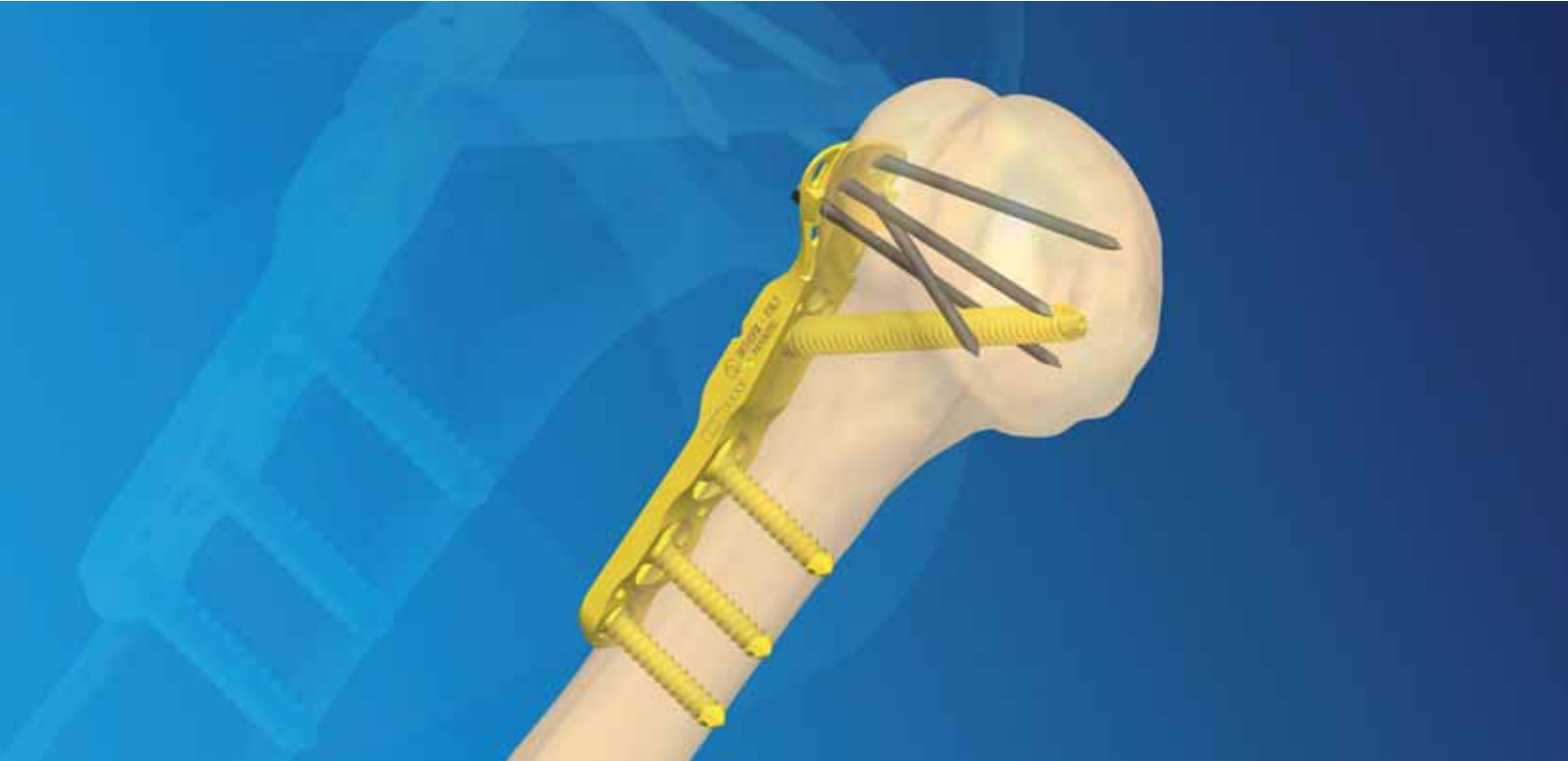




# CONTOURS PHP™

Proximal Humeral Plate



## Contours PHP Proximal Humeral Plate



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Orthofix wishes to thank  
the following surgeons for their contribution  
to the development of the technique:

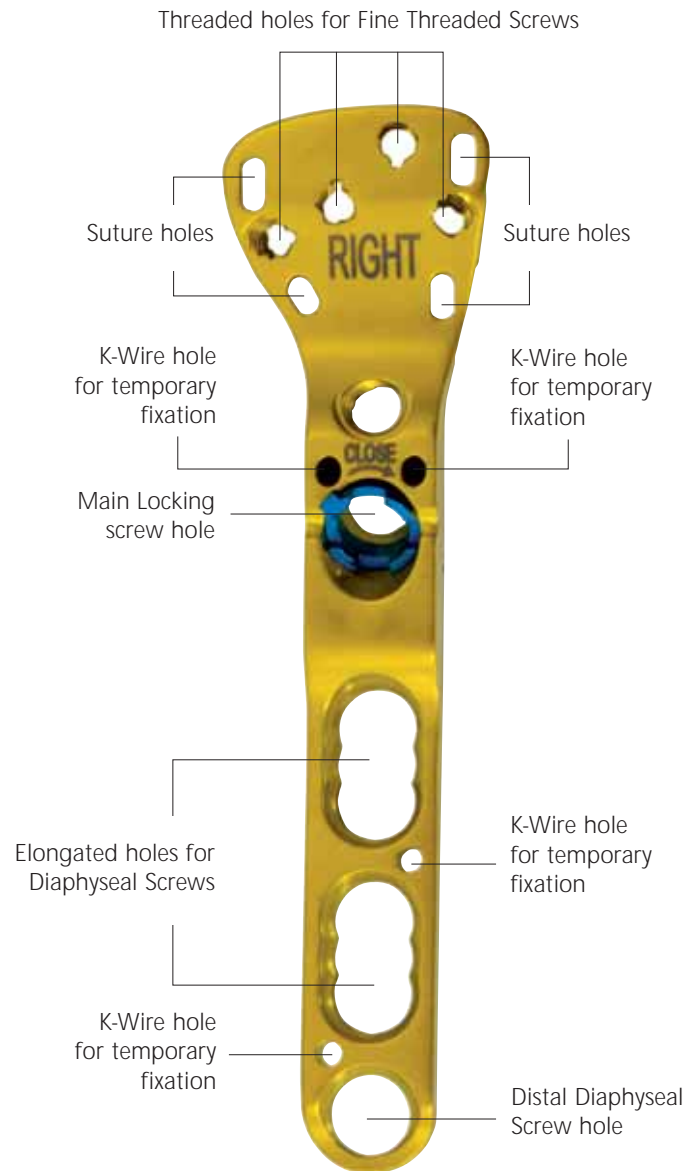
L. CELLI, PROF.  
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## INTRODUCTION

Proximal humeral fractures are common particularly in the elderly. A decision on the optimal treatment is dependent on many factors, of which the fracture type, the biological age of the patient and the bone structure are most important. The living conditions and individual patient needs should also be considered. Most fractures with minimal displacement respond satisfactorily to simple conservative treatment. Recently there has been a trend towards more aggressive surgical intervention even in moderately displaced fractures, and in severely unstable fractures with marked fragment displacement operative stabilization is now advocated by most surgeons. In the most severe fractures (4-segment-fractures and fracture-dislocations according to Neer, C-2- and C-3-fractures according to the AO-classification) there is still controversy on the best management. Many authors prefer hemiarthroplasty in this situation but some orthopaedic surgeons prefer open reduction and internal fixation, particularly in younger individuals.<sup>1,2,3</sup> In spite of good stabilisation techniques partial or total humeral head necrosis often occurs in fractures. Surprisingly enough results with reasonable function can be obtained even with partial avascular necrosis of the humeral head. A crucial part of the management is team work with the physiotherapist and an individual program for each fracture situation, depending on the stability of the fixation. The management of proximal humeral fractures is fairly standardised but it is always dependent on the experience and resources of the attending surgeon and must be tailored to the individual needs of the patient.

## References

1. Fankhauser F, Boldin C, Schippinger G, Haunschmid C, Szyszkowitz R. A new locking plate for unstable fractures of the proximal humerus. *Clin Orthop*. 2005 Jan;(430):176-81.
2. Hente R, Kampshoff J, Kinner B, Fuchtmeier B, Nerlich M. Treatment of dislocated 3- and 4-part fractures of the proximal humerus with an angle-stabilizing fixation plate. *Unfallchirurg*. 2004 Sep;107(9):769-82.
3. Lill H, Hepp P, Rose T, Konig K, Josten C. The angle stable locking-proximal-humerus-plate (LPHP) for proximal humeral fractures using a small anterior-lateral-deltoid-splitting-approach - technique and first results. *Zentralbl Chir*. 2004 Jan;129(1):43-8.



## FEATURES

- Triangular configuration (of the Main Locking Screw and the Fine Threaded Screws)
- Designed to reduce the amount of bone stock removed from the humeral head
- Low head profile designed to avoid impingement
- Anatomically shaped: designed both for the right and the left humerus
- Made of Titanium Alloy
- Suture holes with large groove designed for easy needle insertion

## Proximal locking

### MAIN LOCKING SCREWS



#### 6.0-5.6mm thread diameter

- Cannulated screw
- Self-cutting tip
- Anti-migration collar

### FINE THREADED SCREWS



#### 2.2mm thread diameter

- +/- 15° free angulation to achieve a convergent configuration for fragment stability
- Automatic breakaway
- Hexagonal head for easy removal

## Distal locking

### DIAPHYSEAL SCREWS



#### 4.5mm thread diameter

### REVISION SCREWS



#### 6.5mm thread diameter

Note: Revision screws are available for use when the thread of a standard screw does not have sufficient purchase for any reason.

## INDICATIONS

The Orthofix Contours PHP Proximal Humeral Plate is intended for fractures, osteotomies and non-unions of the proximal humerus, particularly in osteopenic bone.

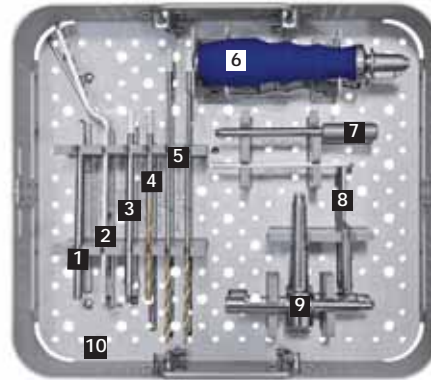


## EQUIPMENT REQUIRED

General surgical instrumentation for open limb surgery, including tissue retractors of various sizes, should be available.

### INSTRUMENTATION TRAY

Code	Description
1) TP3106	Quick connect Screwdriver for hexagonal head
2) TP1145	Ruler
3) TP3102	3.5mm quick connect Screwdriver
4) 1-TP3107	Cannulated Drill Bit (Ø 4.8mm) quick connect
5) 1-TP1104	Drill Bit (Ø 3.2mm) quick connect
6) TP3150	Handle (soft touch) quick connect
7) TP3108	Plate Holder
8) TP1100	Drill Guide (Ø 3.2mm)
9) TP1101	Locking T-Wrench
10) TP3995	Tray empty



### STERILE PACKED ITEMS

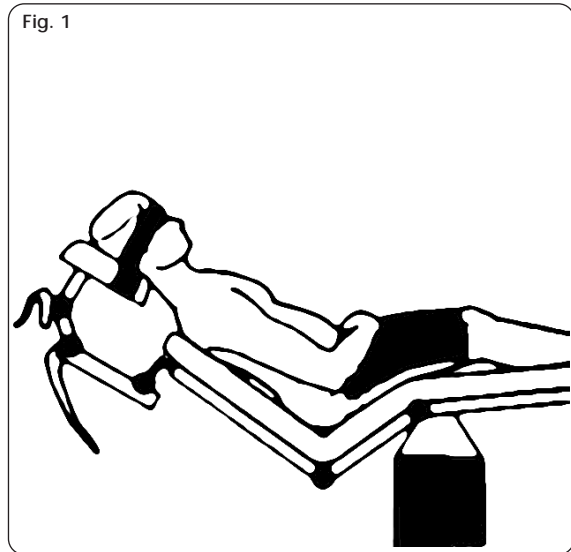
Code	Description
99-TP3000	Proximal Humeral Plate right
99-TP3001	Proximal Humeral Plate left
99-TP1640	Main Locking Screw (Ø 6.0mm) L. 40mm
99-TP1645	Main Locking Screw (Ø 6.0mm) L. 45mm
99-TP1650	Main Locking Screw (Ø 6.0mm) L. 50mm
99-TP1655	Main Locking Screw (Ø 6.0mm) L. 55mm
99-TP1660	Main Locking Screw (Ø 6.0mm) L. 60mm
99-TP1422	Diaphyseal Screw (Ø 4.5mm) L. 22mm
99-TP1424	Diaphyseal Screw (Ø 4.5mm) L. 24mm
99-TP1426	Diaphyseal Screw (Ø 4.5mm) L. 26mm
99-TP1428	Diaphyseal Screw (Ø 4.5mm) L. 28mm
99-TP1430	Diaphyseal Screw (Ø 4.5mm) L. 30mm
99-TP1432	Diaphyseal Screw (Ø 4.5mm) L. 32mm
99-TP1434	Diaphyseal Screw (Ø 4.5mm) L. 34mm
99-TP1436	Diaphyseal Screw (Ø 4.5mm) L. 36mm
99-TP1526	Revision Screw (Ø 6.5mm) L. 26mm
99-TP1528	Revision Screw (Ø 6.5mm) L. 28mm
99-TP1530	Revision Screw (Ø 6.5mm) L. 30mm
99-TP1532	Revision Screw (Ø 6.5mm) L. 32mm
99-TP1534	Revision Screw (Ø 6.5mm) L. 34mm
99-TP1720	Fine Threaded Screw (Ø 2.2mm) L. 120/20mm (pack of two)
99-TP1725	Fine Threaded Screw (Ø 2.2mm) L. 120/25mm (pack of two)
99-TP1730	Fine Threaded Screw (Ø 2.2mm) L. 120/30mm (pack of two)
99-TP1735	Fine Threaded Screw (Ø 2.2mm) L. 120/35mm (pack of two)
99-TP1740	Fine Threaded Screw (Ø 2.2mm) L. 120/40mm (pack of two)
99-TP1745	Fine Threaded Screw (Ø 2.2mm) L. 120/45mm (pack of two)
99-TP1750	Fine Threaded Screw (Ø 2.2mm) L. 120/50mm (pack of two)
99-TP1755	Fine Threaded Screw (Ø 2.2mm) L. 120/55mm (pack of two)
99-TP1111	K-Wire (Ø 2mm) L. 200mm (pack of four)
99-1-TP3107	Cannulated Drill Bit (Ø 4.8mm) quick connect (sterile)
99-1-TP1104	Drill Bit (Ø 3.2mm) quick connect (sterile)

## OPERATIVE TECHNIQUE

### Patient Positioning

Standard X-rays in both planes should be taken. A CT-scan will help to identify the size and position of the fragments. Joint replacement should be considered in cases which are clearly not reconstructable. Positioning of the Main Locking Screw, Diaphyseal Screw, Fine threaded Screws and cerclage wires or sutures should be included in the planning.

The patient should be positioned supine or in a beach chair position. The humerus should be freely mobile on the side of the operating table with an unobstructed image intensifier view (Fig. 1).

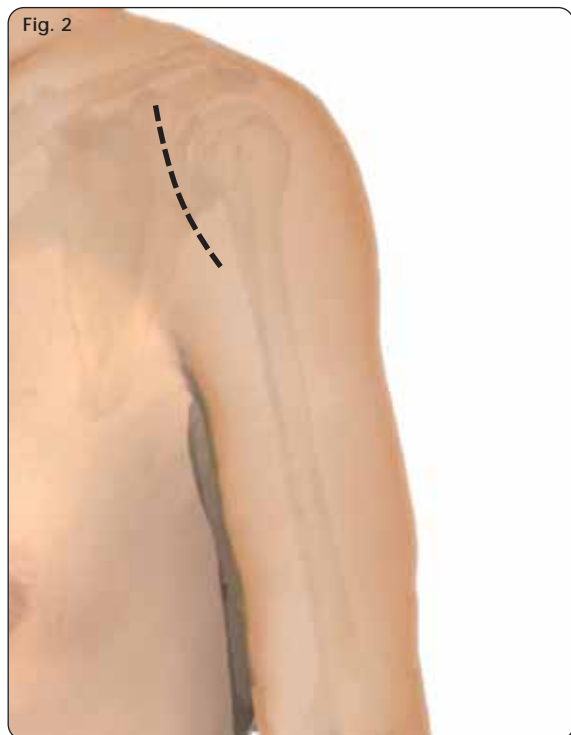


### Surgical Approach

A 3-5 cm incision is carried out over the delto-pectoral groove (Fig. 2). Preliminary reduction should be carried out before the plate is inserted.

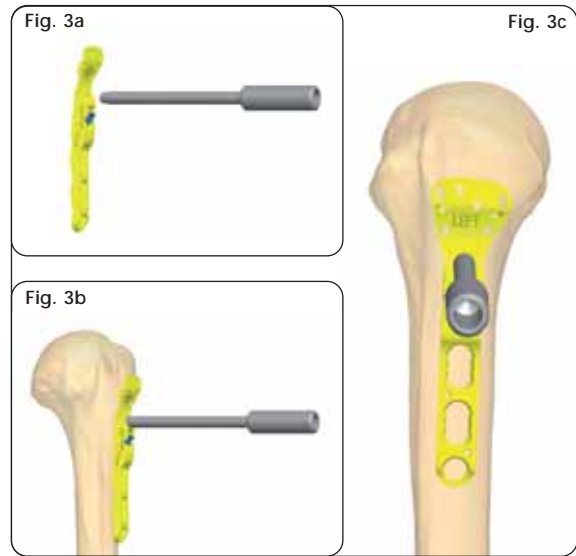
### Fracture Reduction

Reduce the fracture fragments and confirm the reduction under image intensification. The humeral head and tuberosity fragments may be manipulated and provisionally fixed with sutures and/or K-Wires. However, K-Wires should be placed where they will not interfere with plate application.

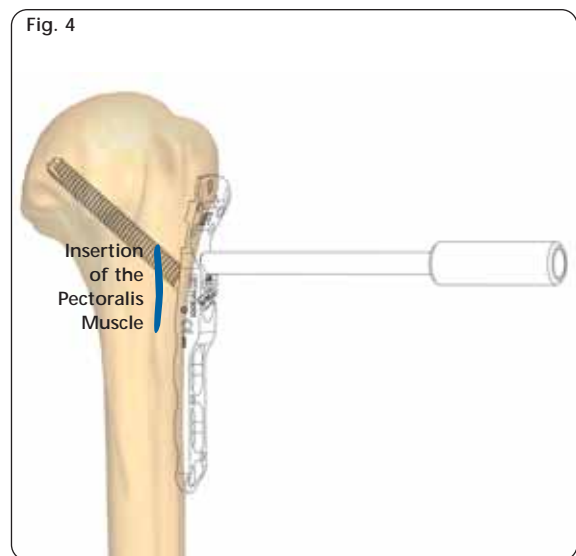


**Plate Application**

Attach the Plate Holder (TP3108) to the plate (Fig. 3a). The plate is designed to be positioned on the antero-lateral face of the proximal humerus below the tip of the greater tuberosity, behind the bicipital groove (Fig. 3b and c). Its anatomical shape facilitates the positioning.



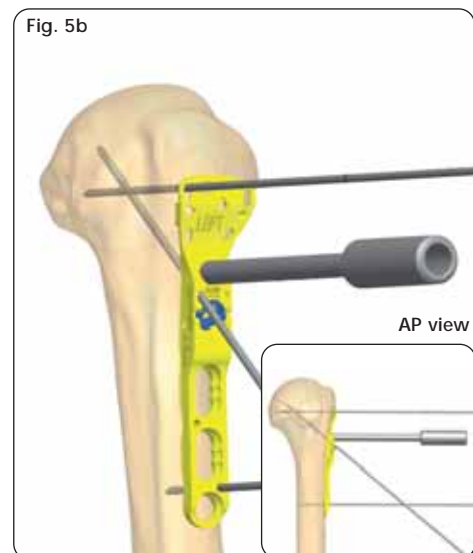
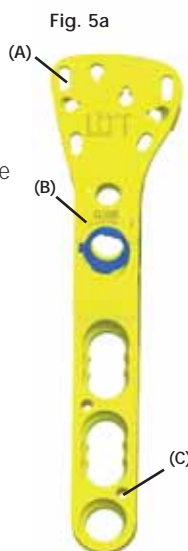
The position of insertion of the Main Locking Screw should be at the level of the Pectoralis Muscle, posterior to the bicipital groove (Fig. 4). The Biceps Brachii Tendon should be identified and protected.



The plate should be fixed temporarily by inserting three 200mm, Ø 2mm K-Wires (code 99-TP1111) into the bone, through the K-Wire hole (A), (B) and (C) (Fig. 5a and 5b), using a power drill. Care should be taken not to penetrate the second cortex. Check, under image intensification, the position of plate and K-Wire.

NOTE: The Main Locking Screw will be distal to the central K-Wire.

If needed, the wire should be cut using the appropriate wire cutter (W1003).





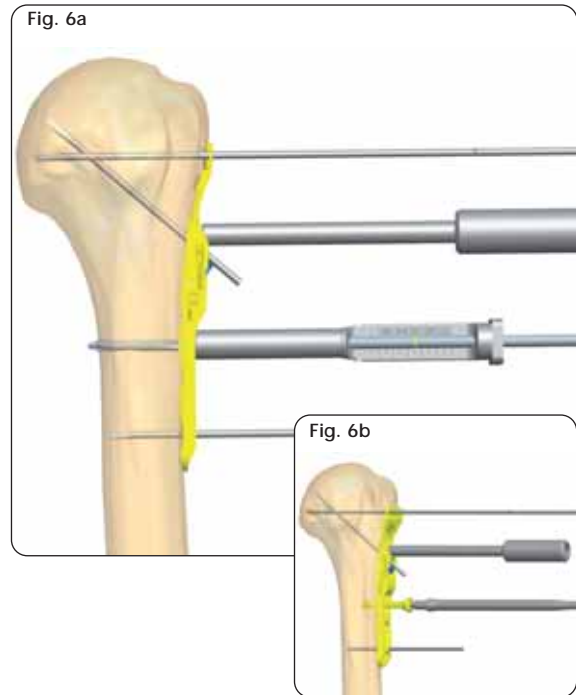
**Insertion of the first Diaphyseal Screw**

If the position is satisfactory, the 3.2mm Drill Guide (TP1100) is inserted into the central screw seat of one of the two elongated Diaphyseal Screw holes in the plate, depending on the position of the fracture line. A 3.2mm Drill Bit (1-TP1104 or 99-1-TP1104) is inserted into the Drill Guide and the bone drilled through the second cortex (Fig. 6a).

The correct length of the Diaphyseal Screw can be read on the scale of the Drill Guide. Alternatively it can be measured using the Cortical Depth Gauge. **NOTE:** The Cortical Depth Gauge TP1140 is not present in the tray and is available on request.

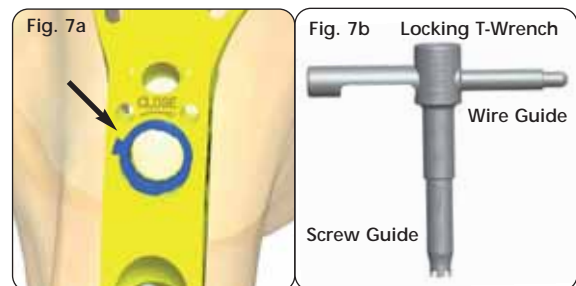
The Drill Bit and Drill Guide are then removed and the selected Diaphyseal Screw can now be inserted using the 3.5mm Screwdriver (Fig. 6b).

Remove the Plate Holder and the K-Wire (B) (Fig. 5a), using a power drill.



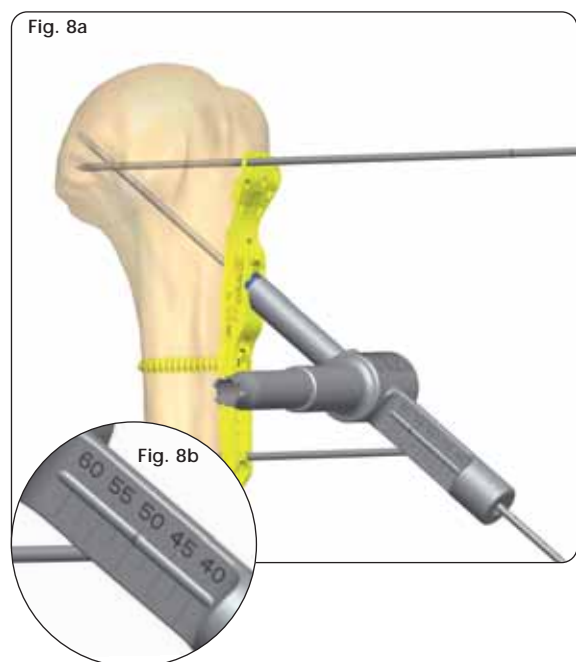
**Insertion of the Main Locking Screw**

The screw guide extremity of the Locking T-Wrench (TP1101) (Fig. 7b) is positioned in the Main Locking Screw hole to open the cam by turning it anticlockwise (Fig. 7a).



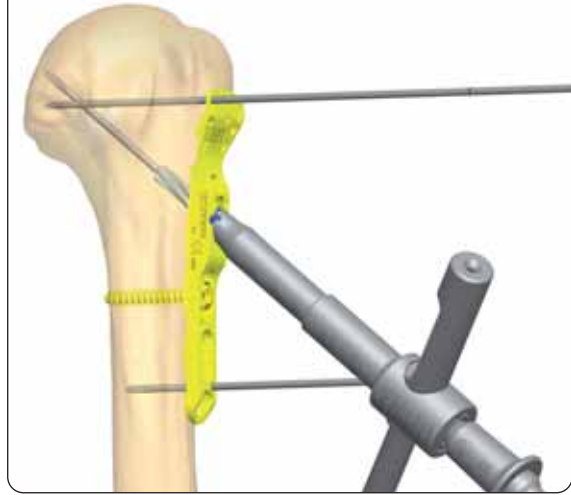
Then the Locking T-Wrench should be turned positioning its wire guide extremity into the Main Locking Screw hole with the scale facing upwards. Under image intensification insert a Ø 2mm, 200mm K-Wire (99-TP1111) through the wire guide into the humeral head, up to a safe distance from the articular surface (Fig. 8a).

The length of the Main Locking Screw to be inserted is read on the scale of the Locking T-Wrench from the mark on the K-wire (Fig. 8b).



Drill **ONLY THE FIRST CORTEX** over the wire with the Cannulated Drill Bit ( $\varnothing$  4.8mm) (1-TP3107 or 99-1-TP3107) (Fig. 9).

Fig. 9



Remove the Drill Bit and proceed with the Main Locking Screw insertion. A Main Locking Screw of correct length is then inserted over the wire into the Locking T-Wrench, by using the 3.5mm Screwdriver (TP3102) (Fig. 10).

Insert the screw until the Screwdriver continues to turn without advancing (because of the built-in stop).

**NOTE:** This indicates that the screw is locked onto the plate and is a safety feature that prevents over-tightening of the screw and damage of the periosteum by the plate.

Fig. 10



The cam is now tightened by turning the Locking T-Wrench clockwise, in the direction of the arrow on the plate (Fig. 11a and b). The Screwdriver, K-Wires and T-Wrench are then removed.

Fig. 11a

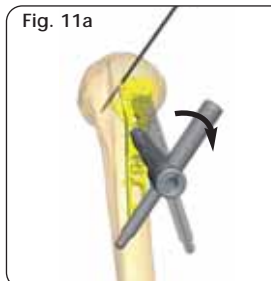
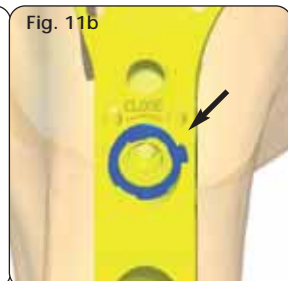
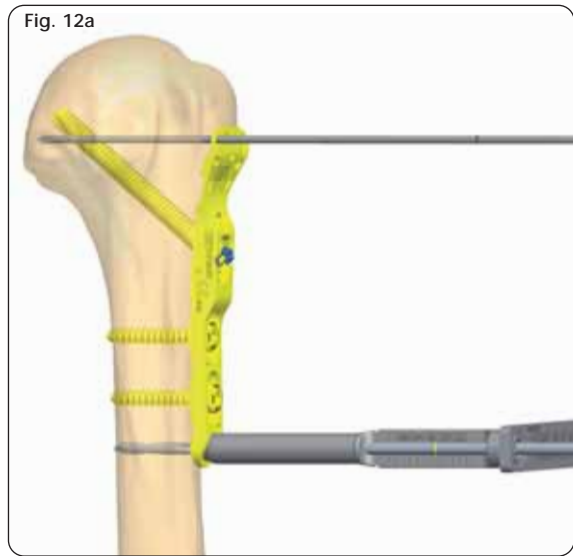


Fig. 11b

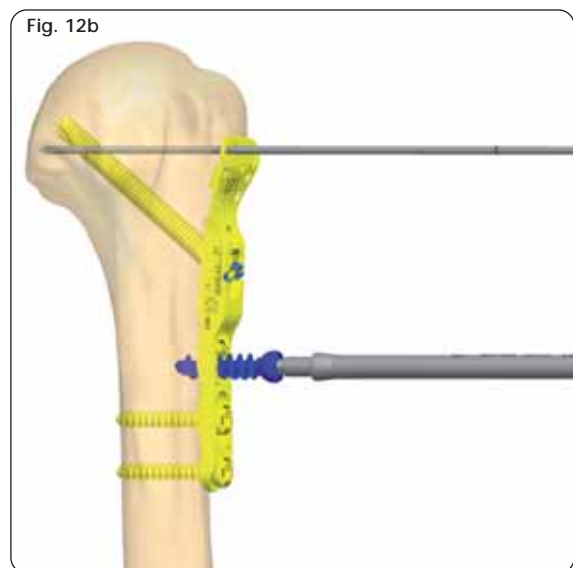


**Insertion of remaining Diaphyseal Screws**

The remaining Diaphyseal Screws are now inserted, after measuring their length as described above (Fig. 12a).

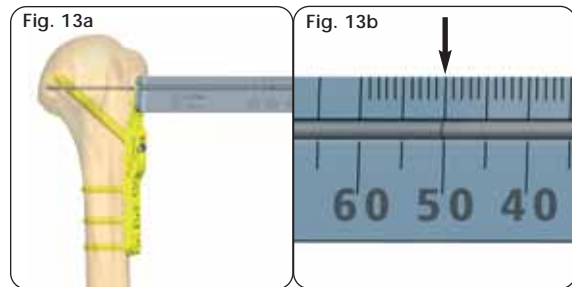


**NOTE:** Revision Screws are available for use when the thread of a standard screw does not have sufficient purchase in the bone for any reason (Fig. 12b).

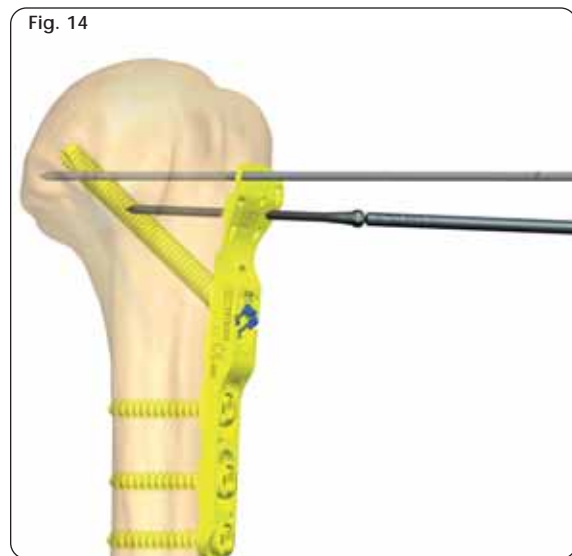


**Insertion of Fine Threaded Screws and cerclage**

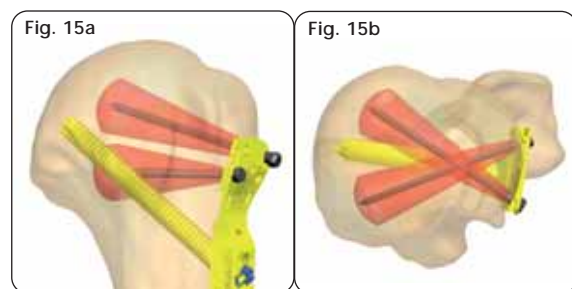
With the appropriate ruler (TP1145), the length of the Fine Threaded Screws is measured over K-Wires (Fig. 13a and b).



Using a power drill, Fine Threaded Screws are inserted through one of the threaded holes in the proximal part of the plate (Fig. 14). After insertion, the wire will break automatically at the level of the breakaway groove.



The Fine Threaded Screws can be oriented in a convergent configuration which provides stability to the fracture, and it is compulsory to insert at least two of them (Fig. 15a and b).

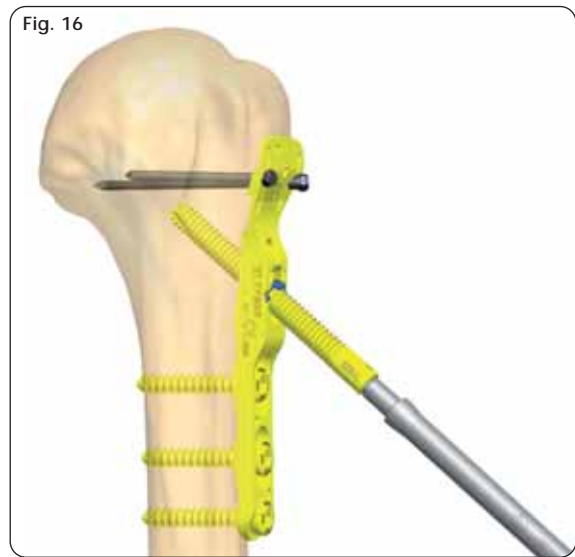


Depending on the fracture type, cerclage can be used to achieve further stabilization of bone fragments and/or tuberosities using titanium wire or polymeric sutures; **DO NOT** use stainless steel implants with the Orthofix Contours PHP.

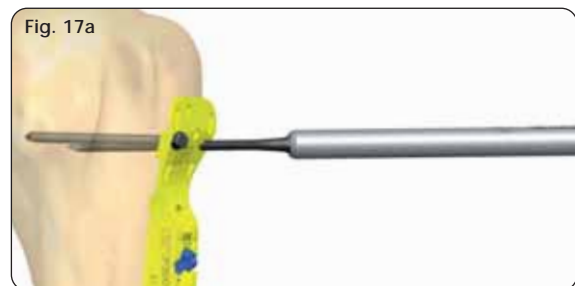
The clinical results of osteosynthesis of proximal humeral fractures depend strongly on the quality of the post-operative physiotherapy. The level of exercise loading and movement must be adapted to the type of osteosynthesis performed and the bone quality of the patient.

## REMOVAL OF THE PLATE

Unlock the cam by turning the Locking T-Wrench anti-clockwise. Using the 3.5mm Screwdriver remove the Main Locking Screw and the Diaphyseal Screws (Fig. 16).



Remove the Fine Threaded Screws with the 3.5mm Quick Connect Screwdriver with Internal Hexagon (TP3102). Extraction can be started manually by attaching the Handle (TP3150) to the Screwdriver and then completed with a power drill (Fig. 17a and b).







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