UP. EXTREMITY

surgical technique

Universal shoulder prosthesis

ARROW®
ANATOMICAL

FH ORTHOPEDICS
quality for health

TRADE REFERENCES

HUMERAL STEM

REFERENCE	DIAMETER	HEIGHT
260 516	Ø 08	120
257 320	Ø 08	170
260 517	Ø 10	125
260 519	Ø 12	130
260 521	Ø 14	135

CENTRED HUMERAL HEAD

REFERENCE	DIAMETER	HEIGHT
260 537	Ø 40	15
260 538	Ø 40	17
260 539	Ø 44	16
260 540	Ø 44	18
260 541	Ø 46	16
260 542	Ø 46	18
260 543	Ø 46	21
260 544	Ø 48	16
260 545	Ø 48	18
260 546	Ø 48	21
260 547	Ø 50	17
260 548	Ø 50	19
260 549	Ø 50	21
260 550	Ø 54	19
260 551	Ø 54	21

OFF-CENTRED HUMERAL HEAD

REFERENCE	DIAMETER	HEIGHT
260 526	Ø 44	16
260 527	Ø 44	18
260 528	Ø 46	16
260 529	Ø 46	18
260 530	Ø 46	21
260 531	Ø 48	16
260 532	Ø 48	18
260 533	Ø 48	21
260 534	Ø 50	17
260 535	Ø 50	19
260 536	Ø 50	21

CEMENTED GLENOID

REFERENCE	SIZE
260 522	44
260 523	46
260 524	48
260 525	50

GLENOID INSERT

REFERENCE	SIZE
260 556	44
260 557	46
260 558	48
260 559	50

METAL-BACK GLENOID BASE

REFERENCE	SIZE
260 552	44
260 553	46
260 554	48
260 555	50

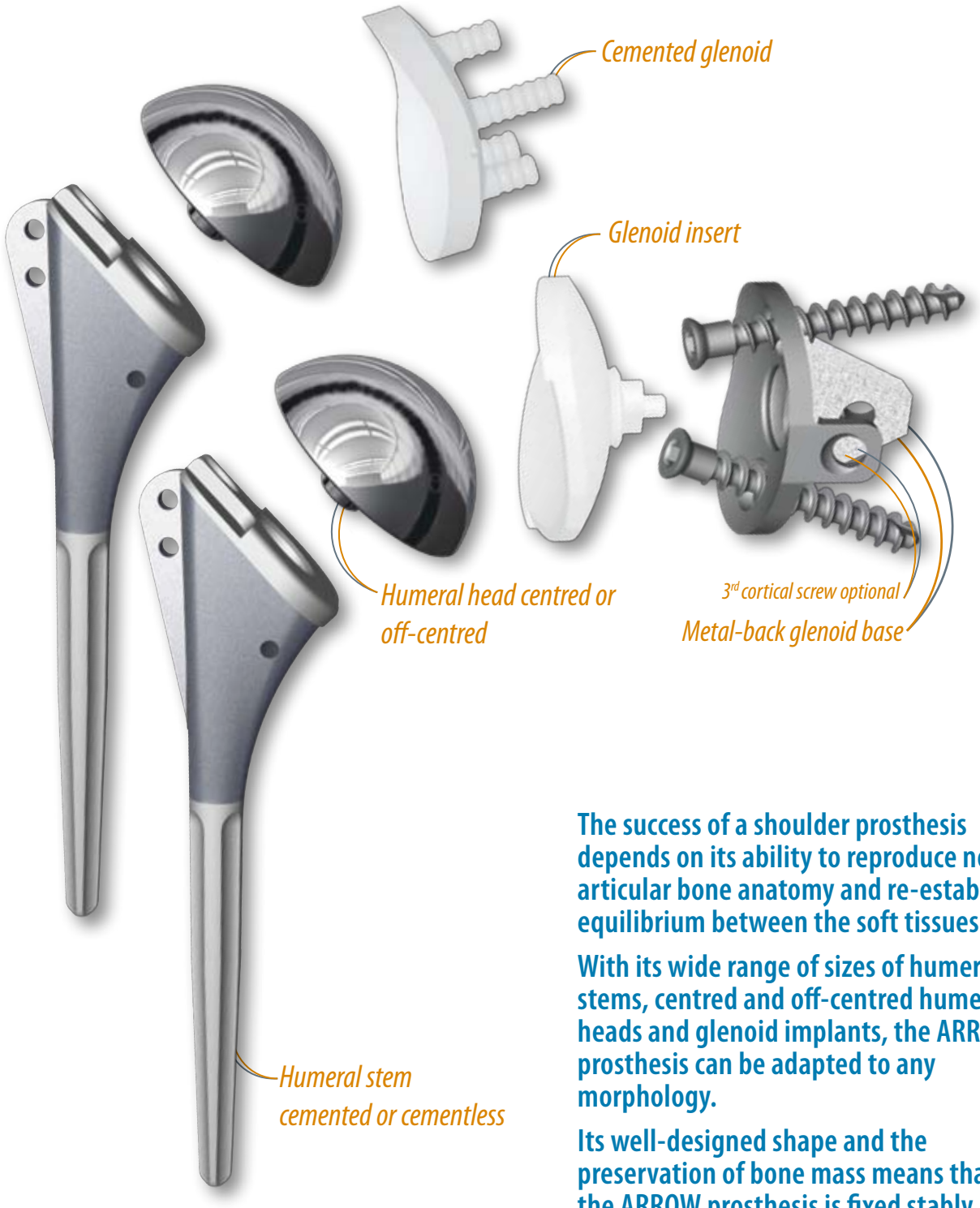
CANCELLOUS BONE SCREW

REFERENCE	DIAMETER	LENGTH
260 576	Ø 5.5	32
260 577	Ø 5.5	36
260 578	Ø 5.5	40
260 584	Ø 5.5	45
260 585	Ø 5.5	50

CORTICAL BONE SCREW

REFERENCE	DIAMETER	LENGTH
260 595	Ø 4.5	32
260 596	Ø 4.5	34
260 597	Ø 4.5	36
260 598	Ø 4.5	38
260 599	Ø 4.5	40

optional



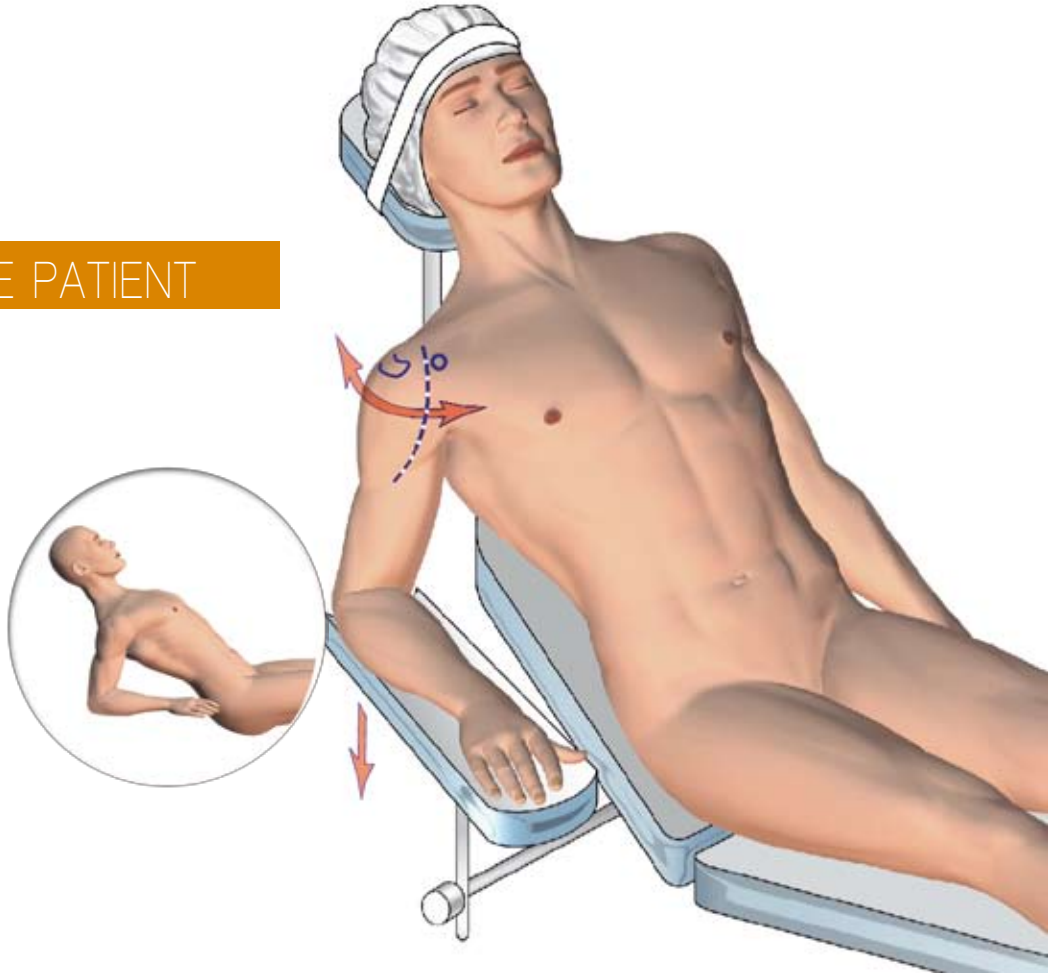
The success of a shoulder prosthesis depends on its ability to reproduce normal articular bone anatomy and re-establish equilibrium between the soft tissues.

With its wide range of sizes of humeral stems, centred and off-centred humeral heads and glenoid implants, the ARROW prosthesis can be adapted to any morphology.

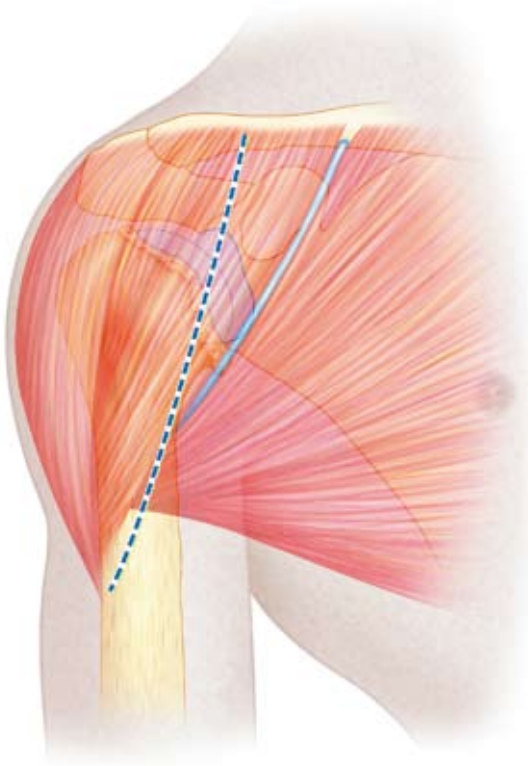
Its well-designed shape and the preservation of bone mass means that the ARROW prosthesis is fixed stably, guaranteeing an optimal life span.

POSITIONING THE PATIENT

- In a half-sitting position
- Upper limb free

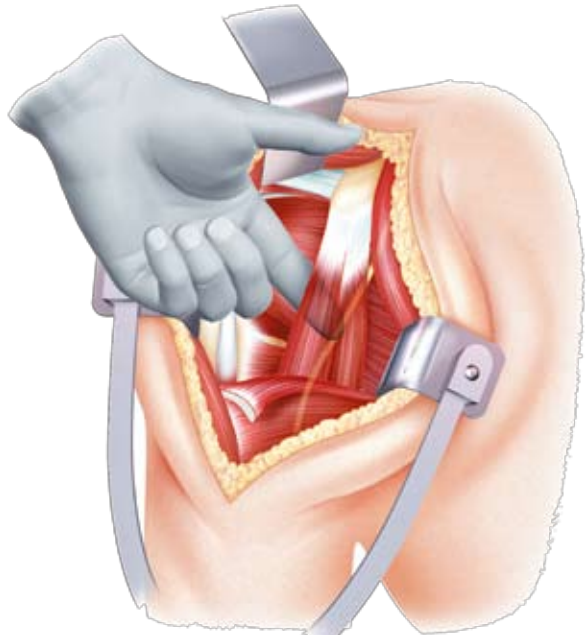


1 - DELTOPECTORAL INCISION

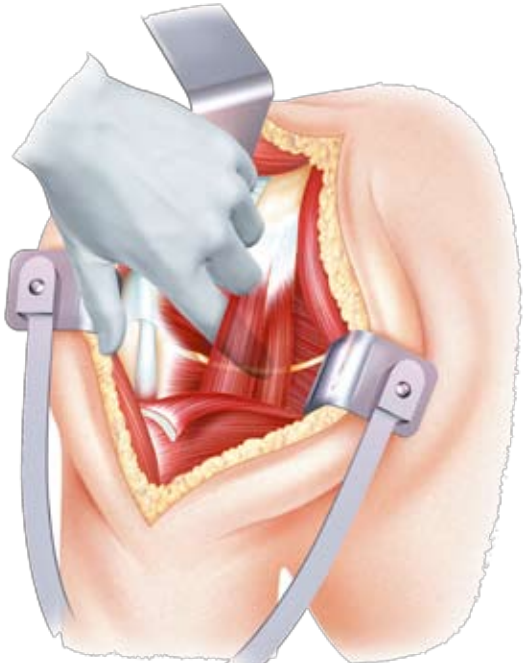


The deltopectoral incision is made from the clavicle to the superior border of the pectoralis major, along the deltopectoral groove, lateral to the coracoid.

The cephalic vein is retracted away.

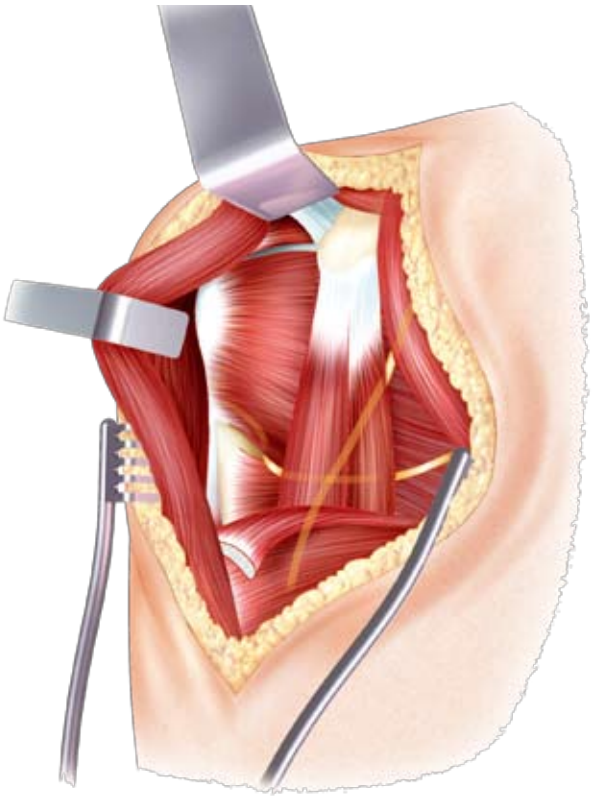


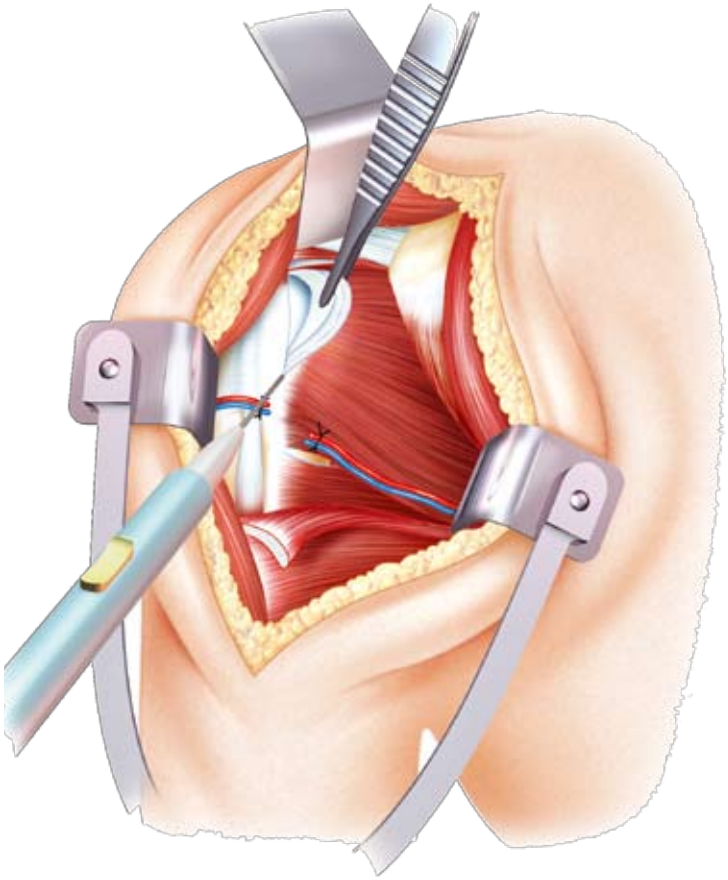
Find the position of the musculocutaneous nerve with the finger, before putting a retractor under the coracobrachialis muscle.



The position of the axillary nerve must be identified before sectioning the subscapularis muscle.

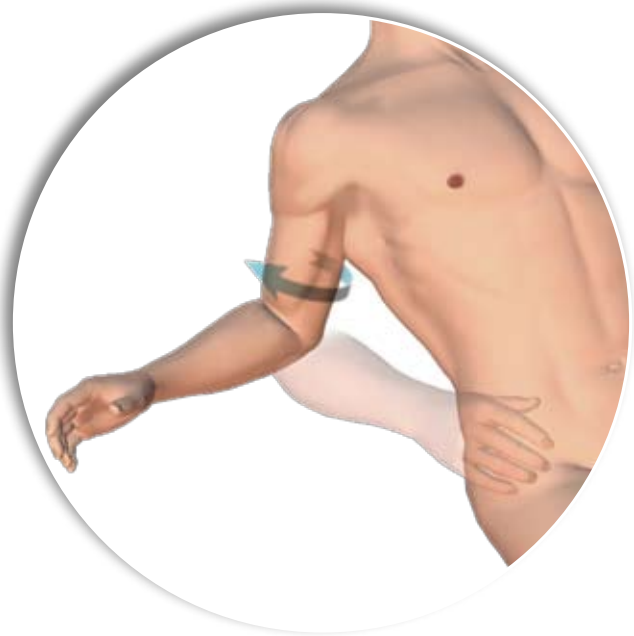
- Free the deep surface of the deltoid by abducting and externally rotating the arm.
- Do not damage the coracoacromial ligament.
- Partially section the pectoralis major tendon for 1 cm (increasing external rotation).

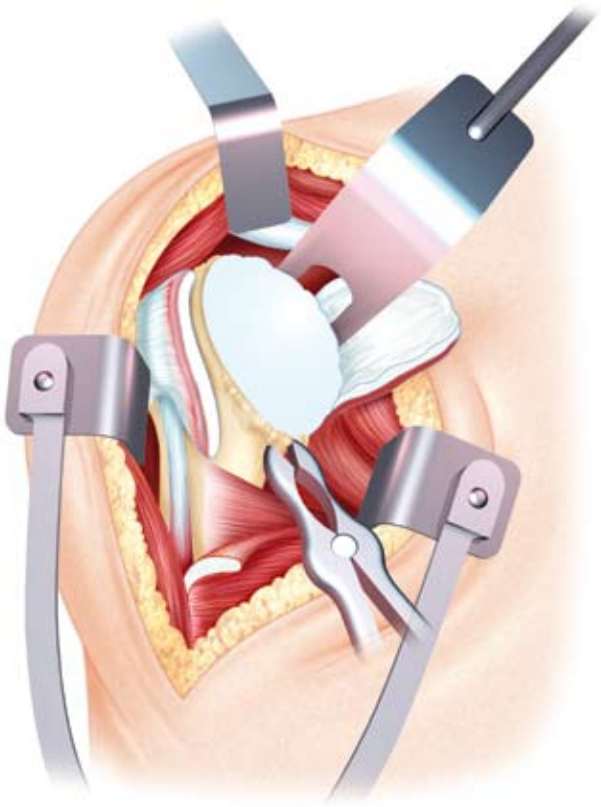




- Ligate the anterior circumflex vessels.
- Identify the rotator interval.
- The subscapular incision can be made in three ways:
  - by sectioning the subscapularis muscle at the musculotendinous junction and sectioning the articular capsule at the same point;
  - if there is limited preoperative external rotation, by detaching the subscapularis tendon subperiosteally starting from the bicipital groove (identified by the long head of the biceps at the superior border of the pectoralis major);
  - by osteotomy of the lesser tuberosity to reduce the risk of secondary atrophy of the subscapularis.
- In pathological conditions of the long head of the biceps:
  - either a tenodesis is performed in the bicipital groove;
  - or a tenotomy.

Dislocate the head of the humerus in abduction and external rotation with retropulsion of the arm.

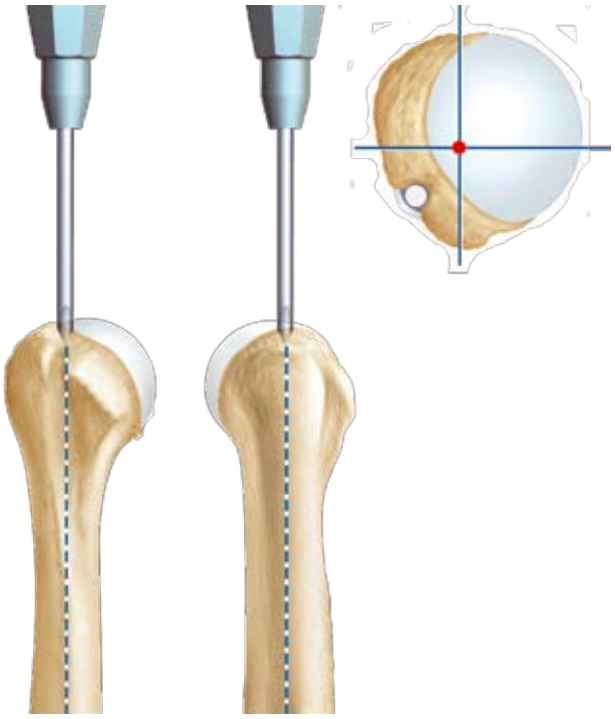




Dislocation is only possible if the anterior-inferior capsule and the coracohumeral ligament have been sectioned.

Osteophytes on the anatomical neck of the humerus are resected using bone forceps.

2 - PREPARATION OF THE HUMERUS



The entry point for the square-point awl is at the junction between the summit of the humeral head cartilage and the greater tuberosity, about 1 cm posteriorly and medially to the bicipital groove.
If the cortical bone is thick the Ø6 diaphyseal bit *(ref. 261 010)* is recommended.

The length of the diaphyseal reamer allows the humeral stem to be aligned along the diaphyseal axis of the humerus and the risk of varus/valgus malpositioning to be reduced.

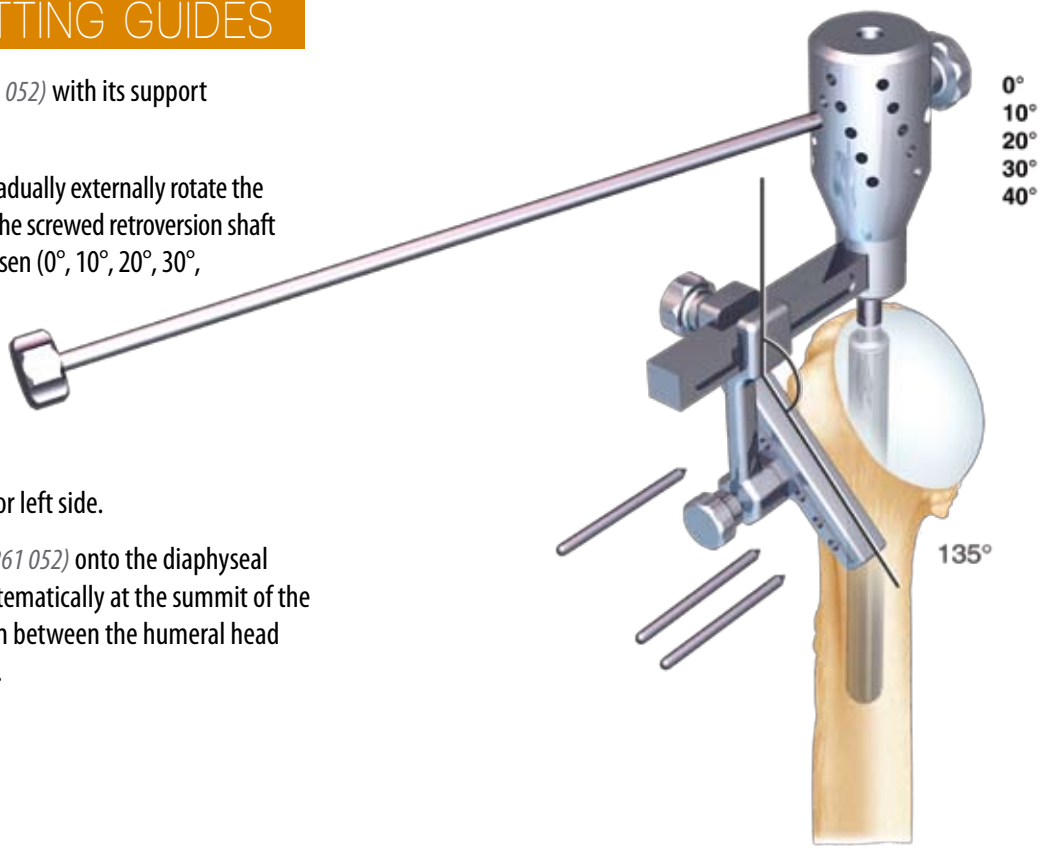
Reamer handle: ref. 261 054

Perform diaphyseal reaming manually using increasing sizes of reamer (Ø 8, 10, 12, 14) until there is a sensation of reaming into the cortex.

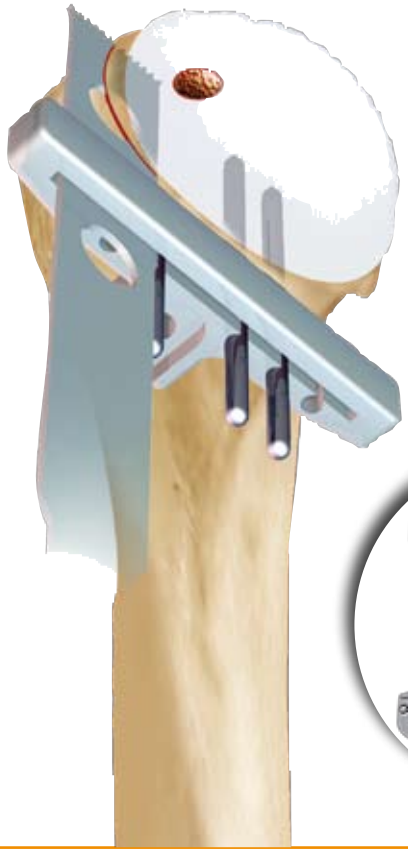
Reamers: Ø8 ref. 261 048
Ø10 ref. 261 049
Ø12 ref. 261 050
Ø14 ref. 261 051

2-1 - USE OF CUTTING GUIDES

- Assemble the cutting guide *(ref. 261 052)* with its support *(ref. 261 011)*.
- Having fixed the axis of the guide, gradually externally rotate the arm until the forearm is in line with the screwed retroversion shaft *(ref. 261 053)* producing the angle chosen (0°, 10°, 20°, 30°, 40°).
  20° of retroversion is recommended for an anatomical prosthesis.



- The guide can be used on the right or left side.
- Put the humeral cutting guide *(ref. 261 052)* onto the diaphyseal reamer. The top of the cut starts systematically at the summit of the head of the humerus, at the junction between the humeral head cartilage and the greater tuberosity.
- The 135° angle is fixed.



- When the depth of cut and degree of retroversion have been defined, fix the humeral cutting block *(ref. 261 012)* with a maximum of 4 pins *(ref. 261 056)* in the metaphysis; the diaphyseal reamer is then removed.
- Cut the head of the humerus using an oscillating saw along the groove in the humeral cutting block with a fixed angle of 135° and the selected retroversion.

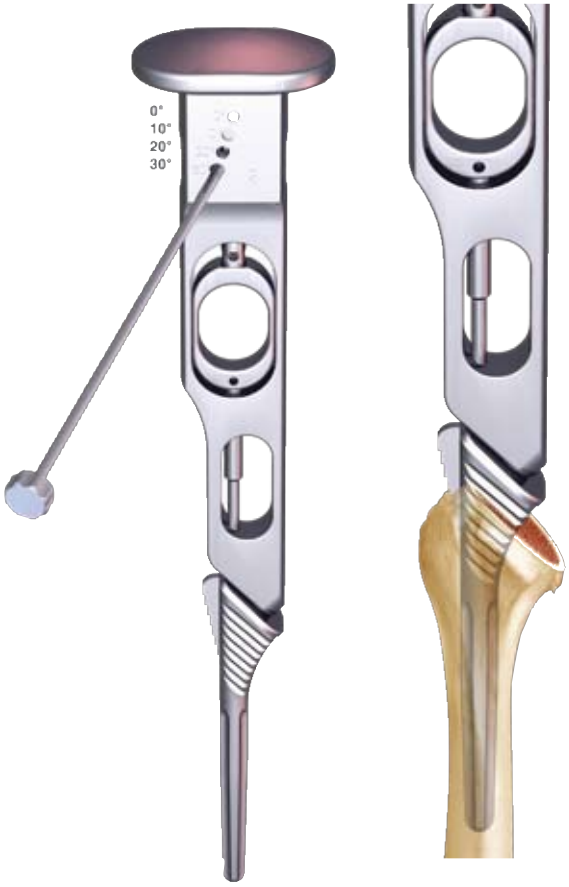
- The diameter and thickness of the articular head is measured with the humeral head template.
  Remove any osteophytes before measuring.

Humeral head template Ø40, 44, 46 *ref. 261 041*
Humeral head template Ø48, 50, 54 *ref. 261 042*

- Reproduce the retroversion by aligning the retroversion shaft *(ref. 261 053)*, attached to the metaphyseal rasp handle *(ref. 261 848)*, and the forearm. It is identical to that produced on the cutting guide.
- The metaphysis is progressively prepared manually using increasing sizes of trial metaphyseal rasps.

Trial rasps: Ø 8	*ref. 261 044*
Ø10	*ref. 261 045*
Ø12	*ref. 261 046*
Ø14	*ref. 261 047*

- The orientation of the metaphyseal ridges of the rasp compacts the spongy bone and provides optimal stability for the implant.



2-2 - CHOICE OF HUMERAL HEAD

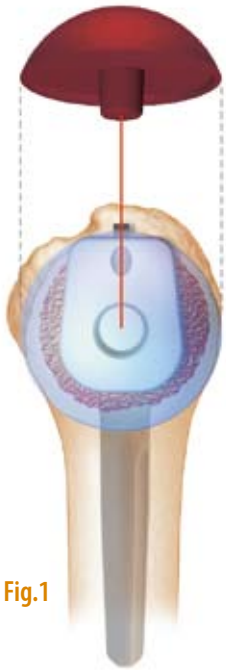


Fig.1

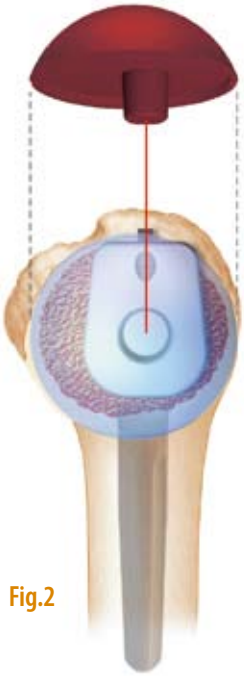


Fig.2

- The trial humeral head should completely cover the bone surface of the cut humerus: a centred trial humeral head is used if the trial humeral stem is centred (Fig.1).

  Centred humeral heads (CHH)- ref. from 261 026 to 261 040

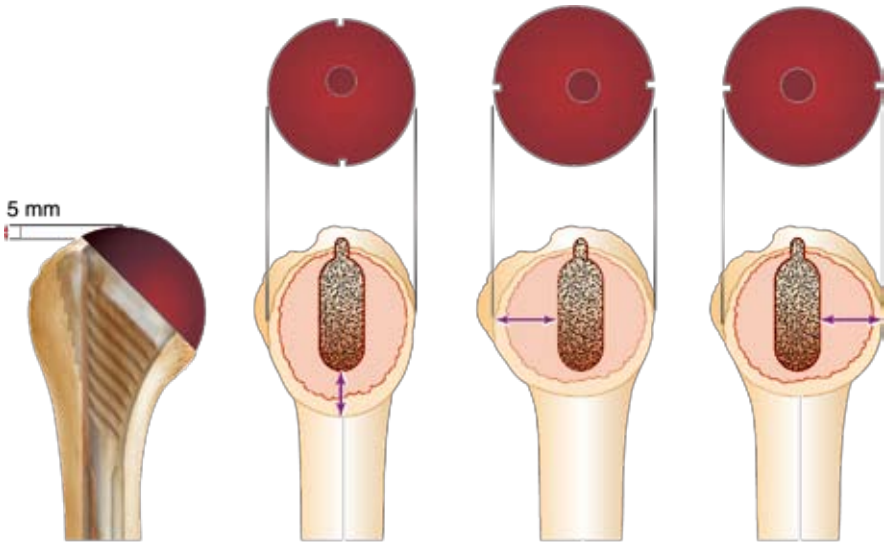
- An off-centred trial humeral head should be preferred if the trial humeral stem is , in order to cover the cut bone as much as possible (Fig.2).
  By marking the reference position of the trial off-centred head on the bone with an electric scalpel the definitive humeral head can be similarly positioned.

  Off-centred humeral heads (OCHH) - ref. from 261 015 to 261 025

- Once the diameter and thickness of the humeral head have been chosen, check to see that the subscapularis can be repaired under tension (ER 30°).

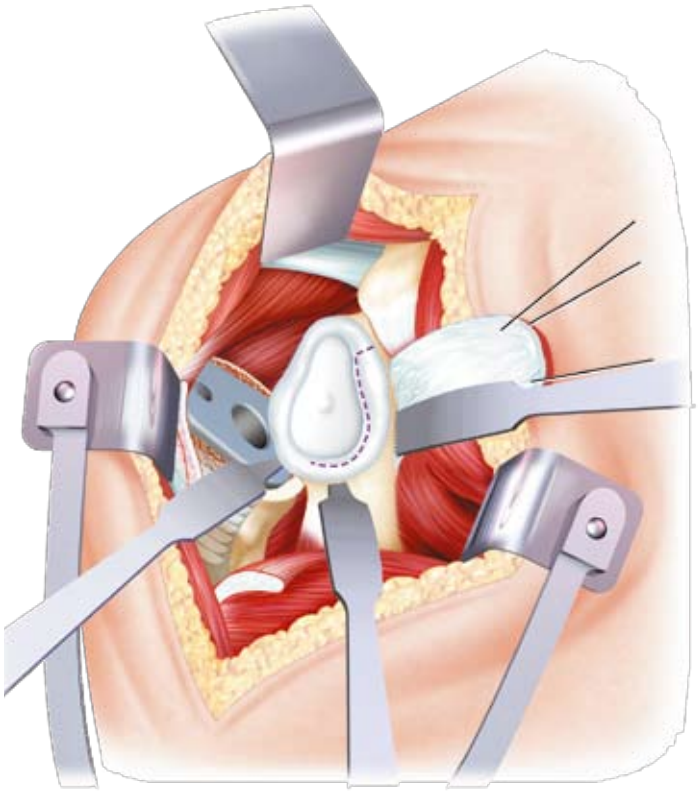
There are 3 positions where the trial head of the humerus may completely cover the cut bone of the humerus.

However the top of the humeral head must be approximately 5 mm higher than the summit of the greater tuberosity.



3 - PREPARATION OF THE GLENOID

3-1 - CEMENTED GLENOID

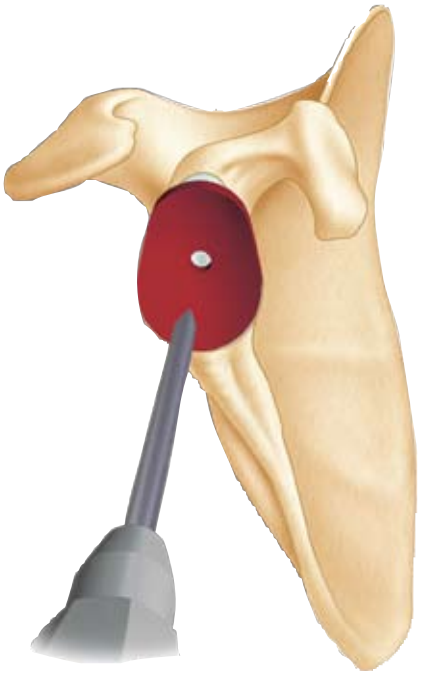


Displace the upper end of the humerus downwards and to the rear.

4 retractors are required to expose the glenoid cavity:
- one retractor in front;
- one retractor below at 6 o'clock;
- one retractor to the rear at 8 o'clock (pushing back the humerus protected by the metaphyseal rasp);
- a deltoid retractor protecting the anterior fibres of the deltoid.

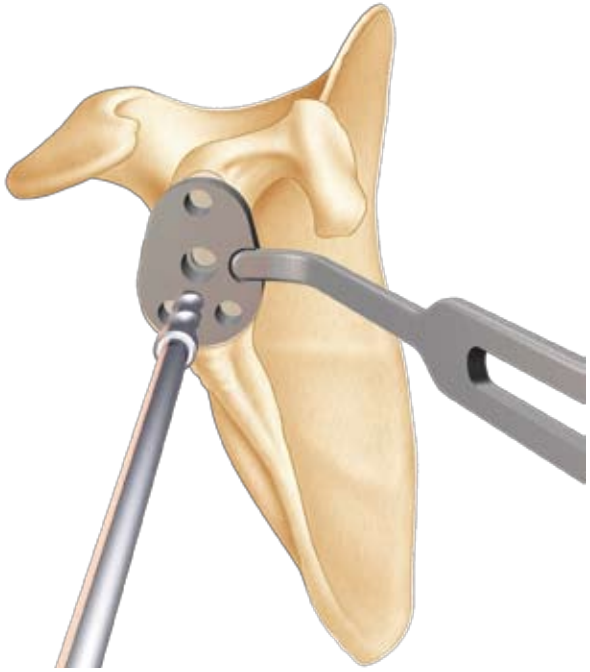
Retractor: ref. 261 059

The capsule and the degenerated rim are resected anteriorly and inferiorly to 8 o'clock.
Where space in the shoulder is very limited, circumferential resection of the capsule and rim is sometimes necessary.



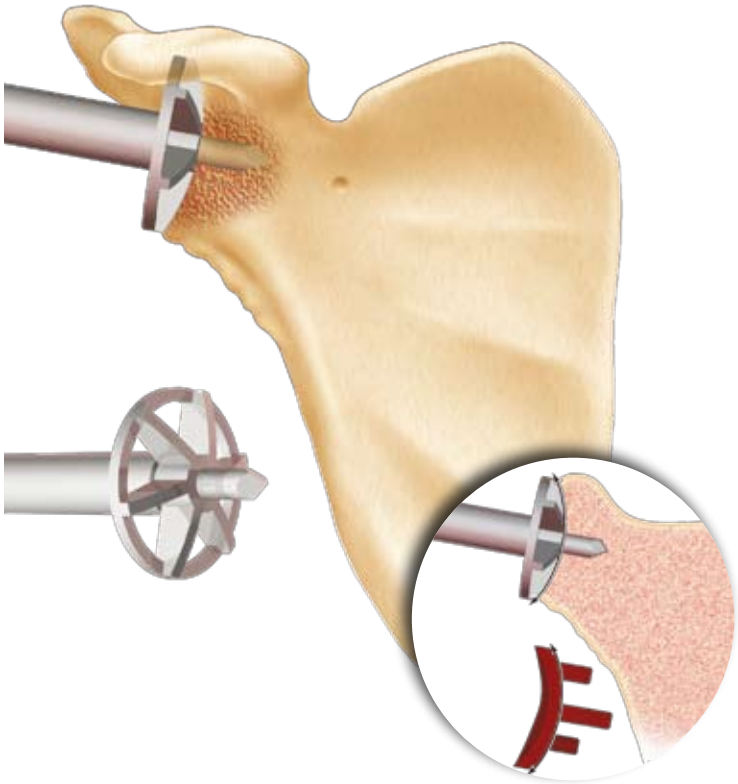
The central glenoid hole is marked with the square-point awl using the most suitable glenoid template (44, 46, 48, 50 available).

Glenoid templates: S44 *ref. 261 077*
S46 *ref. 261 078*
S48 *ref. 261 079*



The central glenoid hole is perforated with a Ø5 mm stopped drill bit using the drilling guide which will be used later to drill the glenoid holes.

Right drilling guide: *ref. 261 067*
Left drilling guide: *ref. 261 068*
Stopped drill bit: *ref. 261 069*



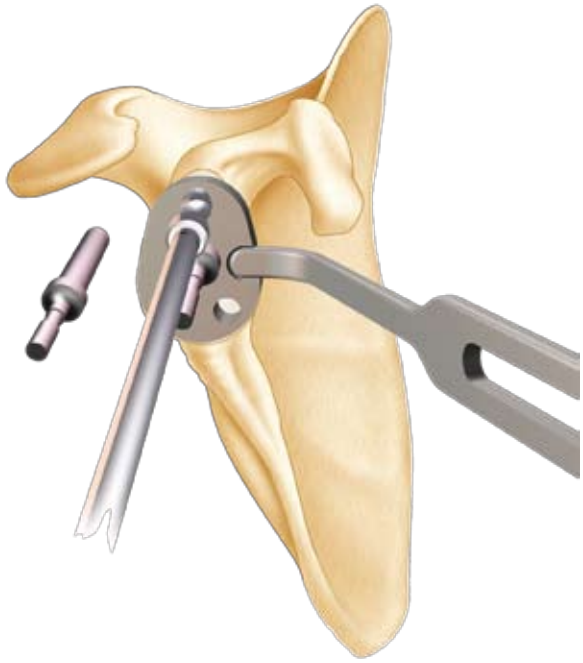
Two openwork glenoid reamers (small and large) are used to abrade the glenoid cavity while retaining the subchondral bone.

Large reamer Ø36 *ref. 261 075*
Small reamer Ø32 *ref. 261 074*

These reamers can be used manually or be power-driven.
If powered, start the motor several millimetres from the bone to avoid fracturing the glenoid.

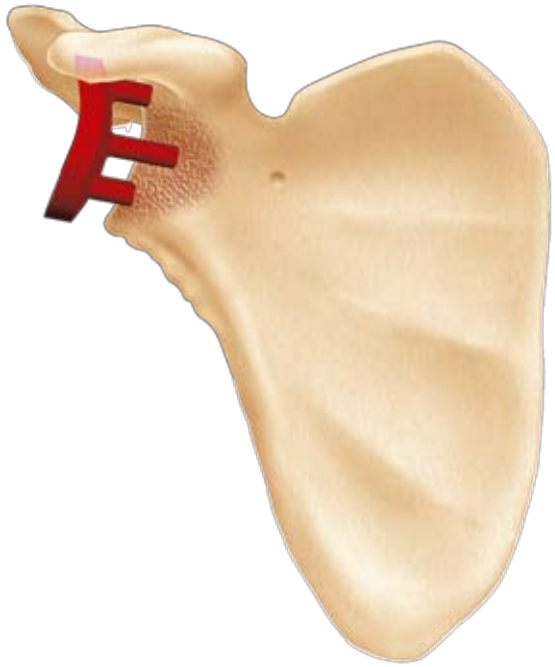
This burring can correct abnormal retroversion of the glenoid cavity (by posterior wear) and create a concave surface which will perfectly fit the convex base of the glenoid implant.

Excision of the bony edge is sometimes necessary using bone forceps or the large reamer.



Deepen the central hole and insert the first fixing pin.
Drill the other glenoid holes (superior and inferior) and stabilise the drilling guide with the other fixing pins.

Drilling guide fixing pins: ref. 261 058

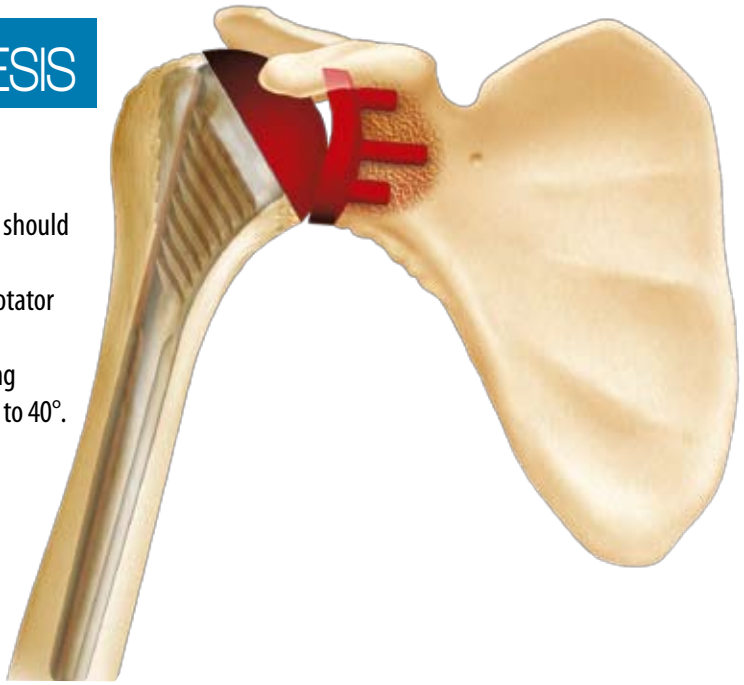


Put the chosen trial anatomical glenoid in place (44, 46, 48, 50 available) using the glenoid unit forceps *(ref. 261 066)* and impact using the glenoid impaction piece. *(ref. 261 081)* with the impaction handle *(ref. 261 009)*

Anatomical trial glenoid: S44 ref. 261 070
S46 ref. 261 071
S48 ref. 261 072

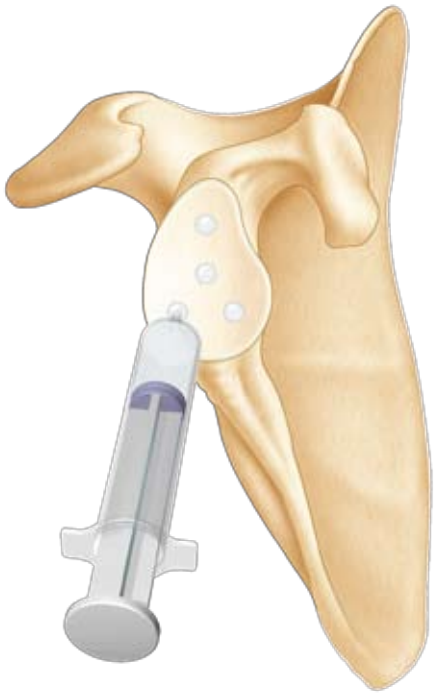
4 - TESTS ON THE PROSTHESIS

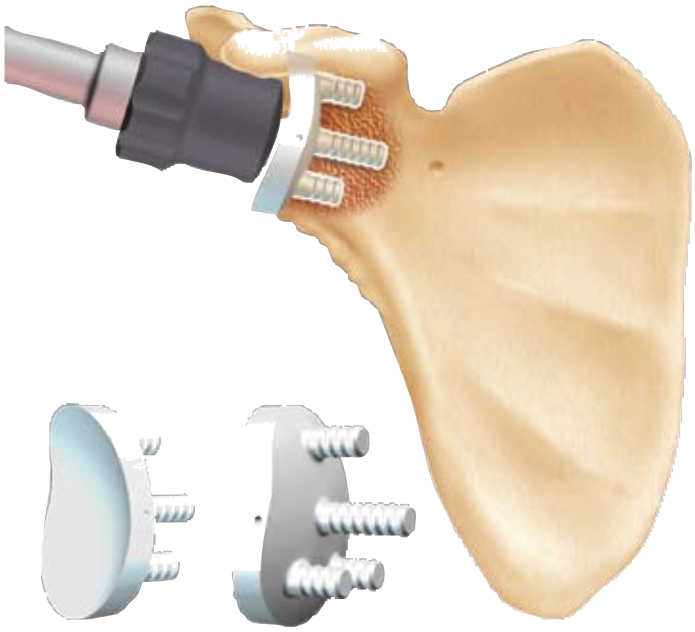
Tests performed:
— Anterior-posterior translation of the head of the humerus should be possible relative to the glenoid cavity (half a head).
— The head of the humerus should not project beyond the rotator cuff.
— The subscapularis should be reinserted with tension allowing external rotation of the elbow relative to the body of at least 30 to 40°.



5 - DEFINITIVE IMPLANTS

5-1 - CEMENTED GLENOID





• CEMENTING THE GLENOID COMPONENT

Clean and dry the glenoid fixing holes.

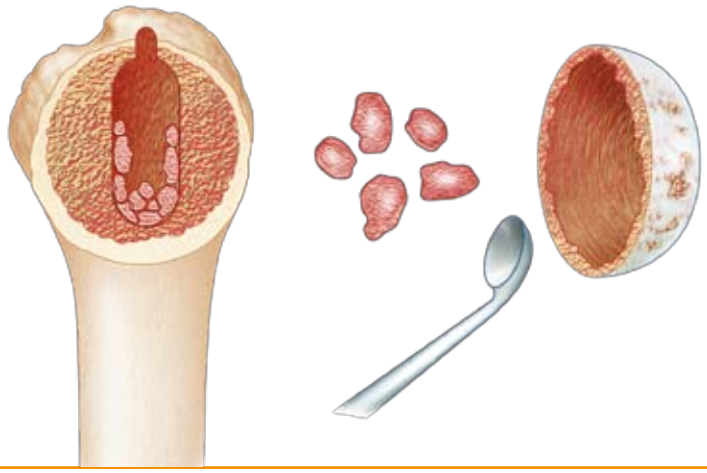
Introduce a moderate amount of cement into the 4 holes using a 20cm^3 syringe, avoiding cement getting between the bone and the back of the glenoid prosthesis.

Cement the definitive glenoid component in place and maintain it there by finger pressure or using a suitable means of applying pressure.

Impaction handle: *ref. 261 009*
Glenoid impaction tip: *ref. 261 081*

• IMPLANTING THE HUMERAL PROSTHESIS

Grafts of spongy bone taken from the resected head of the humerus are put into the (inferior and anterior) metaphyseal region to ensure optimal stability for the definitive humeral stem.

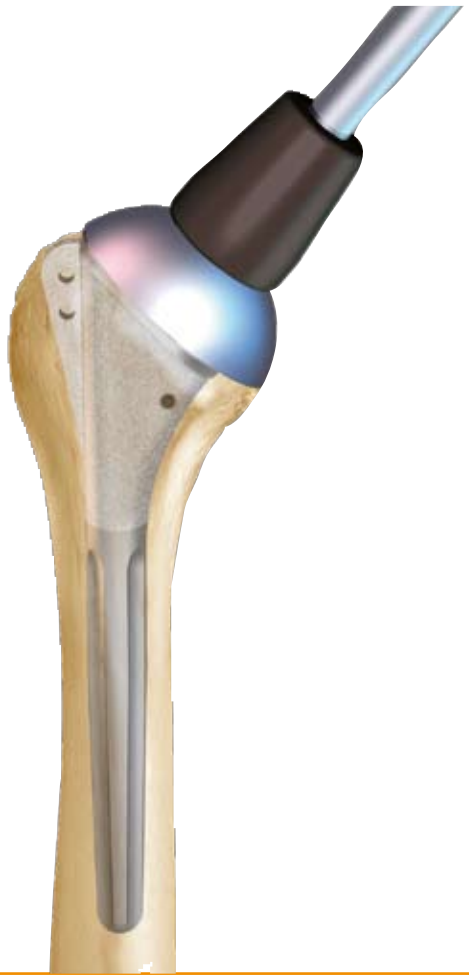


5-2 - HUMERAL STEM

- Guide the retroversion using the shaft *(ref. 261 053)* attached to the rasp handle *(ref. 261 848)* aligned in the axis of the forearm.

- Impact the humeral stem with or without cement in the smooth diaphyseal region, until the plate arrives in contact with the cut bone of the humerus.

Replace the trial rasp by the definitive stem on the rasp handle.

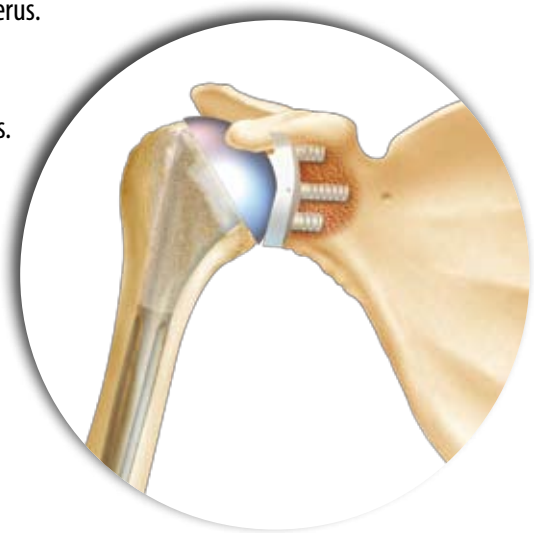


- Put the humeral head in place using the humeral head forceps *(ref. 261 109)*

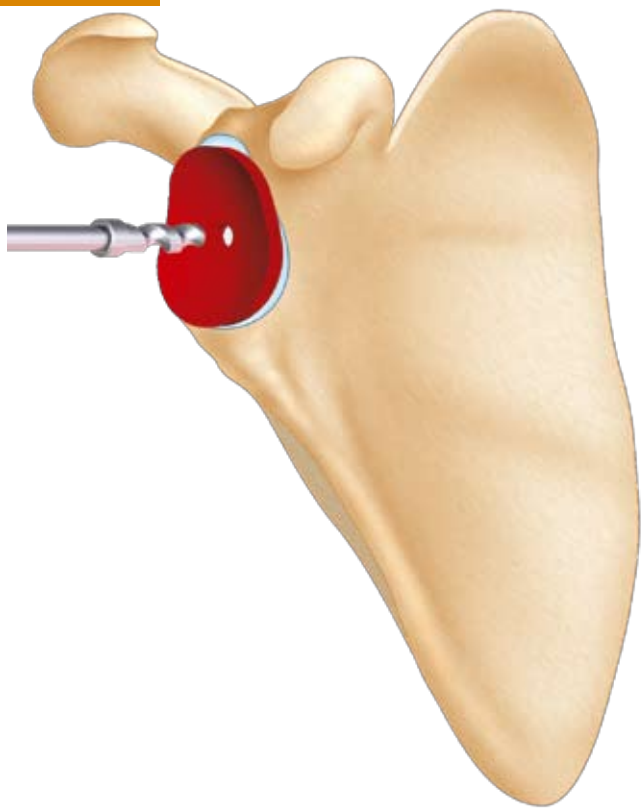
- Impact the definitive centred or off-centred humeral head onto the definitive humeral stem using the head impaction piece *(ref. 261 043)*. (Reproduce the trial position by using the marks previously made on the bone with an electric scalpel.)

- The humeral head covers the plate and is very closely applied onto the cut bone of the humerus.

- Reduce the humeral prosthesis.

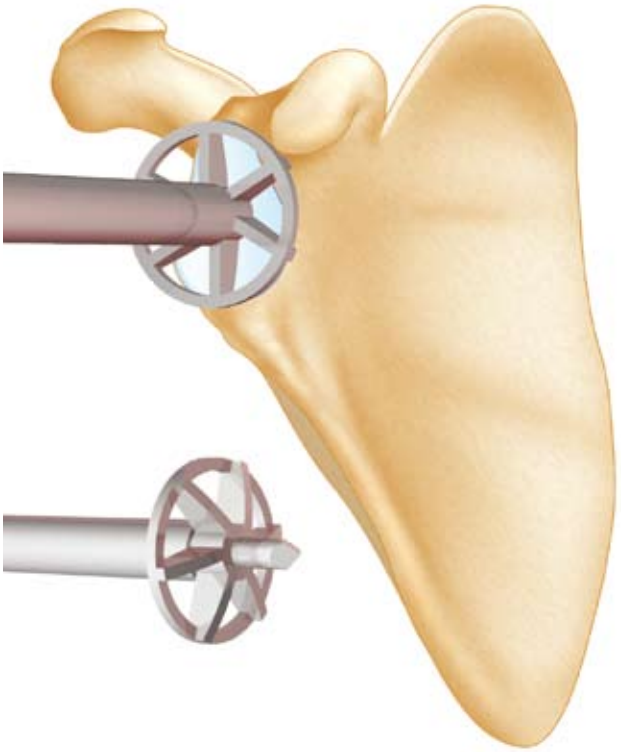


5-3 - METAL-BACK GLENOID BASE

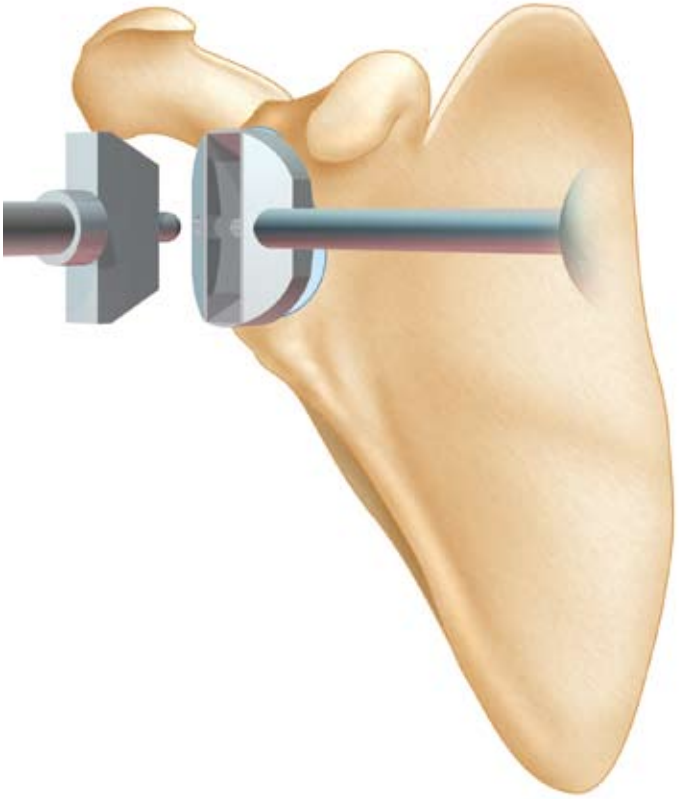


Choose the size of the metal-back glenoid base unit using the glenoid templates.
Identify the central hole with the square-point awl and drill using a Ø 5 mm bit *(ref. 261 069)*, following the glenoid drilling guide.

Glenoid template: S44	*ref. 261 077*
S46	*ref. 261 078*
S48	*ref. 261 079*

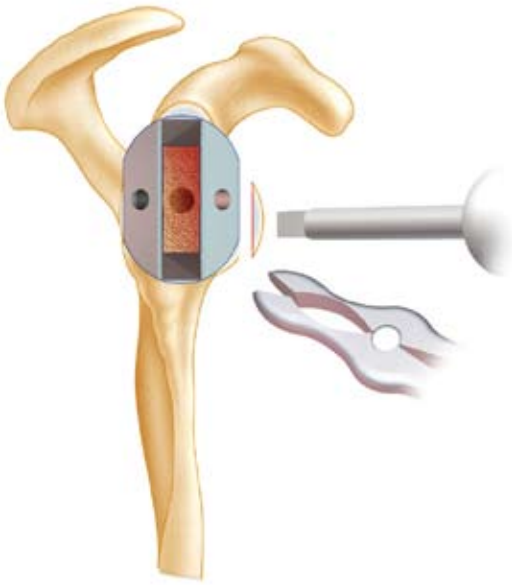


Ablate the glenoid cartilage using a small *(ref. 261 074)* or large *(ref. 261 075)* convex openwork reamer to provide a perfect fit with the convex bottom of the metal-back glenoid base.
— Leave the subchondral bone intact.
— Start the reamer concerned several millimetres from the glenoid cavity to avoid any risk of fracture.
Burring can be motorised or done by hand using the reamer handle *(ref. 261 076)*.

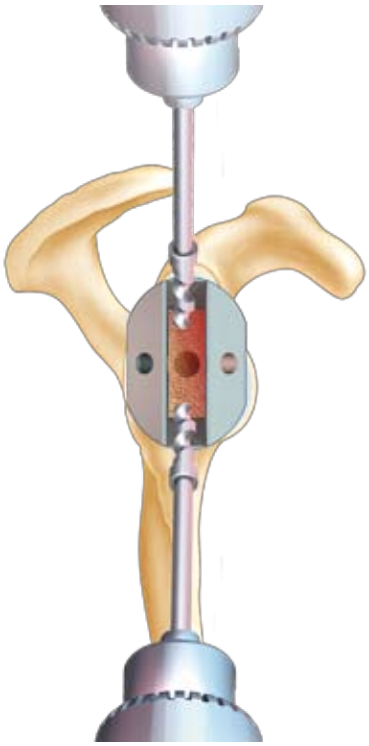


Mount the cutting block corresponding to the size of the glenoid selected on the cutting block handle *(ref. 261 095)*. The cutting block must correspond to the size of the glenoid chosen and be perfectly aligned in the central hole by means of the centring handle *(ref. 261 087)*.

Cutting blocks : S44 ref. 261 082
S46 ref. 261 083
S48 ref. 261 084



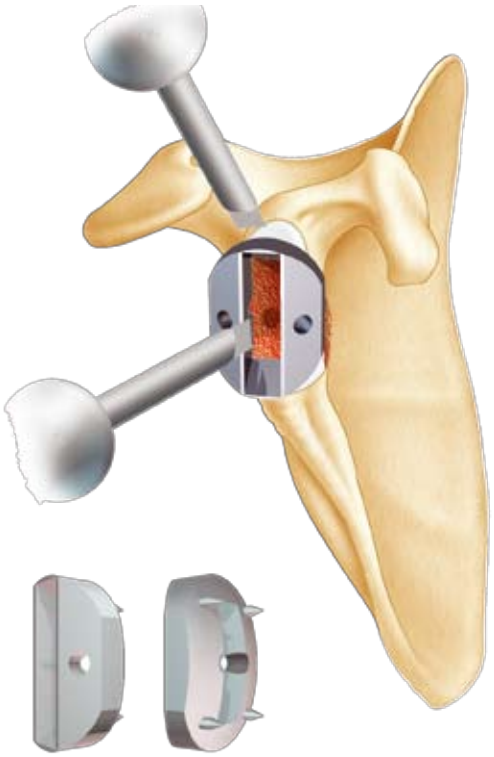
Make an economical anterior cut with the oscillating saw, osteotome *(ref. 261 103)* or bone forceps for perfect shaping of the anterior lug.



Carry out superior and inferior drilling and collapse the subchondral bone.

Stopped drill bit: ref. 261 069

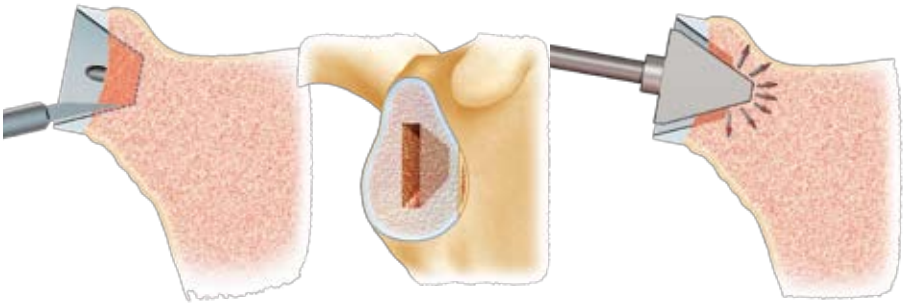
...METAL-BACK GLENOID BASE

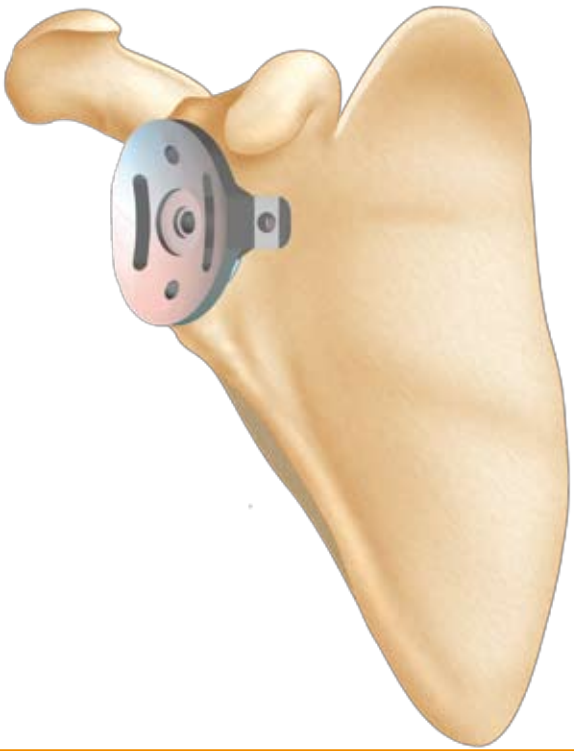


Bone cut to receive the central keel.

Using the osteotome *(ref. 261 103)* with caution, make oblique and frontal cuts; only the osteochondral part is removed.

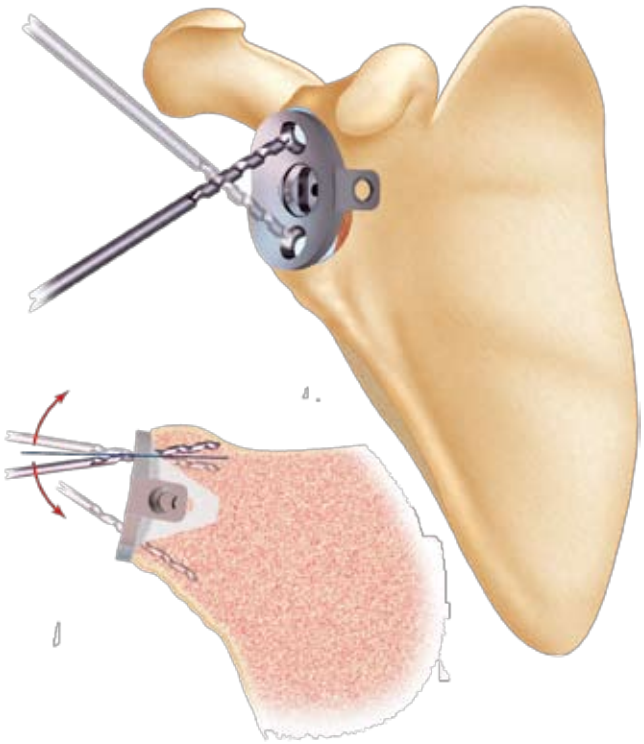
Prepare for the keel using the tapered punch handle *(ref. 261 104)*, followed by the compactor punch handle *(ref. 261 086)*, retaining the spongy bone.





Fit the **trial metal-back glenoid base** using the cutting block handle *(ref. 261 095)*. Check the primary stability and contact of the metal-back glenoid base with the whole of the glenoid surface. If necessary repeat the preceding steps concerning preparation for the keel.

Glenoid base : S44	*ref. 261 088*
S46	*ref. 261 089*
S48	*ref. 261 090*



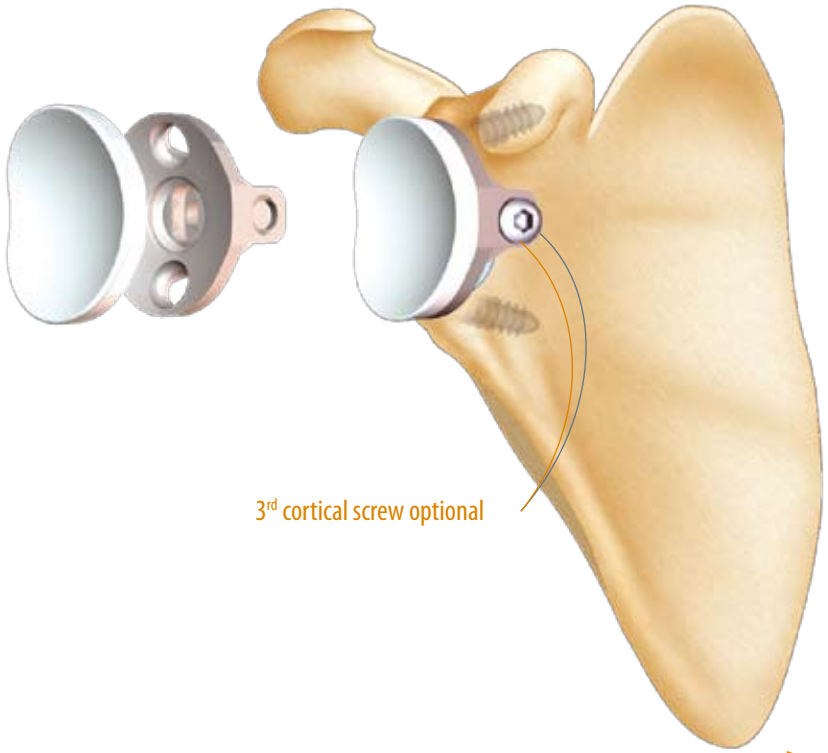
Fit the **definitive metal-back glenoid base** using the glenosphere handle *(ref. 261 101)* and then impact it using the impactor *(refs. 261 009 and 261 081)*. Drill with the Ø3.2mm bit *(ref. 261 065)*. The best bone fixation areas can be sought because of tolerance of 20°.

— The upper Ø5.5mm cancellous screw aims for the base of the coracoid.

— The lower Ø5.5mm cancellous screw aims for the pillar of the scapula.

Screwdriver, 6 sided: *ref. 261 100*
Length gauge ARROW: *ref. 257 204*

Insert the definitive metal-back glenoid base and screws.
Clip the definitive glenoid insert into place.
A Ø4.5mm anterior-posterior cortical screw may be useful during revision of glenoid loosening.

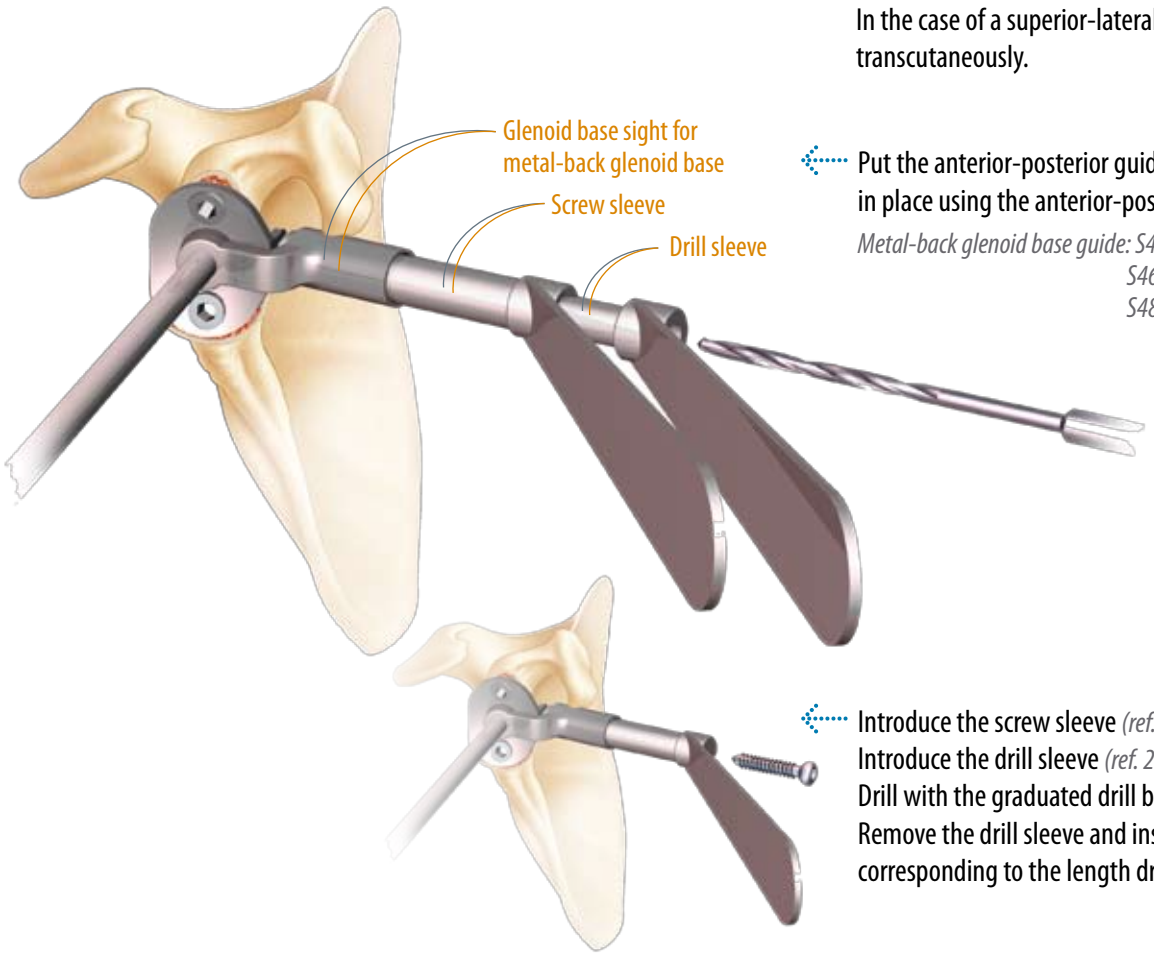


OPTIONAL

FITTING THE ANTERO-POSTERIOR SCREW

This procedure is recommended for a bone graft or anterior glenoid fracture. A deltopectoral approach makes it easier.

In the case of a superior-lateral approach, it could be done transcutaneously.

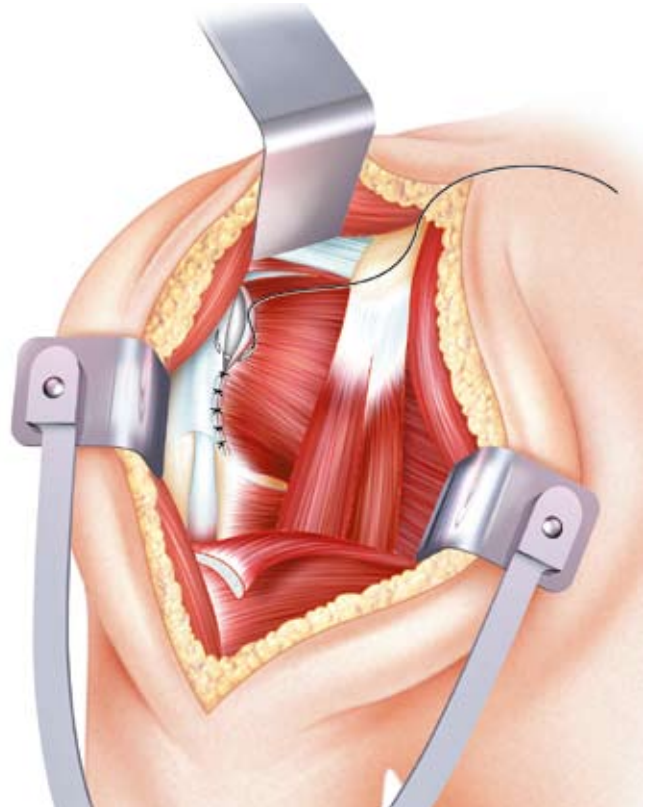


Put the anterior-posterior guide for the metal-back glenoid base in place using the anterior-posterior guide handle *(ref. 261 844)*.

Metal-back glenoid base guide: S44 ref. 261 840
S46 ref. 261 841
S48 ref. 261 842

Introduce the screw sleeve *(ref. 261 846)*.
Introduce the drill sleeve *(ref. 261 847)*.
Drill with the graduated drill bit *(ref. 261 065)*.
Remove the drill sleeve and insert a cortical screw, (Ø 4.5mm) corresponding to the length drilled.

6 - CLOSURE

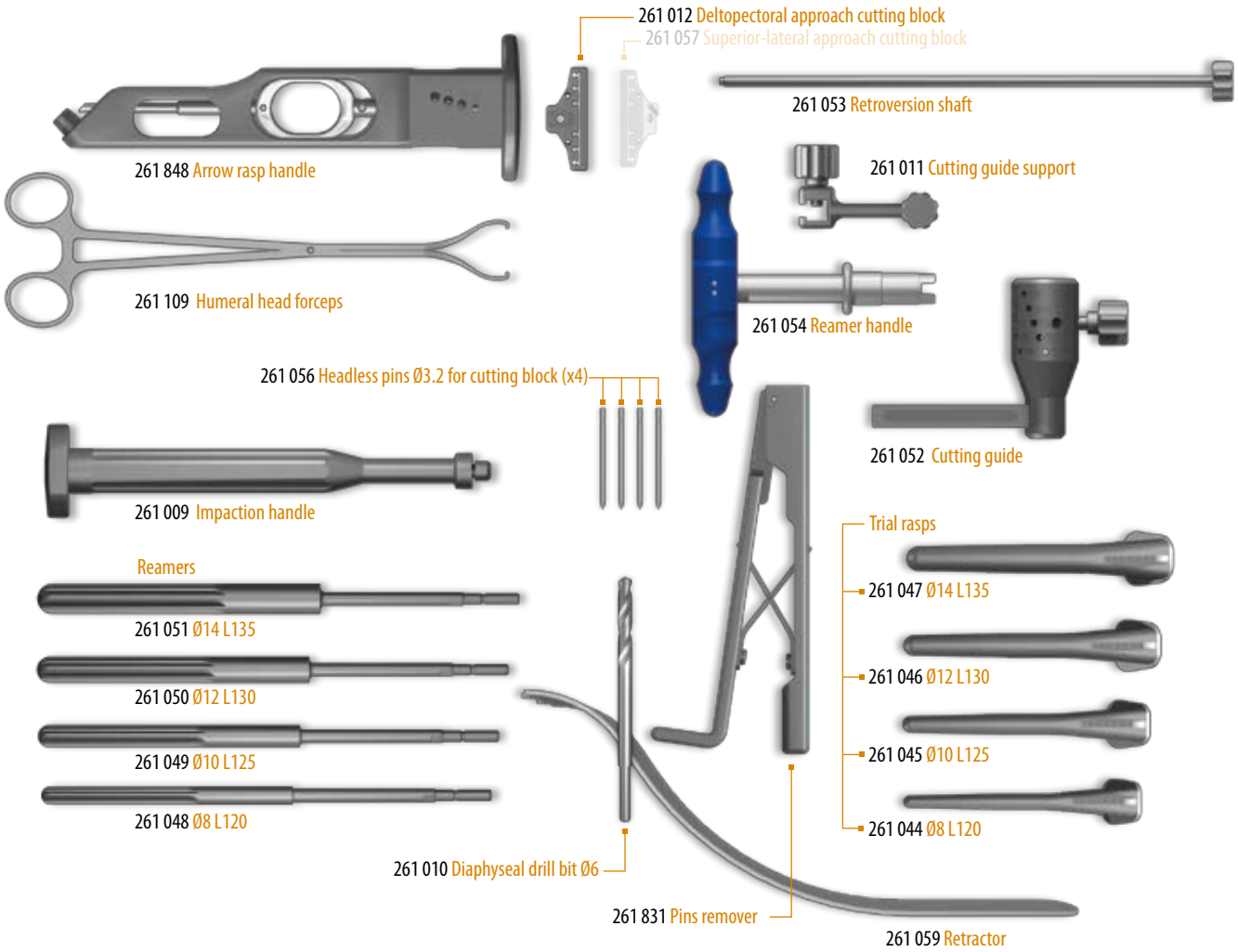


- The subscapularis muscle is moved slightly upwards to close the rotator interval and cover the head of the humerus.
- It is repaired by musculotendinous suturing to allow external rotation of at least 30° to 40° from the body.
- Transosseous stitches are used at the anterior edge of the cut section of the humerus if the subscapularis has been freed subperiosteally for shoulders set in internal rotation, to allow external rotation of 30° or 40°.
- Transosseous fixation is used on the anchor points of the osteotomy of the lesser tuberosity to control external rotation as well as possible.

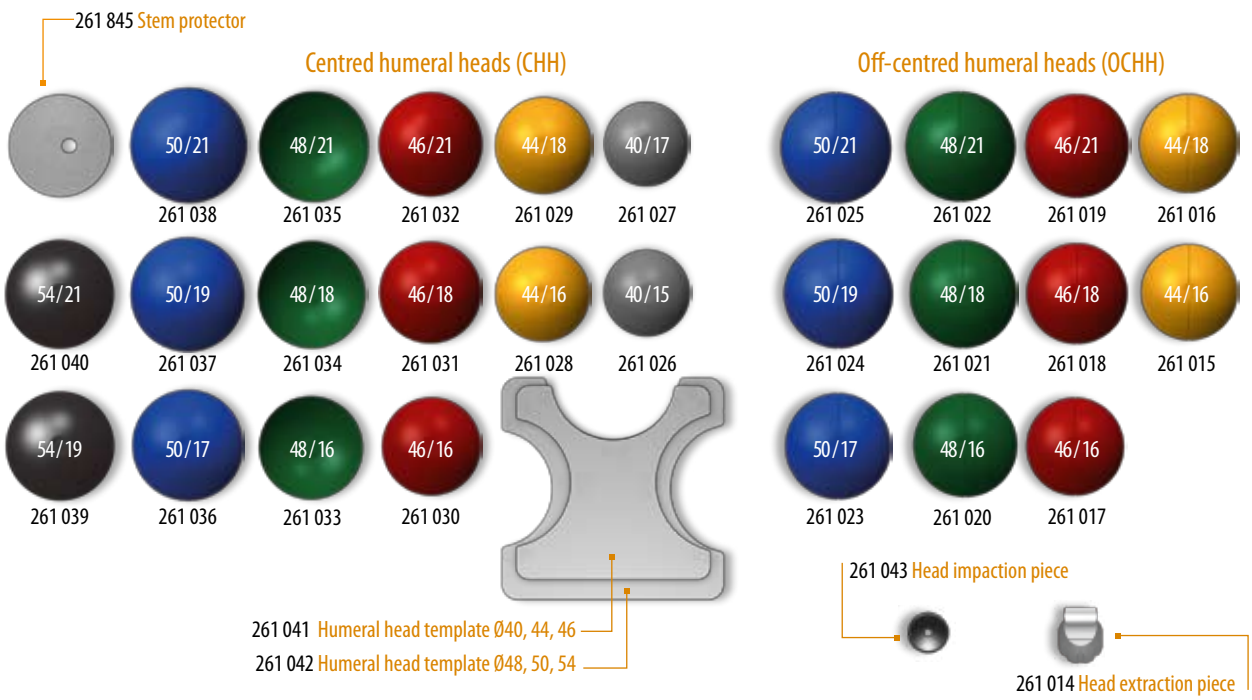
7 - SUGGESTED POST-OPERATIVE TREATMENT

- Hospitalisation: about 5 days.
- The drain is removed after 48 hours.
- A sling is to be used for 8 days.
- External rotation will only be permitted after the 6th week.
- Immediate passive physiotherapy in the plane of elevation of the scapula with pendular movements.

Container N°1 Humerus - Basket n°1: Humerus stem

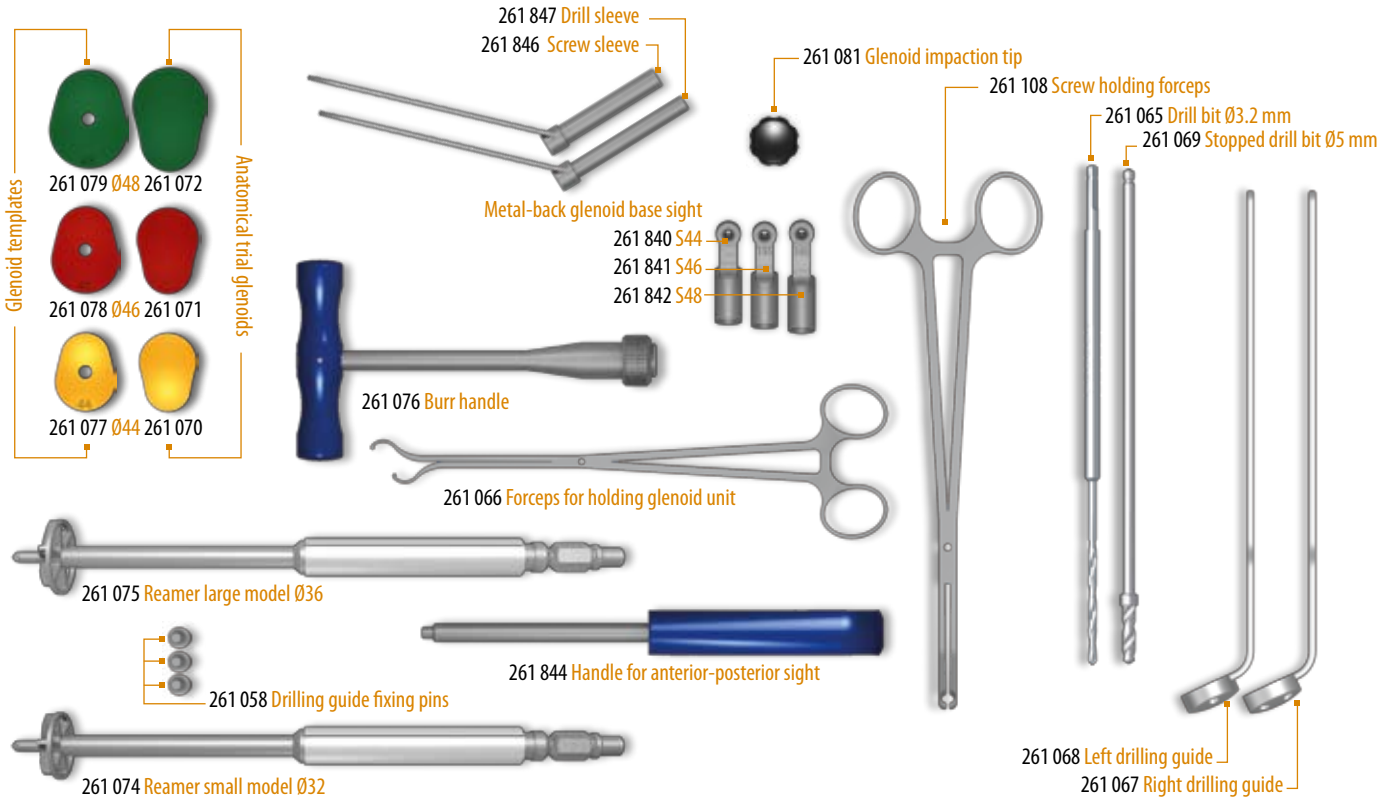


Container N°1 Humerus - Basket n°2: Humeral Heads

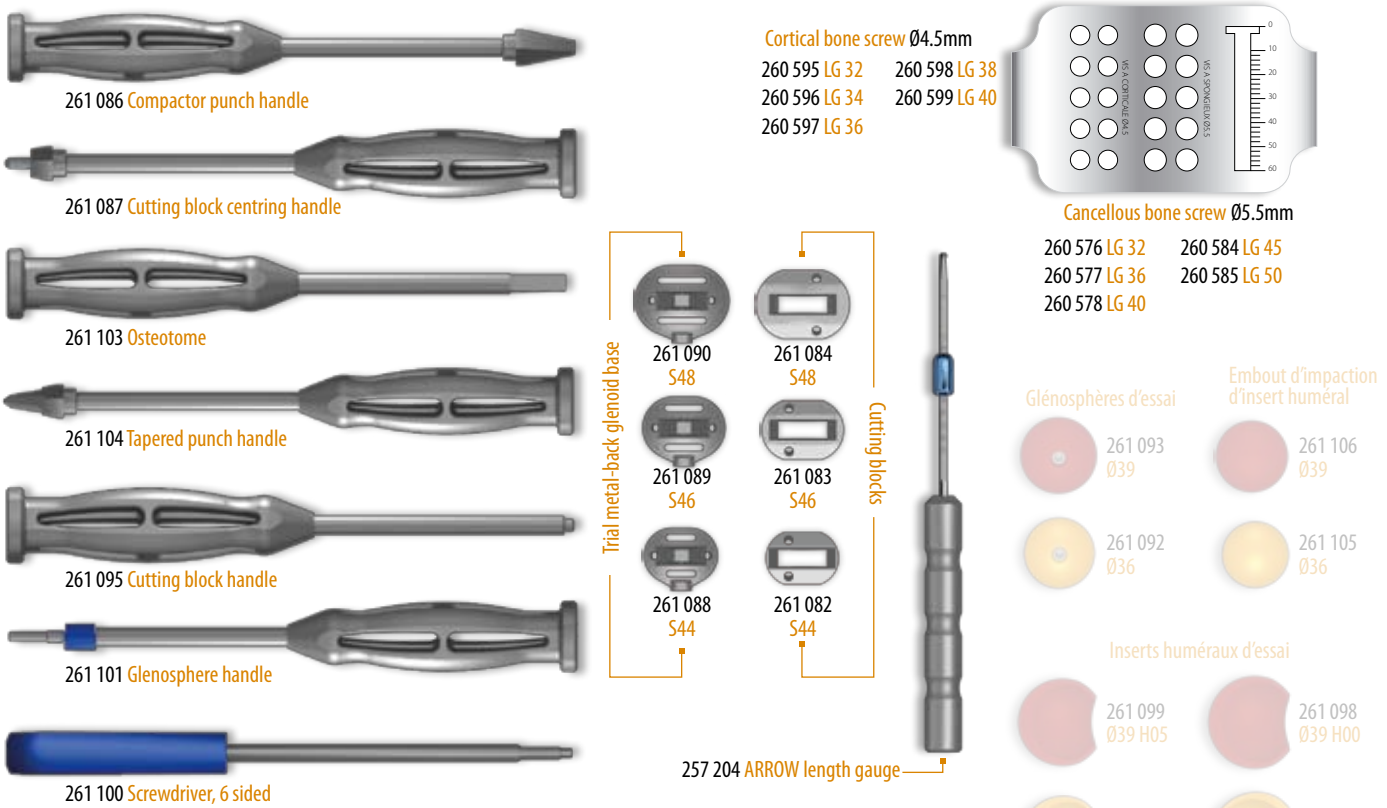


Instrument set

Container N°2 Glenoid - Basket n°1: Preparation of the Glenoid



Container N°2 Glenoid - Basket n°2: Preparation of the Glenoid



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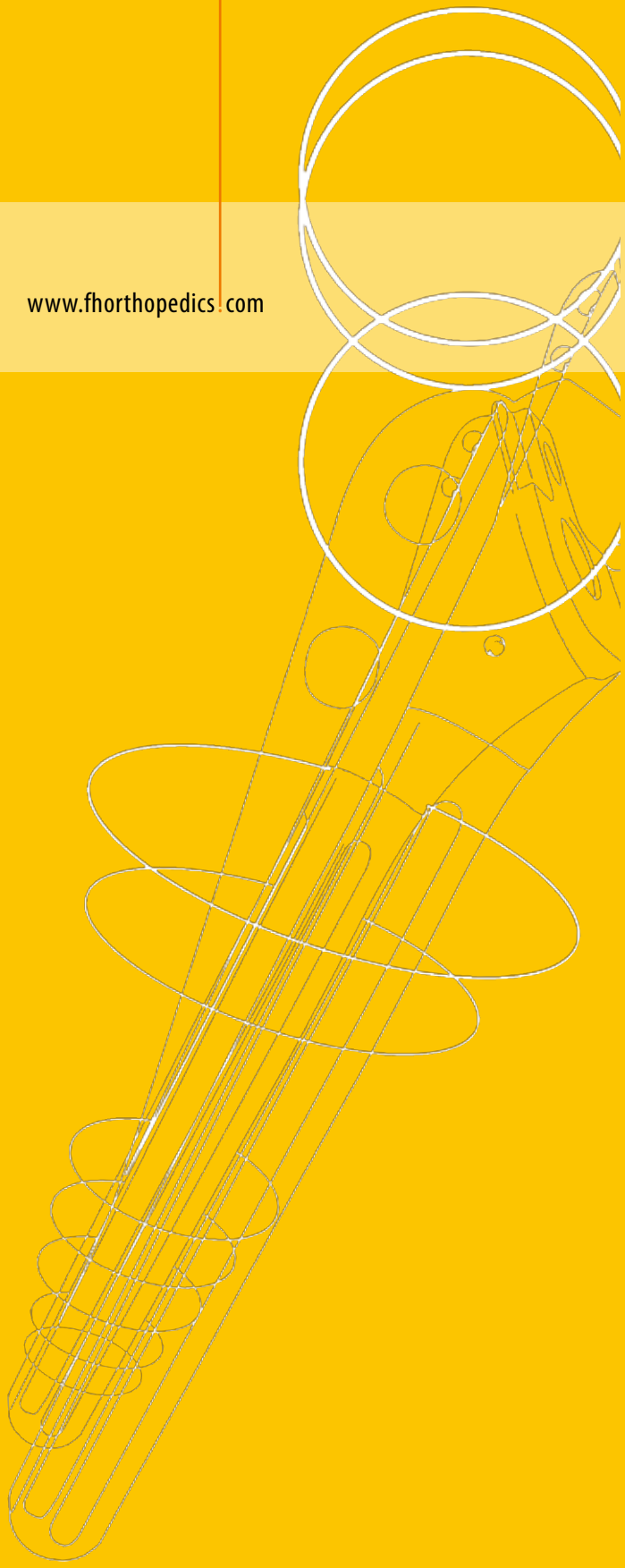

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