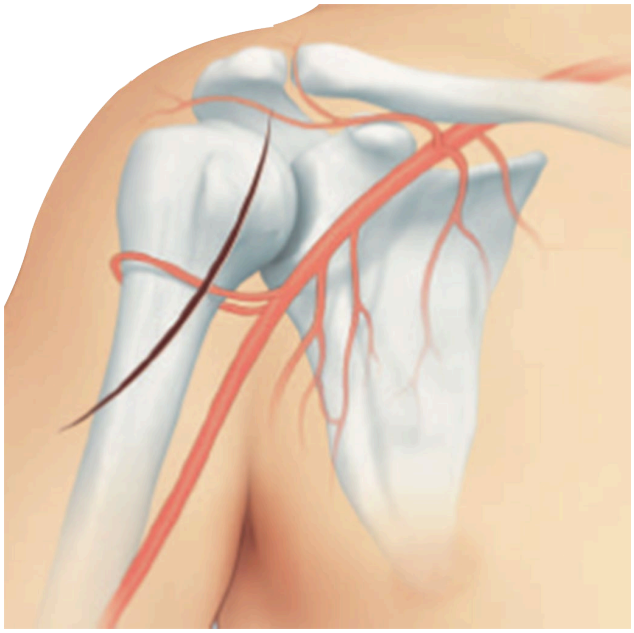
2. Patient positioning



3. Surgical approach

A standard deltopectoral approach is recommended; start the skin incision at the midpoint between the coracoid and clavicle, extend distally in a manner oblique to the deltoid insertion. Divide the skin and subcutaneous tissues and identify the cephalic vein. The cephalic vein marks the location of the deltopectoral interval. The deltopectoral interval is deepened by blunt dissection to the clavipectoralis fascia.

Retract the cephalic vein laterally and the pectoralis major medially. Divide the clavipectoralis fascia to expose the greater and lesser tuberosities and the bicipital slide. To help facilitate reduction and improve visualization of the fracture, free the upper third of the pectoralis major from the diaphysis. It is important to place a finger under the pectoralis major as it is released to protect the biceps tendon, which lies directly underneath. Extend the dissection distally over the lateral diaphysis of the humerus to the pectoral insertion and medial to the deltoid insertion.



4. Fracture reduction and temporary fixation

Adequate fracture reduction is essential to achieve good bone healing and restore full function. In some cases, it may be appropriate to perform a closed reduction before preparing the patient for surgery.

Reduce the humeral head fragments and verify the reduction with the image intensifier (see image 1).

K-wires inserted into the fragments can be used as a reduction lever as well as to achieve provisional fixation of the fracture. It is important to verify that the K-wires do not interfere with the correct placement of the plate.

Note: Locking screws are not suitable for reduction, as they do not allow compression to be applied, therefore, the humeral head fragments must be reduced before inserting the locking screws.

Suture

Provisionally reduce the tuberosities of the humerus with sutures through the insertions of the subscapularis, infraspinatus and supraspinatus muscles. These sutures will help maintain stability of the reconstruction when attached to the plate later.

Suture placement is especially recommended in case of weak bone, which only allows the insertion of short screws to avoid the risk of perforation.

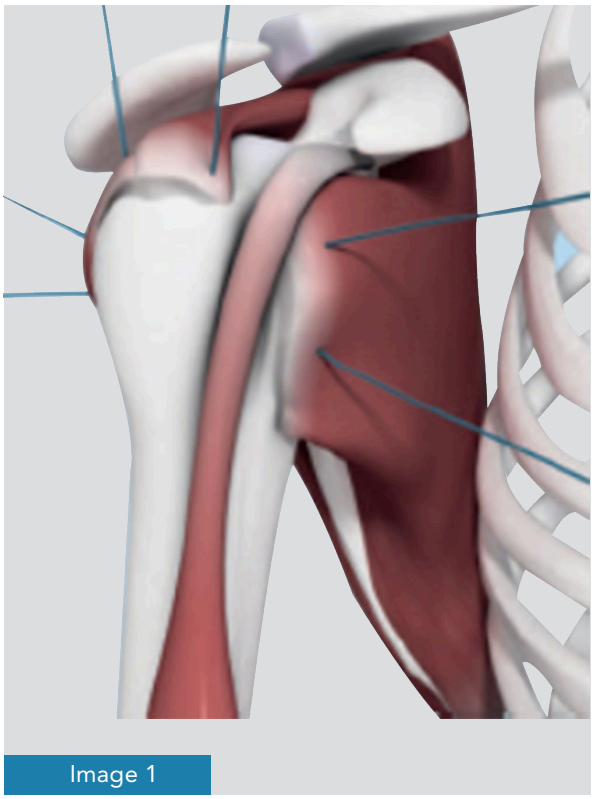


Image 1

5. Preparation of the plate position

To position the plate optimally, insert two K-wires 2 to 4 mm laterally to the bicipital slide and 5 to 7 mm below the tip of the greater tubercle (or trochlea) (see picture 2).

Caution: If the plate is positioned too high, it increases the risk of subacromial conflict, if the plate is positioned too low, it may prevent optimal screw distribution in the head and screw insertion in the proximal portion.

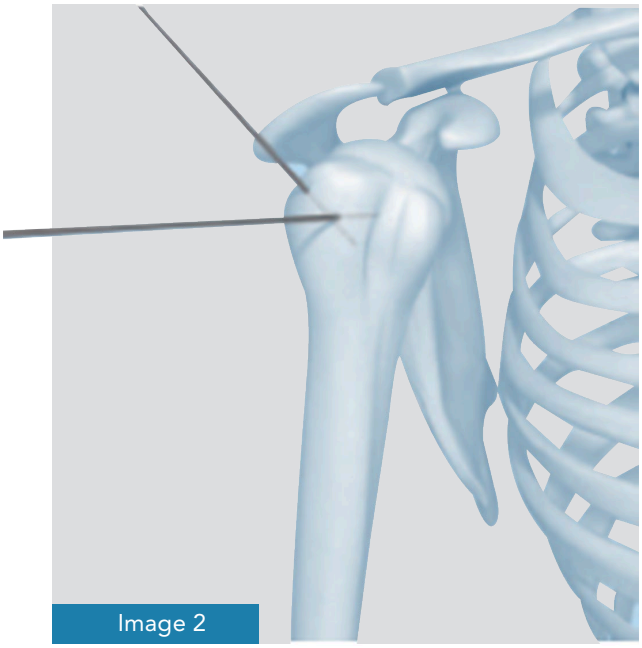


Image 2

6. Insertion and temporary fixation of the plate

Before placing the plate on the bone, screw a 2.7mm Titanium threaded drill guide (code 264.27X) into the peripheral holes of the plate head. Use the threaded guides as manipulation elements to place the plate on the bone.

Insert the plate and place it on the reduced bone, between the K-wires inserted in step 5 (see picture 3). Provisionally fix the plate with a cortex screw through the elongated combination hole in the plate body. If necessary, insert K-wires through the drill guide to temporarily fix the humeral head. (see image 4)

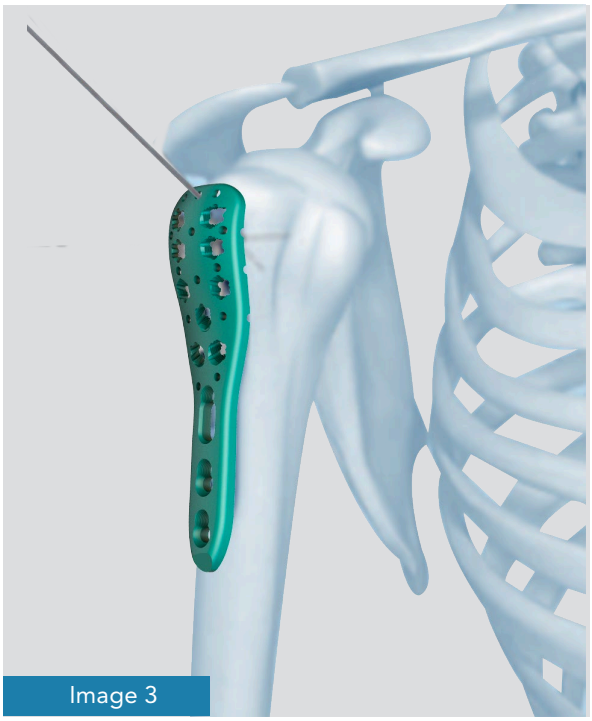


Image 3

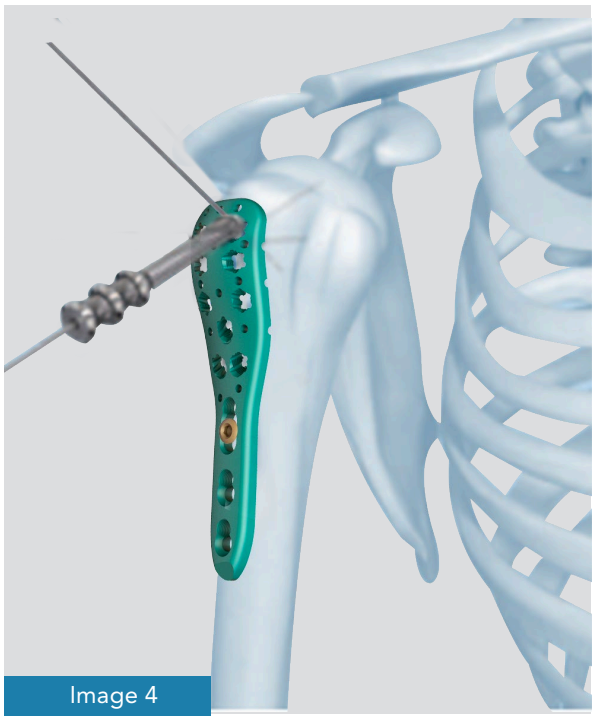


Image 4

7. Pre-drilling of the lateral cortex and determination of the length of the proximal screws.

Insert the drill guide into the desired hole of the PROH-LOCK 2. Through the drill guide, drill t h e lateral cortex with the Ø2.7 drill bit (see picture 5). Repeat the same procedure with all required proximal holes.

Remove the drill guide.

Insert the depth gauge and carefully advance it to the humeral head. Stop advancing when you feel an increase in bone density. Read directly on the depth gauge the appropriate screw length (see picture 6).

Warning: Do not advance the depth gauge across the articular surface.

Note: The tip of the depth gauge should be located 5 to 8 mm below the articular surface

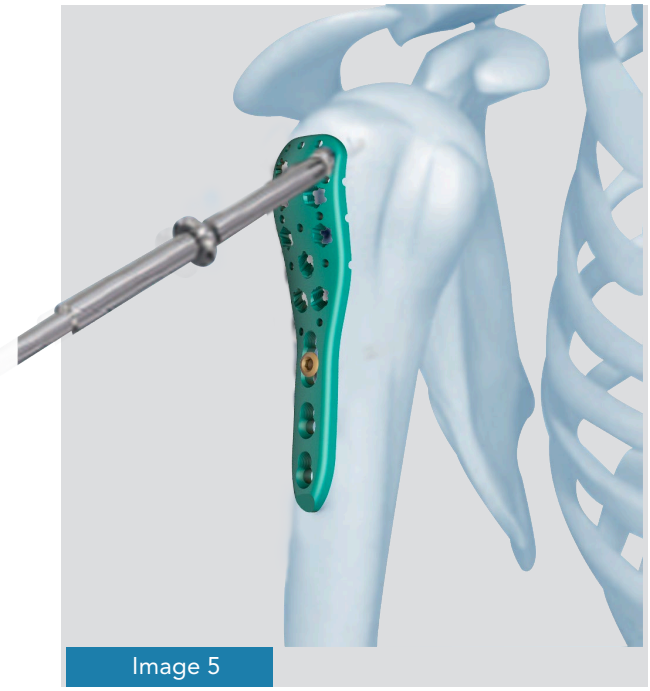


Image 5

Image 6

8. Insertion of proximal screws

Insert the locking screw with the hexagonal screwdriver part mounted on the 1.5 Nm torque adapter. Angular stability decreases if a locking screw is inserted obliquely. Insert the screw until you hear a click. If using a motor, reduce the speed by tightening the head of the locking screw on the plate (see picture 7).

Repeat the same procedure for all required proximal holes

Note: The plate should be fixed with at least 4 proximal screws. In case of poor bone quality, multiple fixation with all screws is recommended.

9. Insertion of distal screws into the plate body: cortex screws

The holes in the distal part of the plate (those from section F to g in the figure on page 4) are ALP combination holes, which can be fixed with a cortex screw to generate interfragmentary compression. In such a case, the screws are inserted by the usual procedure for fixing standard ALP plates, but using the universal drill guide INSTEAD of the ALP drill guide. (see picture 8)

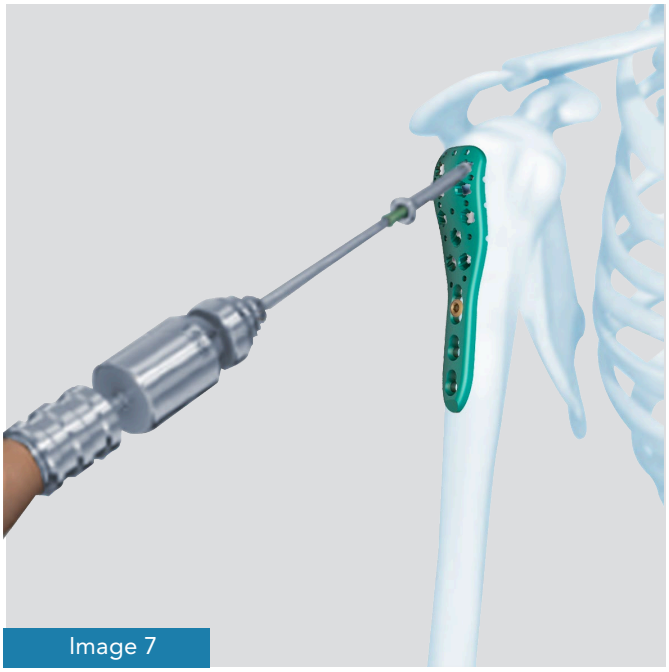


Image 7

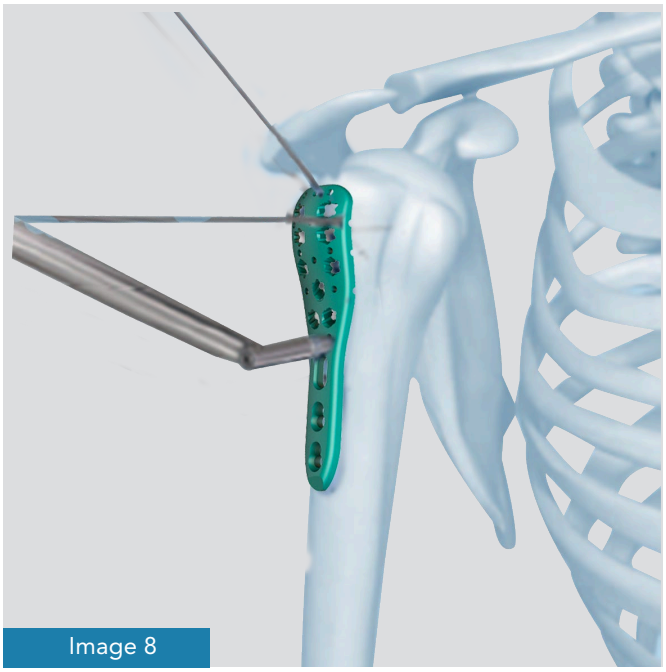


Image 8

10. Insertion of distal screws into the plate body: locking screws

10.1 a) Placement of the ALP drill guide

Carefully place the drill guide into the threaded portion of the desired combination hole until it is fully seated in the thread. The drill guide ensures that the screw is properly locked into the plate. Angular stability decreases if a locking screw is inserted obliquely (see picture 9)

10. b) Pre-drilling and insertion of the screw

Drill a pre-drill through the hole with a Ø 2.7 mm drill bit, bicortical type (see picture 10).
Remove the drill guide

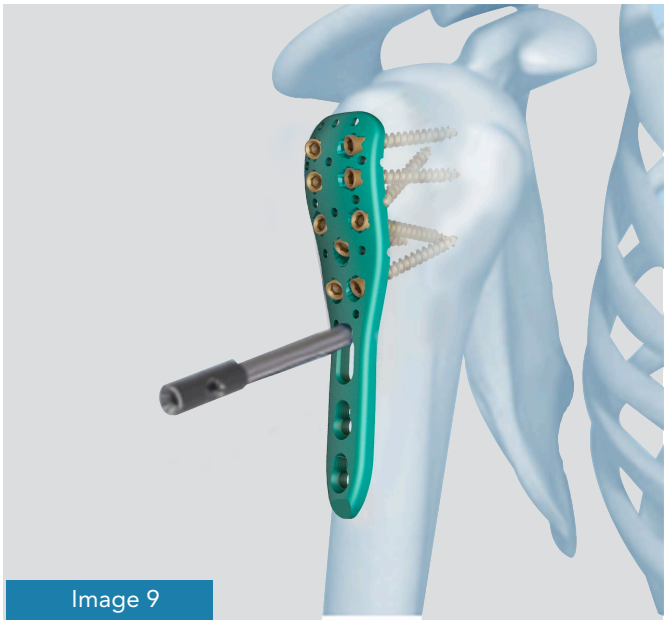


Image 9

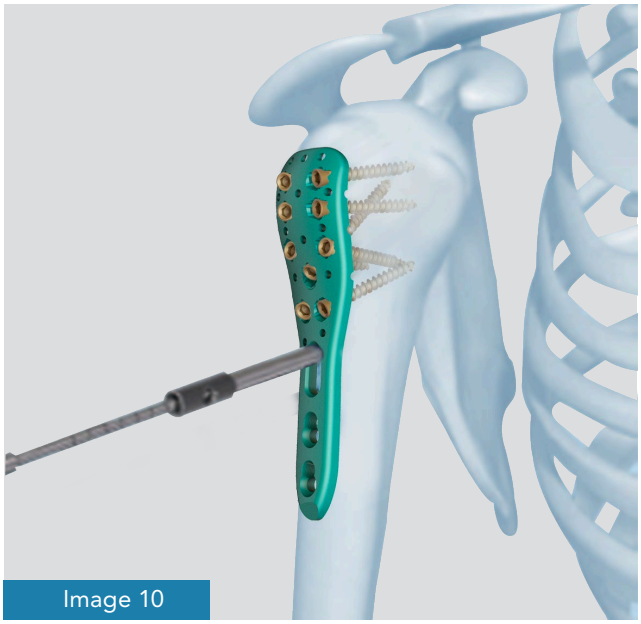


Image 10

Use the depth gauge to determine the proper screw length (see picture 11).

Insert the locking screws according to the procedure described in point 8. The distal locking screws should be locked in the combined hole at a 90° angle to ensure optimum stability.

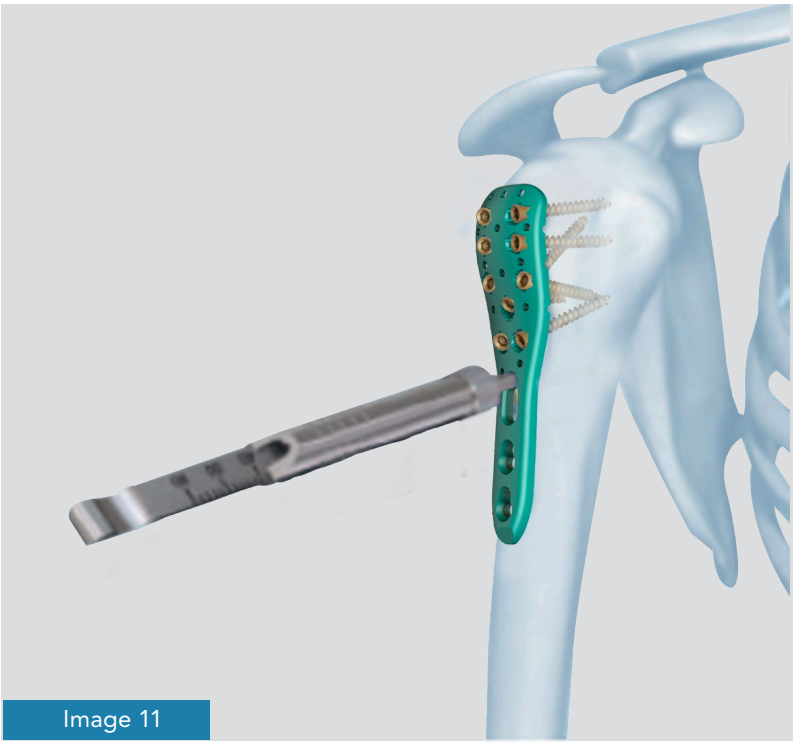


Image 11

11. Suture fixation

Remove the PROH-LOCK 2 guide from the plate.
If you have not already done so, tie the sutures through the indicated holes in the plate. This assembly functions as a tension strap and transmits the forces from the rotator cuff, through the plate, to the humeral shaft, while preventing the fragments from shifting during the early stages of rehabilitation.

12. Final check

Before closing the surgical wound, check the length of the screws with the image intensifier over the entire range of glenohumeral mobility, and make sure that they do not pass through the articular surface (see image I, II and III).

Note: It is important to check the length of the screws in all planes, as their angulation and direction are sometimes difficult to visualize.

Check the stability of the sutures. Sutures should not break during mobilizaton

13. Implant removal

The decision to remove the implant corresponds to the treating physician. It is recommended to remove the implant once the consolidation process is completed, whenever it is feasible and adequate for the patient. To remove the screws, first clear the head of the screw by removing the tissues that may have penetrated the hexagonal entry to ensure that the screwdriver enters correctly and reduce the risk of damage to the screw that may prevent its removal. Unscrew all the screws and remove them in order to extract the plate

I

II

III

IMPLANTS AND INSTRUMENTS

IMPLANTS

ALP titanium proximal humerus plate Proh-Lock 2 Right

130.03R ALP titanium proximal humerus plate Proh-Lock 2 right 3 holes
130.05R ALP titanium proximal humerus plate Proh-Lock 2 right 5 holes

ALP titanium proximal humerus plate Proh-Lock 2 left

130.03L ALP titanium proximal humerus plate Proh-Lock 2 left 3 holes
130.05L ALP titanium proximal humerus plate Proh-Lock 2 left 5 holes

ALP titanium proximal humerus plate Proh-Lock 2 Large right

129.04R ALP titanium proximal humerus plate Proh-Lock 2 Large right 4 holes
129.06R ALP titanium proximal humerus plate Proh-Lock 2 Large right 6 holes
129.08R ALP titanium proximal humerus plate Proh-Lock 2 Large Large right 8 holes
129.10R ALP titanium proximal humerus plate PROH-LOCK 2 Large right 10 holes

ALP titanium proximal humerus plate Proh-Lock 2 Large Left

129.04L ALP Plate for proximal humerus ProH-Lock II Large left 4 holes
129.06L ALP Plate for proximal humerus ProH-Lock II Large left 6 holes
129.08L ALP Plate for proximal humerus ProH-Lock II Large left 8 holes
129.10L ALP Plate for proximal humerus ProH-Lock II Large left 10 holes

Tornillos

106.12 3.5mm titanium cortex locking screw 12 mm
106.14 3.5mm titanium cortex locking screw 14 mm
106.16 3.5mm titanium cortex locking screw 16 mm
106.18 3.5mm titanium cortex locking screw 18 mm
106.20 3.5mm titanium cortex locking screw 20 mm
106.22 3.5mm titanium cortex locking screw 22 mm
106.24 3.5mm titanium cortex locking screw 24 mm
106.26 3.5mm titanium cortex locking screw 26 mm
106.28 3.5mm titanium cortex locking screw 28 mm
106.30 3.5mm titanium cortex locking screw 30 mm
106.32 3.5mm titanium cortex locking screw 32 mm
106.34 3.5mm titanium cortex locking screw 34 mm
106.36 3.5mm titanium cortex locking screw 36 mm
106.38 3.5mm titanium cortex locking screw 38 mm
106.40 3.5mm titanium cortex locking screw 40 mm
106.45 3.5mm titanium cortex locking screw 45 mm
106.50 3.5mm titanium cortex locking screw 50 mm
106.55 3.5mm titanium cortex locking screw 55 mm
106.60 3.5mm titanium cortex locking screw 60 mm

112.12 3.5mm Titanium Cortex Screw 12 mm
112.14 3.5mm Titanium Cortex Screw 14 mm
112.16 3.5mm Titanium Cortex Screw 16 mm
112.18 3.5mm Titanium Cortex Screw 18 mm
112.20 3.5mm Titanium Cortex Screw 20 mm
112.22 3.5mm Titanium Cortex Screw 22 mm
112.24 3.5mm Titanium Cortex Screw 24 mm
112.26 3.5mm Titanium Cortex Screw 26 mm
112.28 3.5mm Titanium Cortex Screw 28 mm
112.30 3.5mm Titanium Cortex Screw 30 mm
112.32 3.5mm Titanium Cortex Screw 32 mm
112.34 3.5mm Titanium Cortex Screw 34 mm
112.36 3.5mm Titanium Cortex Screw 36 mm
112.38 3.5mm Titanium Cortex Screw 38 mm
112.40 3.5mm Titanium Cortex Screw 40 mm
112.45 3.5mm Titanium Cortex Screw 45 mm
112.50 3.5mm Titanium Cortex Screw 50 mm
112.55 3.5mm Titanium Cortex Screw 55 mm
112.60 3.5mm Titanium Cortex Screw 60 mm

107.12 3.5mm titanium cancellous locking screw 12 mm
107.14 3.5mm titanium cancellous locking screw 14 mm
107.16 3.5mm titanium cancellous locking screw 16 mm
107.18 3.5mm titanium cancellous locking screw 18 mm
107.20 3.5mm titanium cancellous locking screw 20 mm
107.22 3.5mm titanium cancellous locking screw 22 mm
107.24 3.5mm titanium cancellous locking screw 24 mm
107.26 T3.5mm titanium cancellous locking screw 26 mm
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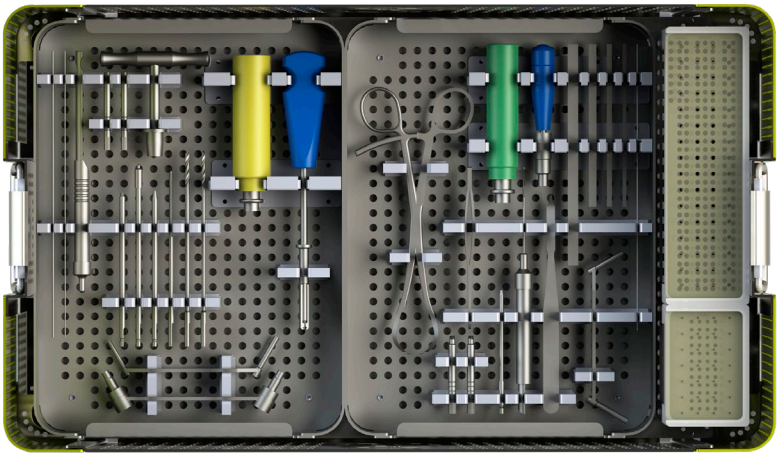
107.40 3.5mm titanium cancellous locking screw 40 mm
107.45 3.5mm titanium cancellous locking screw 45 mm
107.50 3.5mm titanium cancellous locking screw 50 mm
107.55 3.5mm titanium cancellous locking screw 55 mm
107.60 3.5mm titanium cancellous locking screw 60 mm

INSTRUMENTAL

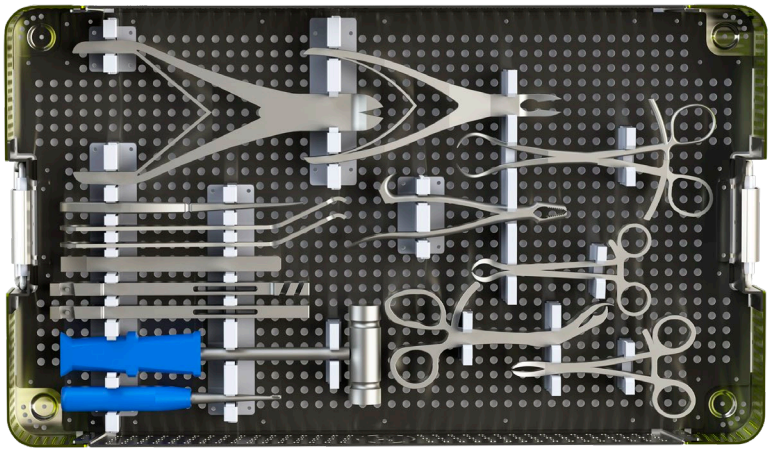
ALP EQUIPMENT FOR SMALL FRAGMENTS

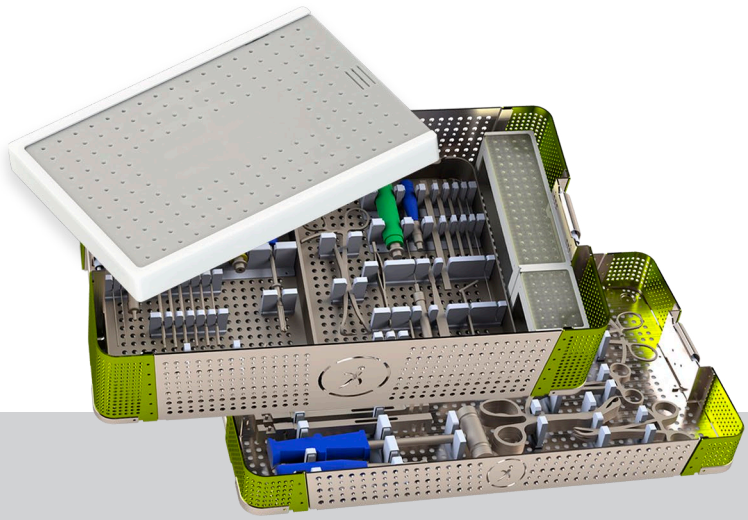
QTY.	EQUIPMENT
1	Eccentric neutral Drill guide Ø 2.5mm
2	Ø 2.5 / 3.5 Double Drill guide
1	Hexagon screwdriver tip with AO anchor Ø2.5mm
1	Screw extractor tip (with cone tip) Ø2.5mm
1	Countersink tip Ø6mm
1	Reamer Tip (Punch) for Small Fragments Ø 6.5 mm
1	T-Handle with quick coupling (AO)
1	Tap point Ø3.5mm
1	Handle with torque wrench AO anchor Ø1.5 NM
1	Depth gauge stainless steel Ø60mm
2	Guide wire with threaded tip Ø1.1mm
2	Kirschner Wire Ø1.6mm
1	Screwdriver with hexagon tip for 3.5/4.0 w/holder screw Ø2.5mm
1	Drill bit with AO anchor Ø2.5 x 150mm
1	Drill bit with AO anchor Ø2.7 x 150mm
1	Drill bit with AO anchor Ø3.5 x 150mm
2	2.7mm Titanium threaded drill guide (code 264.27X)



ALP SUPPORT EQUIPMENT FOR SMALL FRAGMENTS

QTY.	EQUIPMENT
2	Hohmann spacers (pair) 8/22
2	Mini lane
2	Multitoothed tweezers
2	Field type clamp 13.5mm
1	Kirschner cutter f/pin kirschner
1	Volkman spoon 17cm
1	Gouge forceps 20 cm
1	Triscators for small fragments
1	Osteotomo mini lambotte 8mm
1	Osteotomo mini lambotte 12mm
1	Periosteal elevator 9 mm
2	Verbrugge clamp 17.5cm
1	Hammer 200 G
1	Field type clamp 20cm
1	16 cm multitoothed tweezers
1	Stop end clamp 120 cm
2	Hexagon screwdriver tip with AO T8 anchor Ø2.5mm
1	Handle with torque AO green 0.8 NM
1	Osteotome mini-lamb Ø3 x 125mm
1	Osteotome mini-lamb Ø4 x 125mm
1	Osteotome mini-lamb Ø6 x 125mm
1	Osteotome mini-lamb Ø8 x 125mm
1	Watchmaker handle with blue AO input Ø2.5mm
2	Drill guide / sleeve Ø2.0 / 2.5mm
2	Drill bit with AO anchor Ø2.0 x 125mm
1	Lionter gauge 50mm
1	Ø 2.0/2.7mm Double Drill guide
1	Adson brown forceps
2	Mini-Hohmann spacer Ø 6mm
2	Kirschner Wire Ø1.1 X 100mm





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NOTES

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