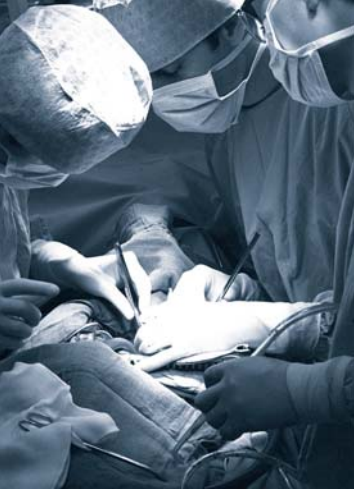


Surgical Technique

Shoulder Prosthesis

Aequalis®-Fracture

www.tornier.com

TORNIER

SURGICAL IMPLANTS

CONTENTS

DISPLACED 4-PART FRACTURE

1. DISPLACED 4-PART FRACTURE OF THE PROXIMAL HUMERUS

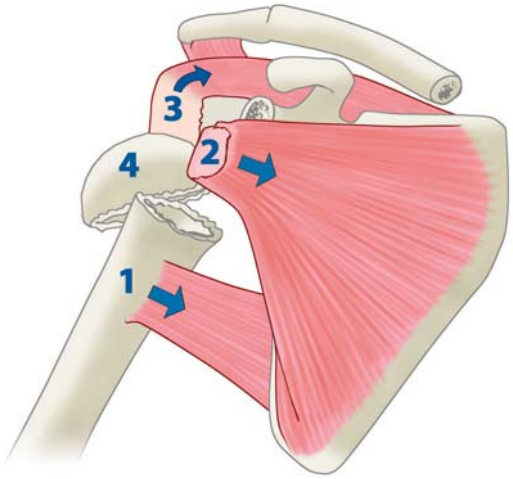
Pathophysiology of displaced 4-part fractures involves each muscle or muscle group pulling the fragments in various directions.

The diaphysis (1) is drawn medially by the pectoralis major and latissimus dorsi muscles and is separated from the epiphysis at the surgical neck.

The lesser tuberosity (2) is retracted anteromedially by the subscapularis.

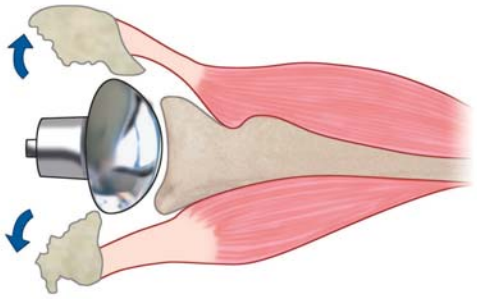
The greater tuberosity (3) is retracted medially, superiorly and posteriorly to the Suprapinatus, Infraspinatus, and Teres Minor.
The tuberosities may remain intact or be fragmented, and may be separated or remain in continuity with one another (impacted type).

The humeral articular surface (4) is no longer in contact with the glenoid: it is separated from the two tuberosities and may undergo varus or valgus displacement, or be displaced in any direction, usually resulting in devascularization. It may present as an impacted fracture or a displaced fracture.



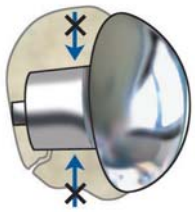
2. RATIONALE FOR A SHOULDER SOLUTION IN THE CASE OF FOUR PART FRACTURE

Major CONCERN for a fracture prosthesis procedure:
Nonunion and migration of the tuberosities

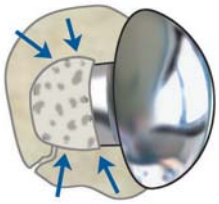


1 Fracture Stem Rational

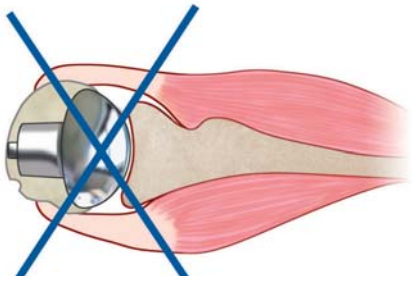
- **The high volume of metal of the proximal body of a standard prosthesis is an obstacle for tuberosity healing and fixation.**



- **Bone grafting is advised** if tuberosity healing is to be obtained.

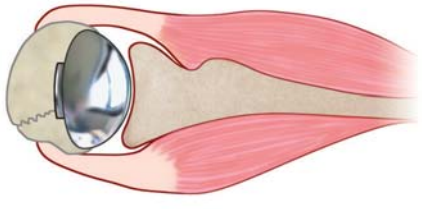


- **A prominent prosthetic lateral fin interferes with anatomical tuberosity positioning causing the greater tuberosity to be too superior and the lesser tuberosity to be too lateral.**



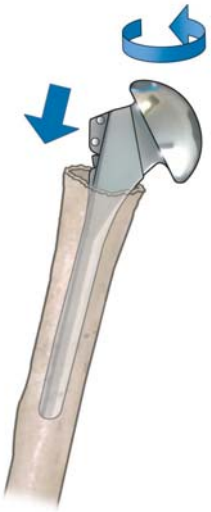
- A low profile lateral metaphysis allows for consolidation of the greater and lesser tuberosities.

- **The inferior neck of the prosthesis must be smooth** to avoid suture breakage.

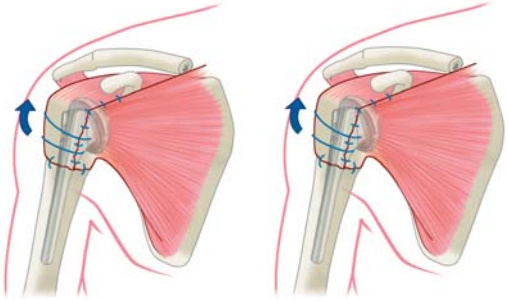


2. RATIONALE FOR A SHOULDER SOLUTION IN THE CASE OF FOUR PART FRACTURE

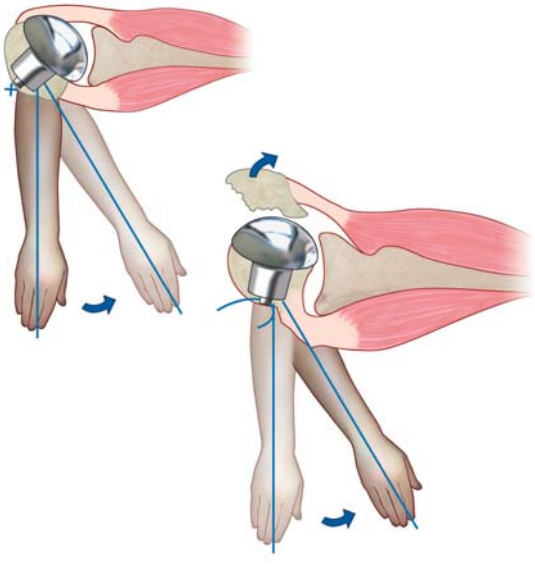
2 Fracture Jig Rationale



- Intra-operative instability of the humeral prosthesis makes accurate final positioning difficult.



- A prosthesis positioned too high can cause pain, superior humeral migration, anterosuperior impingement and overtensioning of sutures.



- Excessive retroversion can cause posterior tuberosity migration and suture breakage.

2. RATIONALE FOR A SHOULDER SOLUTION IN THE CASE OF FOUR PART FRACTURE

3 Standardized Tuberosity Fixation Rationale

- With the classical technique (passing sutures through the prosthetic fin), the tuberosities cannot be adjusted and securely immobilized.

- Use of medial cerclage sutures is simple, reproducible and secure.
  Secures the tuberosities to the stem, rather than pulling them away from the stem.

HOULDER SOLUTION
R PART FRACTURE

THE AEQUALIS®-FRACTURE SOLUTION

The prosthesis

12 eccentric heads
(37 mm to 54 mm diameter)
Cobalt-chromium alloy
* Dia 37, 52, 54 upon special request

Low profile for bone grafting

Open neck for bone grafting

Polished medial neck
to avoid suture abrasion

HA coated

Polished stem for cementing
130 mm length
130° inclination
(6.5, 9, 12 mm diameter)
Titanium alloy

Long stems*
170 length (Dia 6.5 mm)
180 length (Dia 9 mm and 12 mm)
Extra-long stems*
210 length (Dia 9 mm and 12 mm)
*upon special request

RATIONALE FOR A SHOULDER

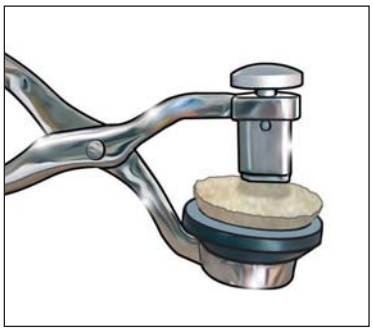
THE AEQUALIS®-FRACTURE SOLUTION

The Aequalis®-Fracture Jig

The Aequalis®-Fracture Jig is designed to stabilize the prosthesis and to assist the surgeon in more precisely positioning the humeral implant with proper height and retroversion.

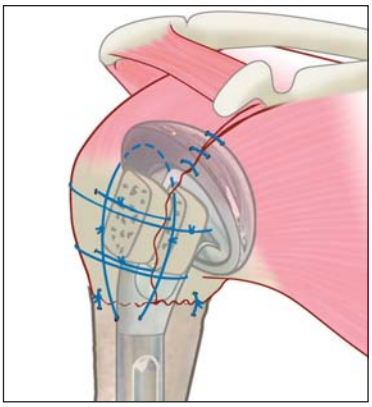
The bone graft cutter

The bone graft cutter is designed to remove cancellous bone from the humeral head for incorporation into the prosthetic metaphysis thus improving the metaphyseal bone adhesion.



The standardized tuberosities fixation technique

Detachment and migration of the tuberosities are the most common complications after shoulder replacement for fractures.
The suture technique for positioning and securing the tuberosities is critical.



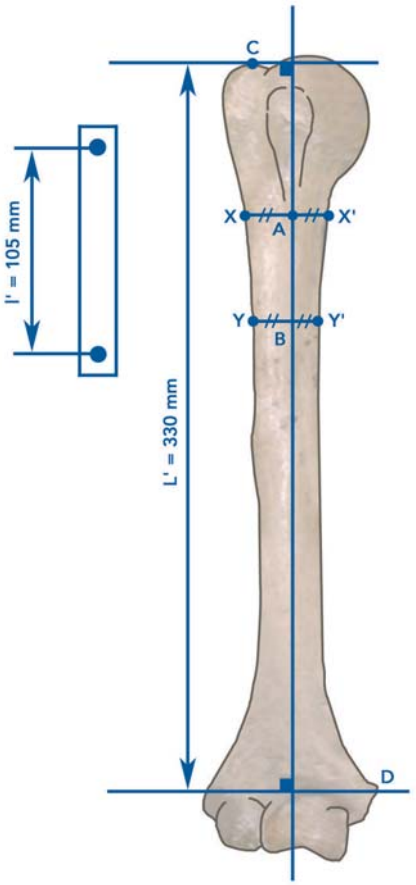
3. SURGICAL TECHNIQUE

1 Pre-operative planning

- The stabilization of the prosthesis is automatically obtained while using the fracture jig.
- The prosthetic retroversion is fixed at 20 degrees from the trans-epicondylar axis (average value).
- The prosthetic height can be chosen:
  - Intra-operatively, using the bony aspect and soft tissue without any pre-operative planning (approximate height).
  - Pre-operatively, using a scaled x-ray of the healthy contralateral humerus (precise height).

A ruler with two marker points, with a distance of 100mm, will allow for radiographic magnification conversion.

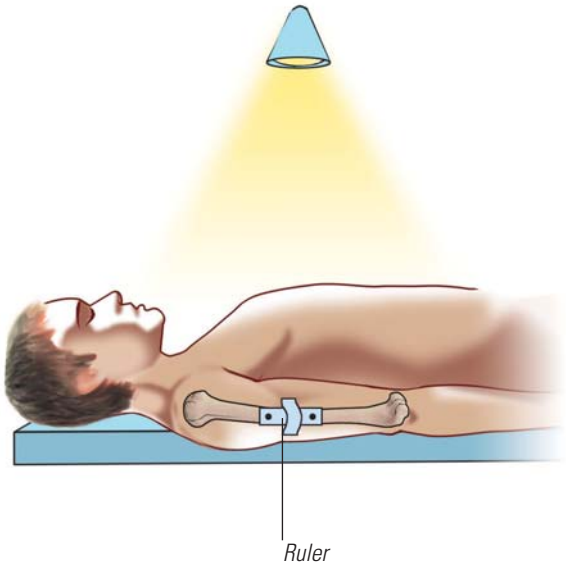
Recommendation: place the ruler with the marker point and the arm parallel to the x-ray cassette to minimize errors of measurement. A small cushion is placed under the elbow.



Example: calculation of humeral length taking into account the radiological magnification: the real length between the two markers is 100 mm; the measured length between the two markers (A-B) is 105 mm; the measured length of the healthy humerus (C-D) is 330 mm. Therefore, using a rule of three:

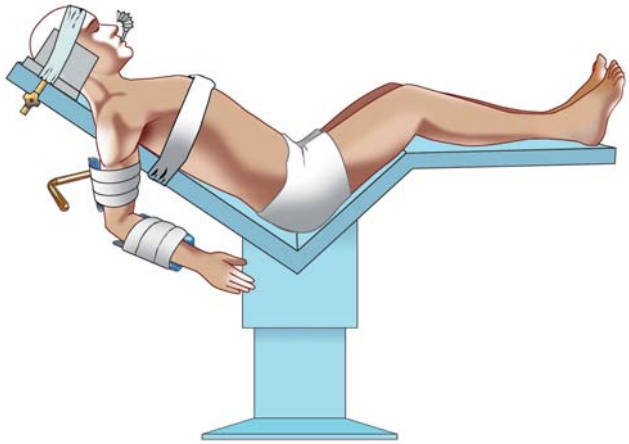
105 → 100 mm
330 → L'
L = 330 x 100/105 = 314 mm

The real length of the healthy humerus is therefore 314 mm, a measurement that should be entered on the fracture jig height ruler (see page 12).

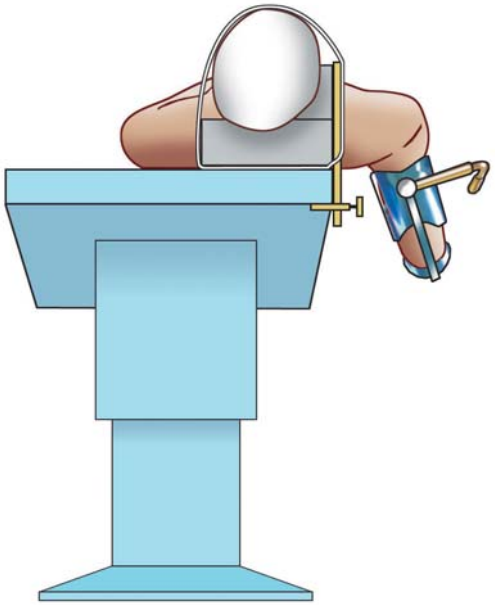


2 Patient positioning

General anesthesia, beach chair position, shoulder free from the table. The shoulder and entire upper extremity are prepped and draped. The arm support for the fracture jig is secured to the arm using a sterile elastic bandage. The elbow must be carefully positioned to fit correctly in the arm support.



The arm support is fixed, leaving the elbow uncovered at the level of the angle of the support.
The entire shoulder must be free from the table to allow the jig to be correctly positioned.

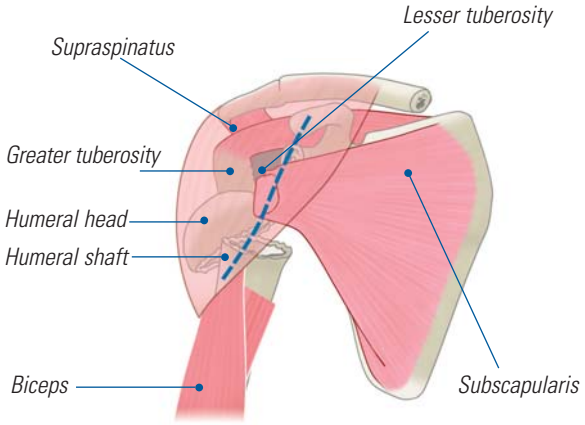


3. SURGICAL TECHNIQUE

3 Deltopectoral approach and exposure

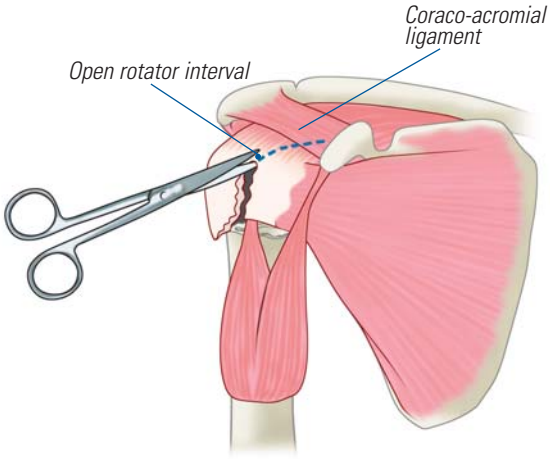
An incision is made from the tip of the coracoid process along the deltopectoral groove, slightly lateral to avoid post-operative scars in the axillary fold.
The deltopectoral groove is opened to the insertion of the Pectoralis Major, and the Deltoid and cephalic vein are retracted laterally.

The coracoid process is identified to allow for the insertion of a Hohmann retractor above it.
The clavicular, acromial and humeral insertions of the deltoid are always preserved.
The clavipectoral fascia is incised at the lateral border of the conjoined tendon of the coracobrachialis and the short head of the biceps. Usually the coracoacromial ligament is preserved.

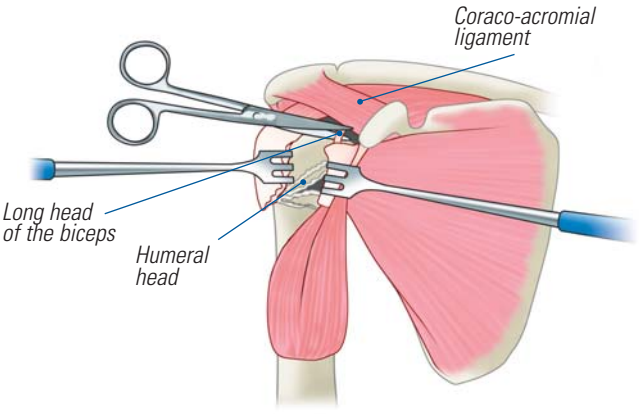


4 Identification of the lesser and greater tuberosities and anterosuperior arthrotomy

The glenohumeral joint is exposed by extending the fracture line between the tuberosities, incising the rotator interval over the long head of the biceps tendon.

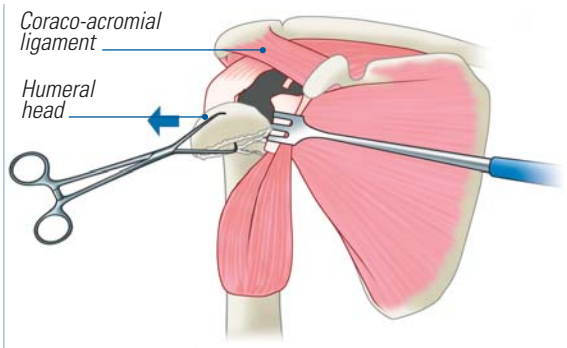


5 Tenotomy and excision of the long head of the biceps



3. SURGICAL TECHNIQUE

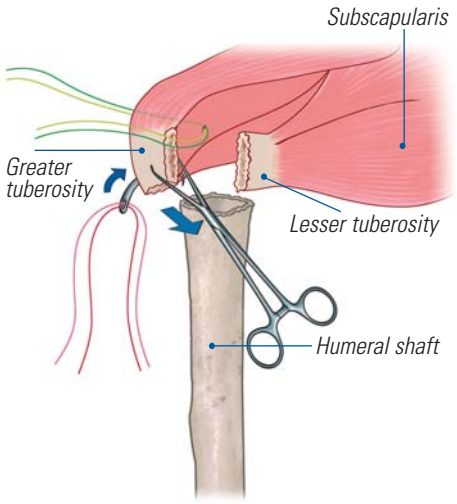
6 Extraction of humeral head fragment and selecting proper prosthetic head replacement



The diameter of the humeral head is determined by measuring the humeral head diameter with a caliper, or by using the trial head support tray as a template. Hint: if the humeral head is between sizes, select the smaller size. The most common mistake is to use a too large size.

7 Placing four horizontal stay sutures in the rotator cuff

Two non-absorbable sutures are placed in the infraspinatus tendon and two more are placed in the Teres minor tendon.



8 Humeral reaming

With the arm in adduction, external rotation and extension, the humerus is progressively reamed using cylindrical reamers of increasing diameter (6.5, 9 and 12 mm).
The final reamer used will determine the diameter of the humeral stem.
At this stage, in case of revision, it is also important to remove as much residual cement as possible in order to avoid compromising the healing of the tuberosities.

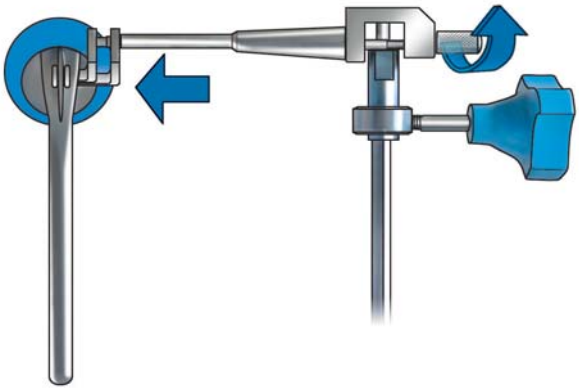
Cylindrical reamers of increasing sizes are advanced as far as the last ridge.

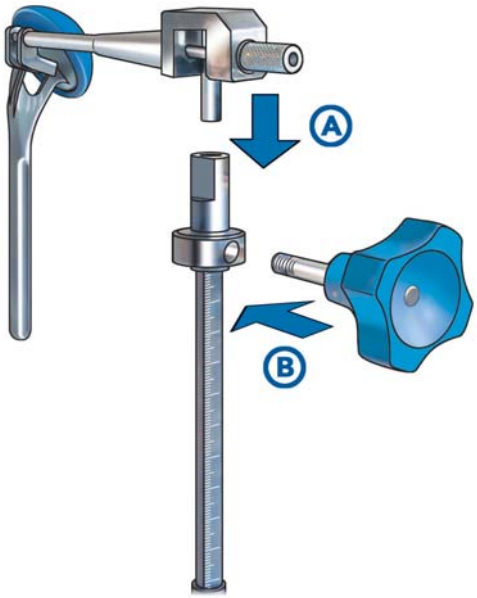
3. SURGICAL TECHNIQUE

9 Choice of trial prosthesis and attachment to the fracture jig

To accurately re-establish the humeral head, we recommend the use of a prosthetic humeral head of the same size as the removed head.
The humeral head should be positioned either on the **R** for a right arm or on the **L** for left arm.

The trial stem is secured to the prosthesis holder (right or left depending on the side) using the two holes located on the low profile lateral part of the implant.
The prosthesis holder is then fixed to the fracture jig.





3. SURGICAL TECHNIQUE

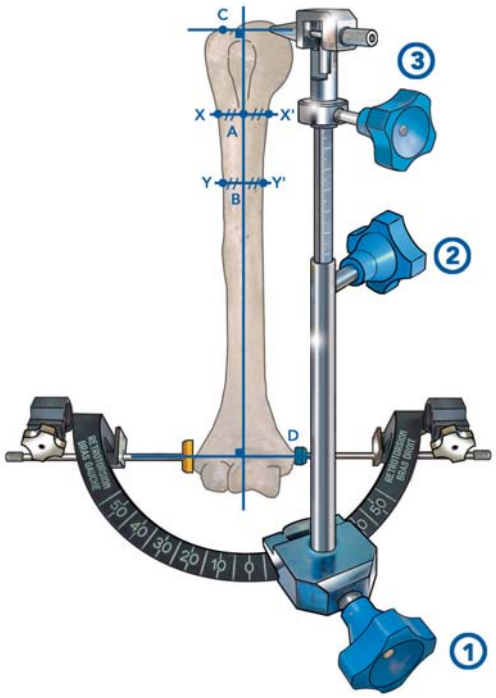
10 Setting height and retroversion

- The height has been determined by the pre-operative planning (page 9).
- The retroversion is set at 20° which is an average value based on anatomic studies from Gilles Walch MD and Pascal Boileau MD.

The Aequalis®-Fracture Jig is composed of:
- a ruler, to determine the humeral height
- a protractor, to determine the humeral retroversion.

The humeral height is determined in relation to the metaphyso-diaphyseal axis (A-B), the top of the greater tuberosity (C) and the medial epicondyle (D), while the humeral retroversion is determined in relation to the axis of the epicondyles (D-E).

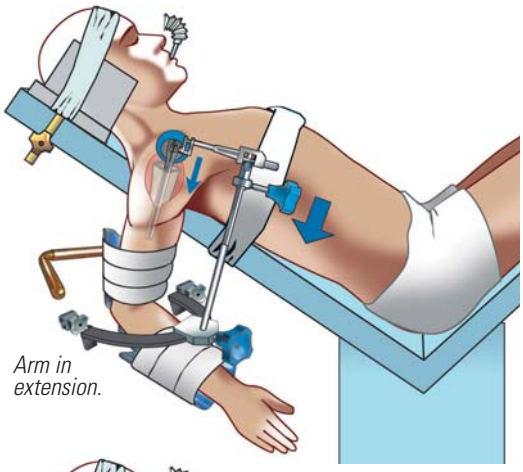
The proximal metaphyso-diaphyseal axis (A-B) represents the axis of the future prosthetic stem. It must not be confused with the diaphyseal axis, at the risk of causing a valgus position of the prosthesis and giving a false measurement of length.



3. SURGICAL TECHNIQUE

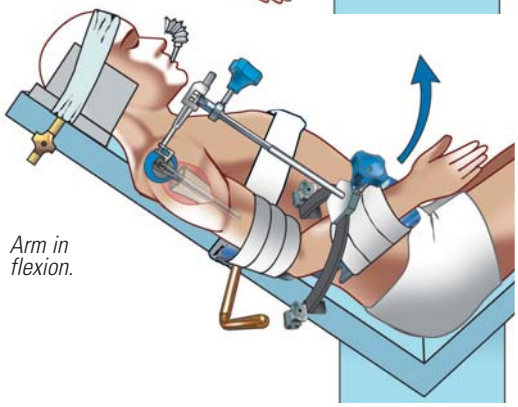
11 Implantation and reduction of the trial prosthesis

Positioning of the remaining components of the fracture jig assembly (protractor, ruler, prosthesis holder and trial prosthesis) must be done with **the arm in extension.**



Arm in extension.

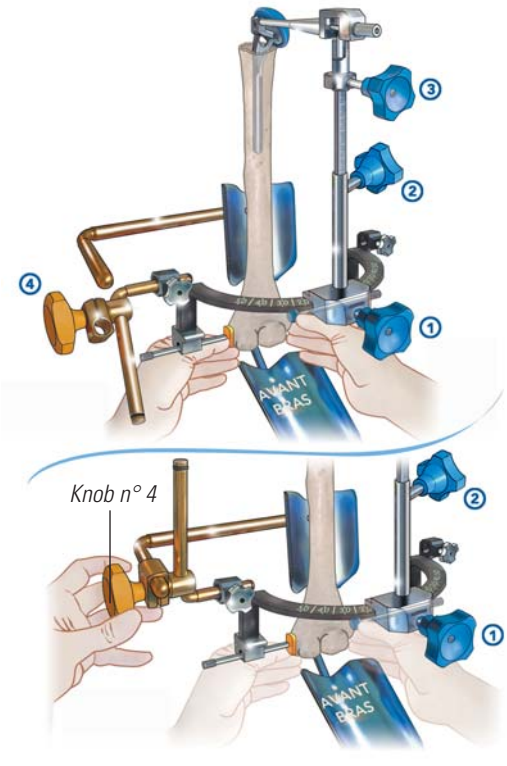
Once the trial prosthesis has been inserted into the humerus, **the arm is placed in flexion** to reduce the glenohumeral joint.



Arm in flexion.

12 Identification of the epicondyles and stabilization of the trial prosthesis

Accurate recreation of height and retroversion begins with the placement of the epicondylar pads on the medial and lateral epicondyles.
The surgeon positions each epicondylar pad on the prominences of the lateral and medial epicondyles.
At the same time, the assistant connects the protractor to the arm support, securing the two angle joints by using knob n° 4.
The fracture jig is then secured, allowing the selection of height and retroversion and a trial reduction.

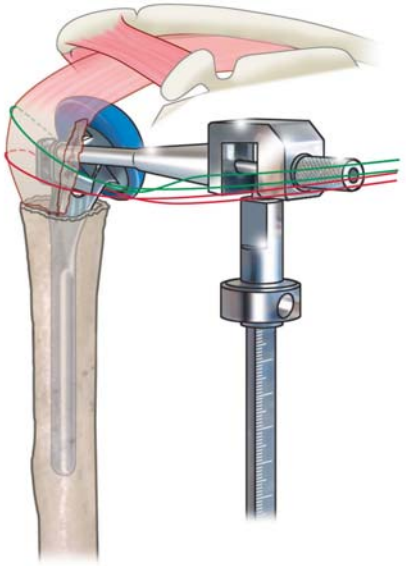


3. SURGICAL TECHNIQUE

13 Reduction of the greater tuberosity around the trial prosthesis and testing of the height

The initial reduction of the prosthesis and the greater tuberosity enables both the height and the retroversion to be tested. The greater tuberosity is placed on the diaphysis and the prosthesis, effectively testing the height of the prosthesis. There are three landmarks of interest:

1. The height of the acromiohumeral space, which is usually **10 mm.**
2. The top of the greater tuberosity, which should be located **5 mm below the upper** limit of the prosthetic head.
3. **There must be no diastasis or overlap between the greater tuberosity and the humeral diaphysis.** The lesser tuberosity is then reduced to verify the adjustment with the greater tuberosity and the diaphysis. Once all of the adjustments have been performed, the trial prosthesis is withdrawn.

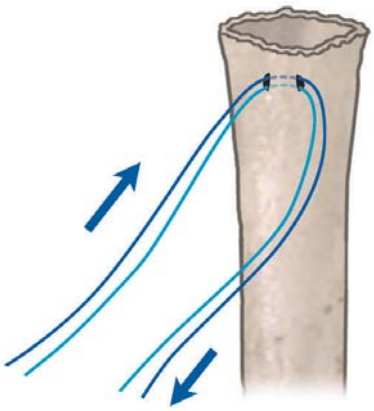


14 Removal of the trial prosthesis

The shoulder is placed in extension to dislocate the trial prosthesis.
The prosthetic holder and the trial prosthesis are removed, leaving the remaining component of the fracture jig in place.

15 Drilling of the diaphysis and placement of the 2 vertical sutures

Two holes are drilled laterally to the bicipital groove. Two non-absorbable sutures are passed through the holes.



3. SURGICAL TECHNIQUE

16 Assembling the implant

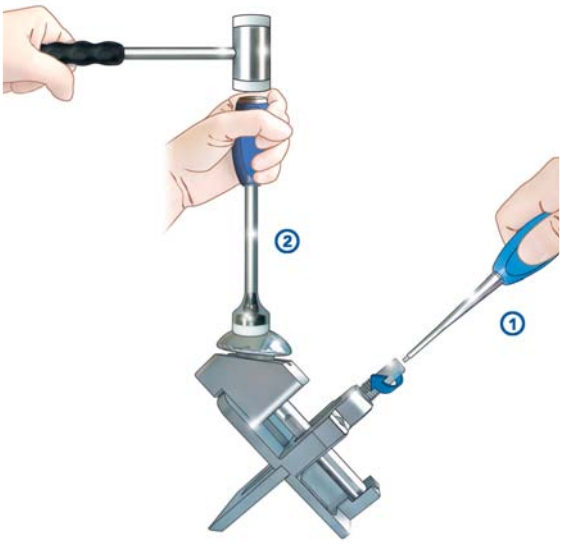
Assembling

The assembly of the implant is done by impaction of the prosthetic head onto the stem.
The assembly is secured by a taper lock system.

The prosthetic head is positioned on the stem, aligning the preselected offset number with the superior aspect of the stem.

Impaction

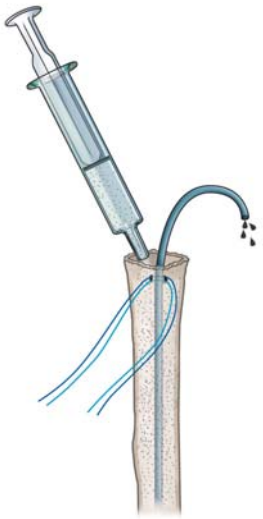
The prosthesis is positioned on the impaction support.
The locking screw of the impaction support is tightened with a 4.5 mm screwdriver to secure the prosthesis during impaction.
A mallet is used to firmly engage the head onto the stem taper.



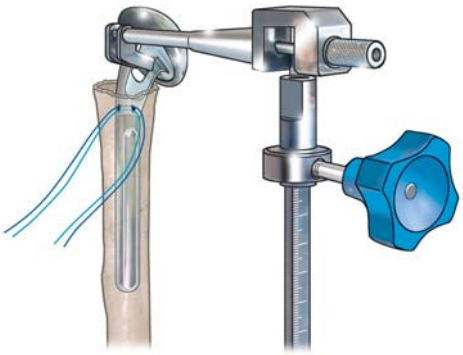
3. SURGICAL TECHNIQUE

17 Cementing the implant

After placement of a cement restrictor, the canal is dried and cement is injected using a large syringe.

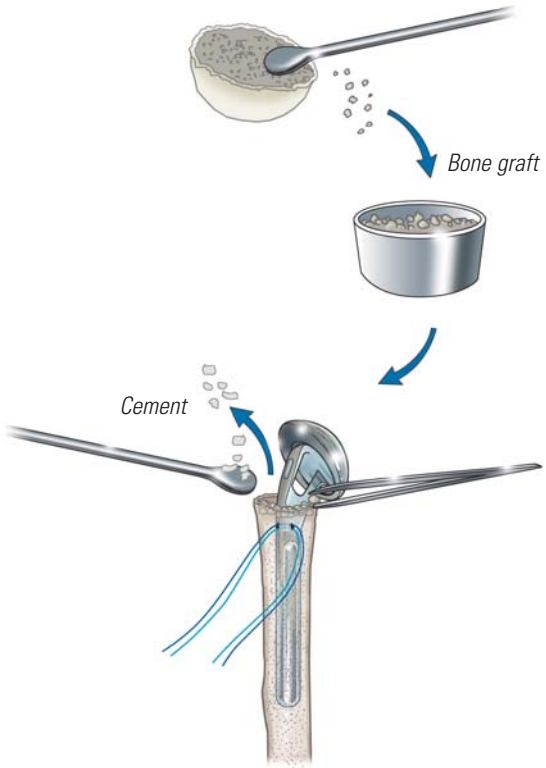


The implant is attached to the prosthesis holder in the same manner as the trial stem.
The prosthesis is introduced into the medullary canal as the prosthesis holder is introduced into the ruler.
Knob n° 3 is then tightened, to secure the implant holder to the jig assembly.



18 Removal of excess cement and placement of the cancellous bone graft

Excess cement is removed from the metaphyseal region and replaced with cancellous bone, taken from the humeral head to promote healing between the tuberosities and the diaphysis.

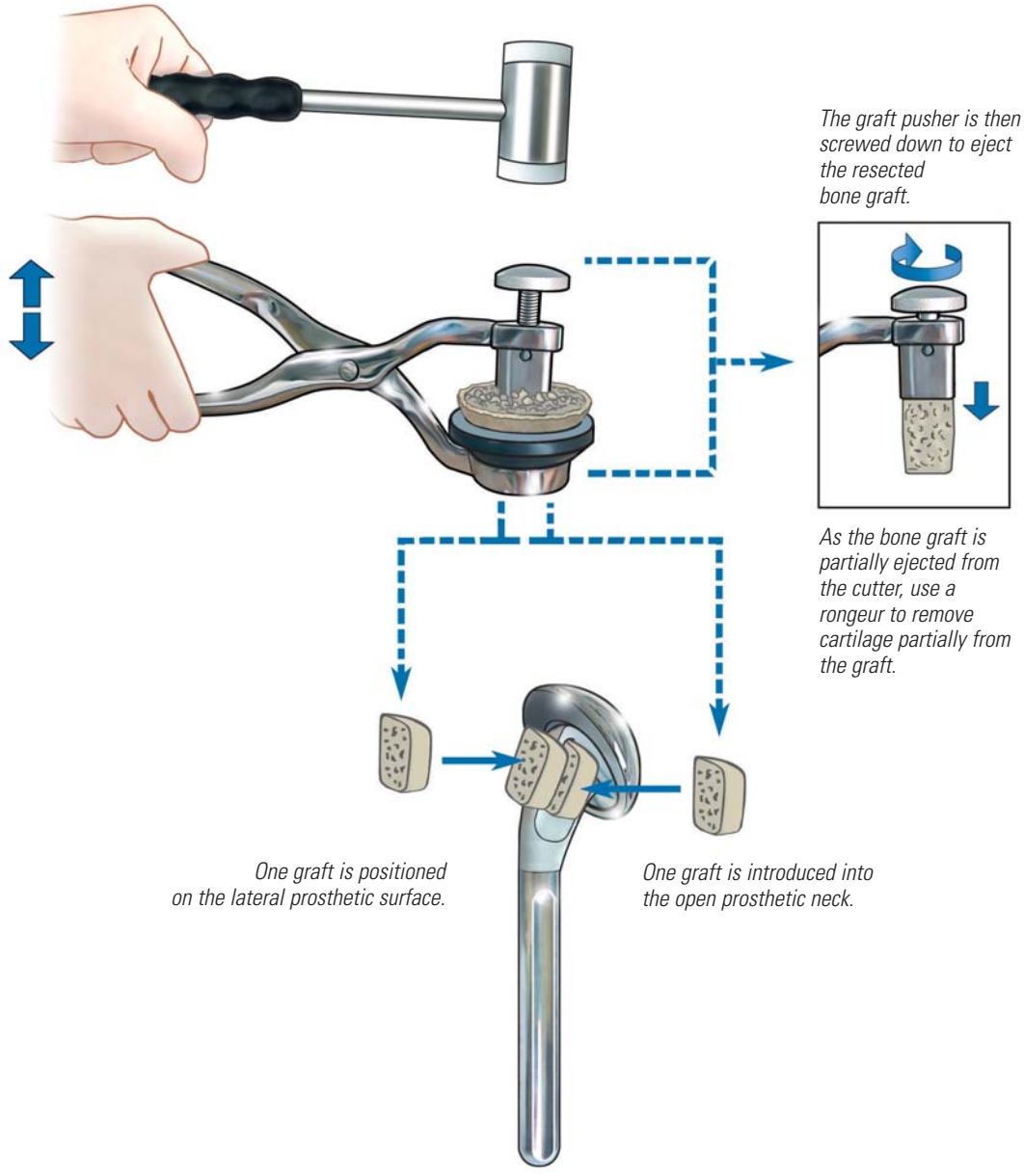


At this stage, if the humeral head doesn't provide enough bone graft (or in case of revision), it is possible to use other graft sources.
Once the cement is set, the prosthesis holder and the rest of the Aequalis®-Fracture Jig are removed.

3. SURGICAL TECHNIQUE

19 Removal of two cancellous bone grafts with the bone graft cutter

Bone grafting is highly recommended to improve tuberosity healing. Two bone grafts are removed from the resected humeral head using the bone graft cutter.
The bone graft cutter allows two bone grafts shaped according to the fenestration of the prosthesis to be removed from the resected humeral head.
The graft pusher is unscrewed and the bone graft source is placed in the base of the bone graft cutter.
The bone graft cutter handles are firmly tightened to cut the bone graft.
In the case of exceptionally hard bone, a mallet can be used to impact the clamp.
The positioning of the two bone grafts is described in sections 20 and 22.



The graft pusher is then screwed down to eject the resected bone graft.

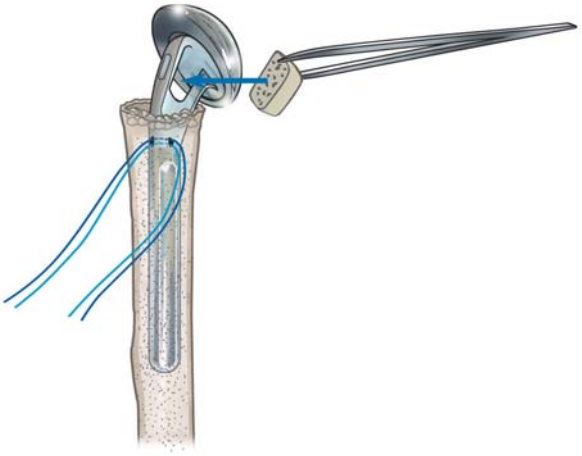
As the bone graft is partially ejected from the cutter, use a rongeur to remove cartilage partially from the graft.

One graft is positioned on the lateral prosthetic surface.

One graft is introduced into the open prosthetic neck.

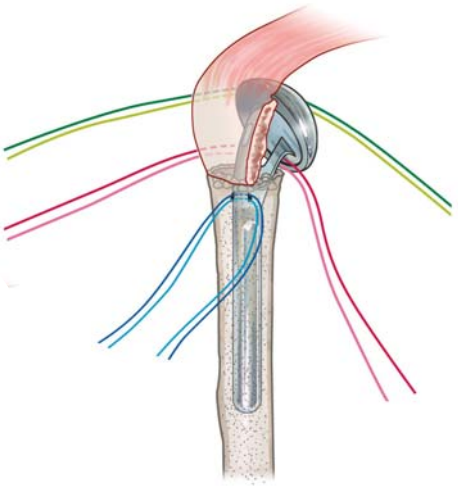
3. SURGICAL TECHNIQUE

20 Positioning the bone graft into the fenestration of the prosthesis

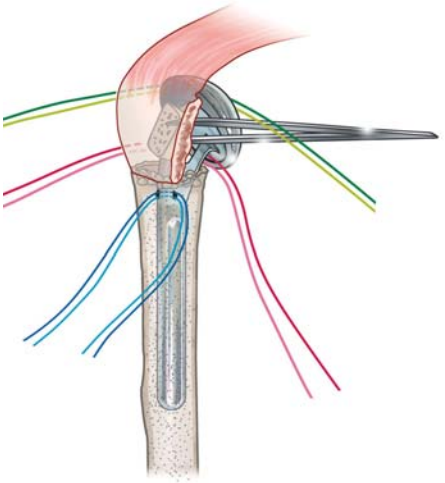


21 Placement of four horizontal sutures around the prosthetic neck

Reconstruction begins with the greater tuberosity and employs two of the four horizontal sutures placed earlier. Passing these sutures through the prosthetic fin does not provide enough stability for the fixation of the tuberosities.
Therefore, we recommend that they are passed medially around the prosthetic neck.



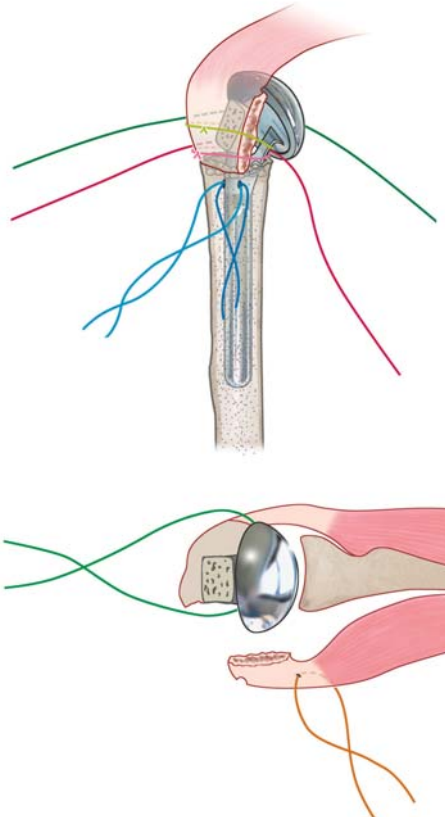
22 Positioning of the bone graft on the flat lateral base of the neck



3. SURGICAL TECHNIQUE

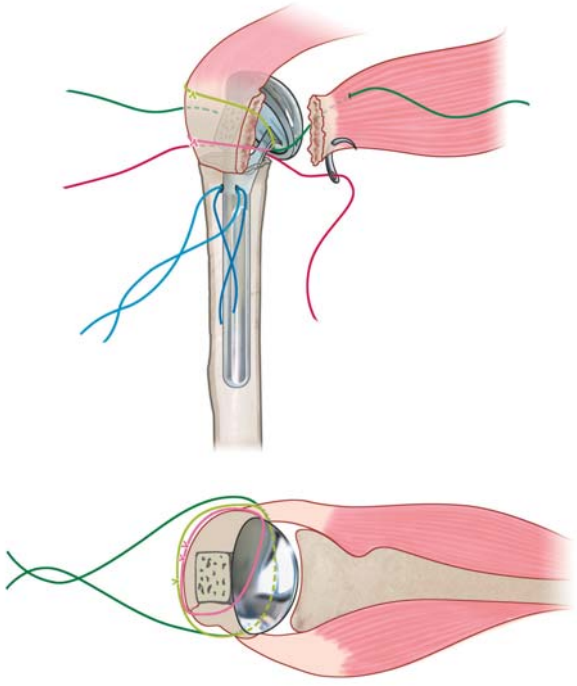
23 Placing two horizontal cerclage sutures around the greater tuberosity

Fixation of the greater tuberosity begins with two horizontal cerclage sutures to anatomically position the tuberosity.
The arm is placed in neutral position. A clamp is used to pull the greater tuberosity anteriorly, reducing the greater tuberosity to the prosthesis. The two horizontal cerclage sutures (one superior, one inferior) are then tied to secure the greater tuberosity to the prosthesis.



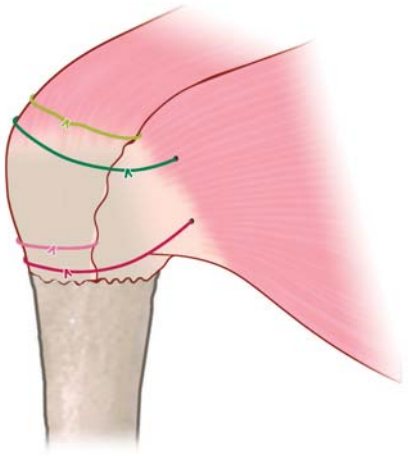
24 Placing two horizontal cerclage sutures around both tuberosities

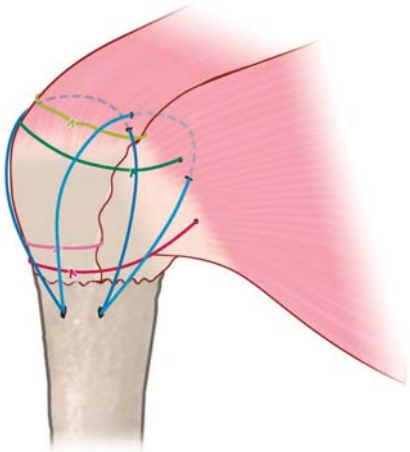
The next step is the reconstruction of the lesser tuberosity, which also uses two of the four horizontal sutures. The two remaining horizontal sutures, which have initially been passed around the greater tuberosity, and the prosthetic neck are then passed through the subscapularis tendon from inside to outside. This maneuver pulls the lesser tuberosity into position under the prosthetic head.



25 Adding vertical tension band sutures on both tuberosities

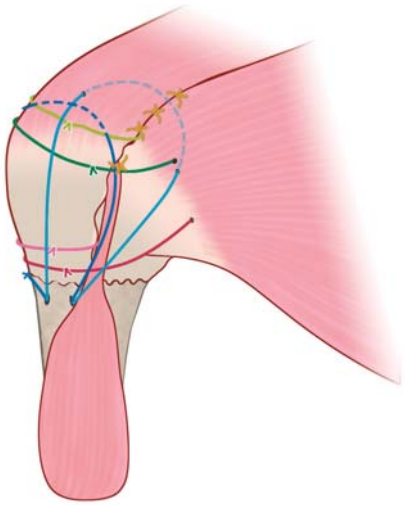
The final tightening is performed in the vertical plane using the two nonabsorbable sutures from the diaphysis in a tension-band technique. One suture is passed anteriorly through the Subscapularis and the Supraspinatus Tendons, while the other suture is passed posteriorly through the Infraspinatus and Supraspinatus Tendons. This provides the all-important fixation of the tuberosity fragments to the humeral shaft.





26 Closing and tenodesis of the long head of the biceps

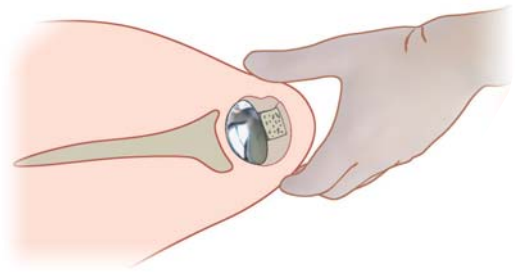
Biceps Tenodesis
After resecting the intra-articular portion of the long head of the biceps, a nonabsorbable suture is passed through its free end using a modified Kessler stitch. The tendon is relocated in the bicipital groove with one end of the suture passed through the Supraspinatus Tendon. The suture is then tied.

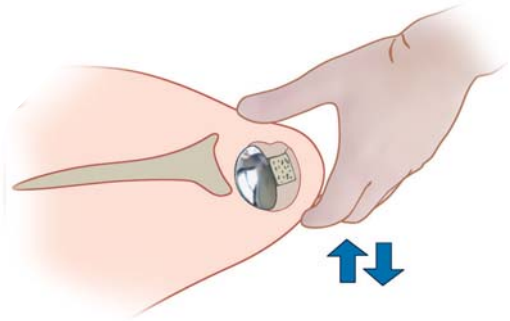


3. SURGICAL TECHNIQUE

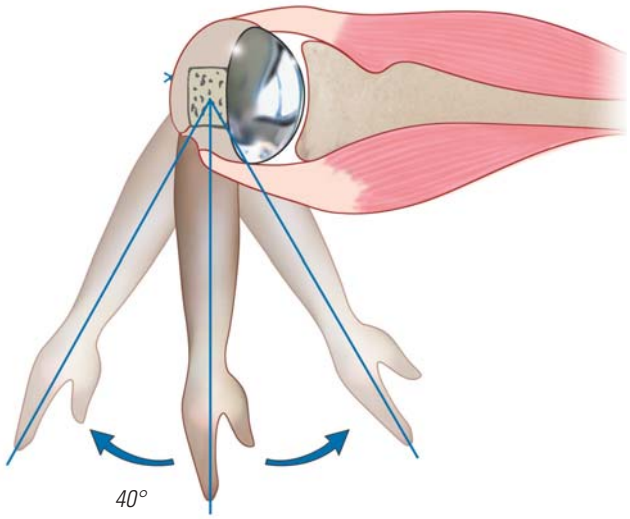
27 Evaluation of the prosthetic stability and mobility

With the arm in neutral position, it is recommended to have a posterior translation of approximately 25% to 50% with an automatic rebound.





A minimum external rotation of 40° is recommended.
The greater tuberosity should not move as the arm is internally rotated.



28 Final closing and immobilization of the arm in abduction and neutral rotation

4. AEQUALIS®-FRACTURE SHOULDER PROSTHESIS LONG AND EXTRA-LONG STEMS

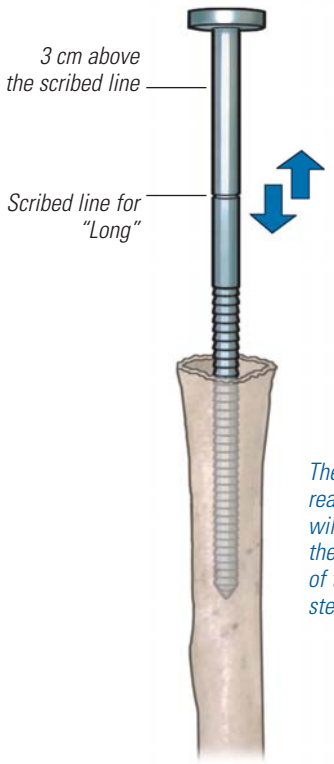
The surgical technique for the Aequalis®-Fracture long and X-Long stem slightly differs from the standard Aequalis®-Fracture stem procedure.
Some steps of the standard surgical protocol have been modified. To ensure correct implantation of this long and X-long stem, please follow the directions below regarding paragraphs 8, 9, 16, 17, 18 and 19 of the surgical procedure.

8 Humeral reaming (page 12)

With the arm in abduction, external rotation and extension, the humerus is progressively reamed using cylindrical reamers of increasing diameter (6.5, 9 and 12 mm). When using the long stem, the reamer needs to be inserted beyond the final teeth as far as the "Long" mark located on the superior portion of the reamer. It is important to prepare the medulary canal over its total length. When using an extralong stem (210 mm), the reamer should be inserted carefully, until the scribed line for "Long" on the smooth section of the reamer is buried approximately 3 cm into the bone.

At this stage, it is also important to remove as much of the residual cement as possible because it might compromise healing tuberosities.

The remainder is exactly the same as the standard Aequalis®-Fracture surgical technique.



The final reamer used will determine the diameter of the humeral stem.

9 Choice of trial prosthesis (page 13)

Trial head, trial stem and the attachment for a "long-stem" prosthesis (170 mm, 180 mm) are available within the dedicated instrumentation YKAD50 (Long Stems Aequalis®-Fracture instrumentation).
The same trials are used for extra-long stems.

The assembly between the trial head and the trial stem, and the attachment of the trial prosthesis to the Fracture Jig prosthesis holder is the same as the regular surgical technique.

4. AEQUALIS®-FRACTURE SHOULDER PROSTHESIS LONG AND EXTRA-LONG STEMS

16 Assembling the implant (page 17)

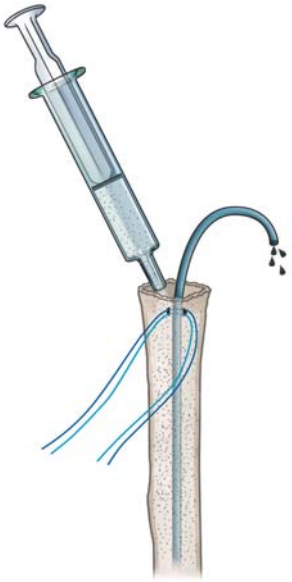
The assembly of the definitive implant is made on a specific impaction support for the long Aequalis®-Fracture stems available in the YKAD50 instrument set. For correct assembly of the implant, the support should be moved to the edge of the table so that the stem can hang off the table.

The remainder is exactly the same as the standard surgical technique.

17 Cementing the implant (page 18)

After placement of a cement restrictor, **10 mm under the extremity of the prosthesis,** the canal is dried, and cement is injected using a large syringe.

The remainder is exactly the same as the standard Aequalis®-Fracture surgical technique.



18 Removal of excess cement and placing the cancellous bone graft (page 18)

Remove any excess cement from the humeral upper shaft and insert bone grafts to promote healing of the tuberosities to the shaft. Bone graft can be taken from the humeral head (if still available), or from other bone graft sources in case of revision.

The remainder is exactly the same as the standard Aequalis®-Fracture surgical technique.

19 Removal of two cancellous bone grafts with the bone graft cutter (page 19)

Bone grafting is highly recommended to improve tuberosity healing. The bone graft cutter allows two bone grafts shaped according to the fenestration of the prosthesis to be removed from the resected humeral head, when possible, or from the bone graft source.

4. AEQUALIS®-FRACTURE SHOULDER PROSTHESIS LONG AND EXTRA-LONG STEMS

The graft pusher is unscrewed and the humeral head or the other bone graft source is placed in the base of the bone graft cutter.The bone graft cutter handles are firmly tightened to cut the bone graft. In case of exceptionally hard bone, a mallet can be used to impact the clamp. The positioning of the two bone grafts is described in paragraphs 20 and 22 of the standard surgical technique.

The remainder is exactly the same as the standard Aequalis®-Fracture surgical technique.

Post-operative rehabilitation (page 24)

The post-operative rehabilitation protocol is identical to the one described in the standard Aequalis®-Fracture surgical technique. However, it is recommended to wait for the radiographic bone healing of all the bony fragments prior to the start of the passive motion rehabilitation procedure.

Except for the above specifications, all other steps of the operative technique and the use of the instrumentation are unchanged, and strictly identical.

INSTRUMENTS

In addition to the basic Aequalis®-Fracture instrument set, a specific tray for long stem (YKAD50) should be used. The same tray could be used for extra-long stem.

Basic instrumentation
YKAD08-09 + YKAD01 + YKAD33 or YKAD30 + YKAD01

Ref. YKAD50

Long trial stems

Size	Ref.
Ø 6.5 mm / L 170 mm	MWA320
Ø 9 mm / L 180 mm	MWA321
Ø 12 mm / L 180 mm	MWA322

Impaction support
ref. MWA325

5. POST-OPERATIVE REHABILITATION

Post-operative rehabilitation is as equally important after shoulder arthroplasty for a fracture case as it is following shoulder arthroplasty for chronic etiologies, contributing at least 50% to the final outcome. Rehabilitation after prosthetic replacement of a 4-part proximal humerus fracture is perhaps the most challenging aspect of shoulder rehabilitation.

In order to avoid complications such as hemarthrosis, hematoma, and prosthetic instability, it is recommended to delay the post-operative rehabilitation until the tuberosities have healed, 45 to 60 days post-operatively.

Because of frequent tuberosity fixation failure previously observed, the aggressiveness of post-operative rehabilitation has been reduced to avoid these potentially catastrophic complications. Early passive motion is not recommended because it is easier to treat a stiff shoulder than a tuberosity migration or nonunion.

The patient's arm is immobilized in 45 degrees abduction and neutral rotation for a period of 4 to 6 weeks. During the first 3 post-operative weeks, active mobility of the hand, fingers and elbow is allowed without any movement of the shoulder joint.

In the fourth post-operative week, after ensuring the tuberosities have remained in place radiographically, passive abduction of the arm is permitted starting from a resting position of 45 degrees abduction.
No rotation is allowed at this time as this could cause suture failure before the tuberosities have healed.

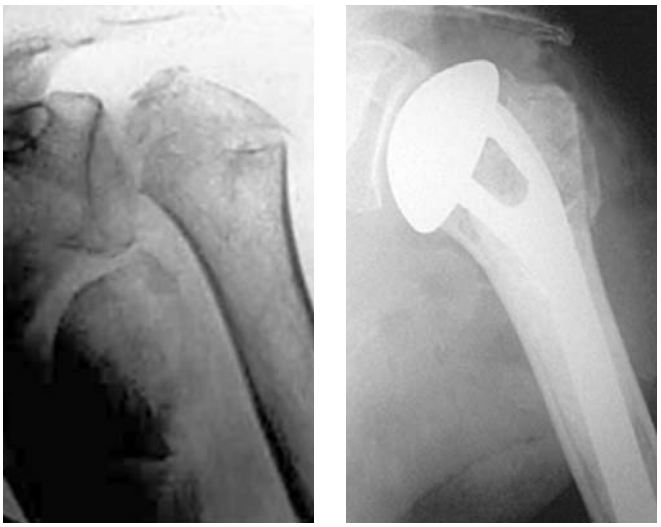
At 6 weeks post-operative, passive rehabilitation is initiated emphasizing elevation and rotation. The patient sees a physiotherapist 3 times per week, but the patient, with the assistance of family, carries out therapy exercises at home on days they do not see the therapist. Rehabilitation in a warm water pool is particularly helpful when feasible from the 21st post-operative day.

Once the tuberosities clearly show radiographic healing (2 to 3 months post-operative), active mobility is permitted in elevation and internal rotation. These exercises can be performed by the patient at home many times during the day. Strengthening and resistance exercises are avoided as these can be responsible for pain and have shown no proven benefit.

Experience with this rehabilitation protocol has demonstrated tuberosity migration and nonunion to occur infrequently. Patients must be informed of the risk of post-operative stiffness during the first 6 to 9 post-operative months. This stiffness invariably diminishes, provided the anatomy has been properly re-established. Final mobility is usually obtained by 12 months post-operatively.
In summary, rehabilitation following humeral head replacement for fracture focuses on obtaining union of the tuberosities.

The post-operative radiographs show anatomical reconstruction using the Aequalis®-Fracture Solution.

Pascal Boileau MD
and Gilles Walch MD



The post-operative X-rays shows a perfect anatomical reconstruction using the Aequalis®-Fracture Solution.

6. ASSEMBLY INSTRUCTIONS LEFT ARM

For assembly on an instrument table.
The yellow items are on the outside of the operative arm.

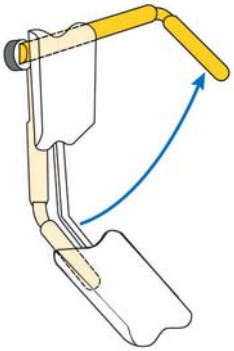
1 PREPARATION OF ARM SUPPORT

What you need

- Arm support

What you do

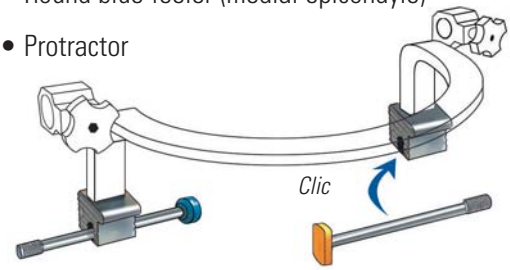
- *Pivot the angle joint horizontally.*



2 ATTACHMENT OF EPICONDYLAR PADS

What you need

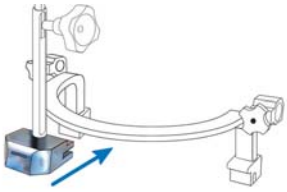
- Rectangular yellow feeler (lateral epicondyle)
- Round blue feeler (medial epicondyle)
- Protractor

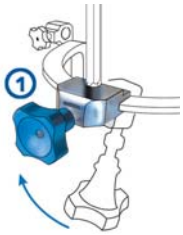


3 ATTACHMENT OF SLIDE

What you need

- Protractor,
- Blue handle n° 1
- Slide





What you do

- *Place slide on 20° (side marker "retroversion left arm").*
- *To alter the retroversion loosen blue knob n° 1, slide and then tighten.*

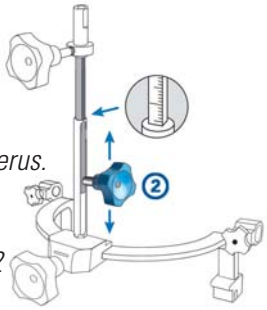
4 ATTACHMENT OF RULER

What you need

- Graduated ruler
- Blue handle n° 2

What you do

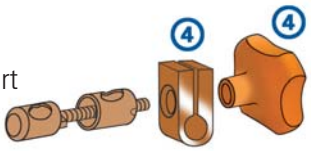
- *The definitive height is that of the healthy humerus. To slide the ruler to the desired measurement, loosen the blue knob n° 2 and then tighten.*



5 ATTACHMENT OF HANDLE N° 4

What you need

- Yellow male part
- Yellow female part
- Yellow ring n° 4
- Yellow handle n° 4



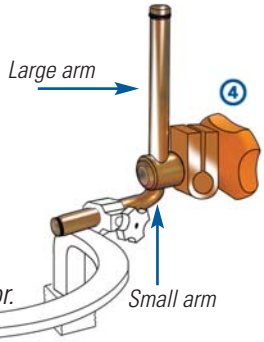
What you do

- *Leave the unit untightened to allow assembly 6.*

6 ATTACHMENT OF SWIVEL JOINT TO SMALL ANGLE JOINT

What you need

- Small angle joint
- Articulated swivel joint



What you do

- *Attach angle joint to protractor.*
- *Loosen knob n° 4 and small thumbwheel to allow free assembly.*

Parts used later: 1 right prosthesis holder - knob n° 3.

6. ASSEMBLY INSTRUCTIONS RIGHT ARM

For assembly on an instrument table.
The yellow items are on the outside of the operative arm.

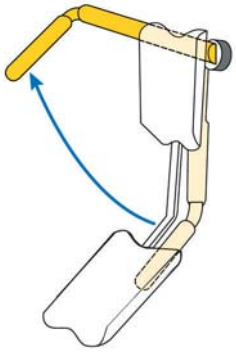
1 PREPARATION OF ARM SUPPORT

What you need

- Arm support

What you do

- *Pivot the angle joint horizontally.*



2 ATTACHMENT OF EPICONDYLAR PADS

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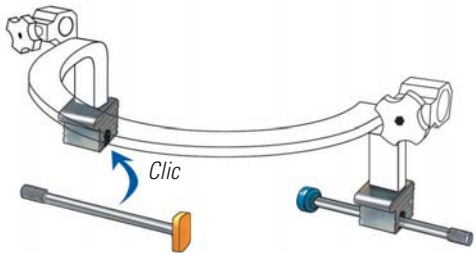
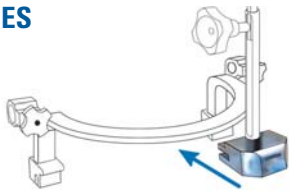
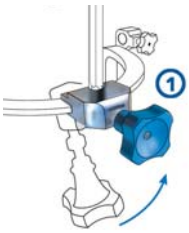


3 ATTACHMENT OF SLIDES

What you need

- Protractor
- Blue handle n° 1
- Slide





What you do

- *Place slide on 20° (side marker retroversion loosen blue knob n° 1, slide and then tighten.*
- *To alter the retroversion loosen blue knob n° 1, slide and then tighten.*

4 ATTACHMENT OF RULER

What you need

- Graduated ruler
- Blue handle n° 2

What you do

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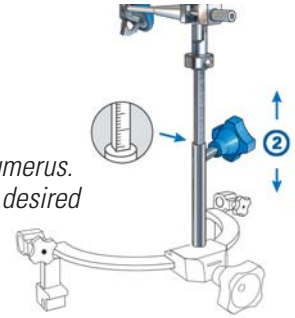

5 ATTACHMENT OF HANDLE N° 4

What you need

- Yellow male part
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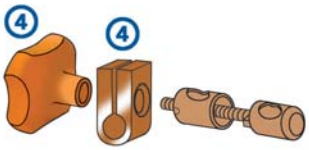
- Yellow ring n° 4
- Yellow handle n° 4



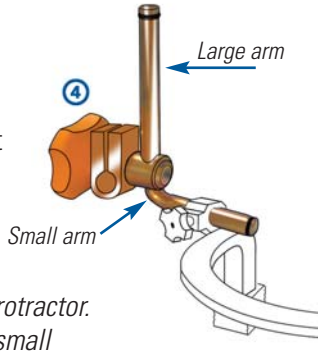
What you do

- *Leave the unit untightened to allow assembly 6.*

6 ATTACHMENT OF SWIVEL JOINT TO SMALL ANGLE JOINT

What you need

- Small angle joint
- Articulated swivel joint



What you do

- *Attach angle joint to protractor.*
- *Loosen knob n° 4 and small thumbwheel to allow free assembly.*

Parts used later: 1 right prosthesis holder - knob n° 3.

INSTRUMENTS

Ref. YKAD52

Cylindrical reamers

Ø 6.5	Ref. MWA607
Ø 9	Ref. MWA609
Ø 12	Ref. MWA612

Hexagonal screwdriver 3.5 mm

Ref. MWA124

Trial head template

Ref. MWA162

Trial head

37 x 13.5	Ref. MWA237
39 x 14	Ref. MWA239
41 x 15	Ref. MWA241
43 x 16	Ref. MWA243
46 x 17	Ref. MWA246
48 x 18	Ref. MWA248
50 x 16	Ref. MWA250
50 x 19	Ref. MWA251
52 x 19	Ref. MWA252
52 x 23	Ref. MWA253

Cement restrictor inserter

Ref. MBO101

Trial head clamp

Ref. MWA103

T handle

Ref. MWA106

Humeral prosthesis impactor

Ref. MWA108

Mallet

Ref. MWA122

Hexagonal screwdriver 4.5 mm

Ref. MWB012

Trial stem

Ø 6.5 mm	Ref. MWA308
Ø 9 mm	Ref. MWA309
Ø 12 mm	Ref. MWA310

Bone graft cutter

Ref. MWA301

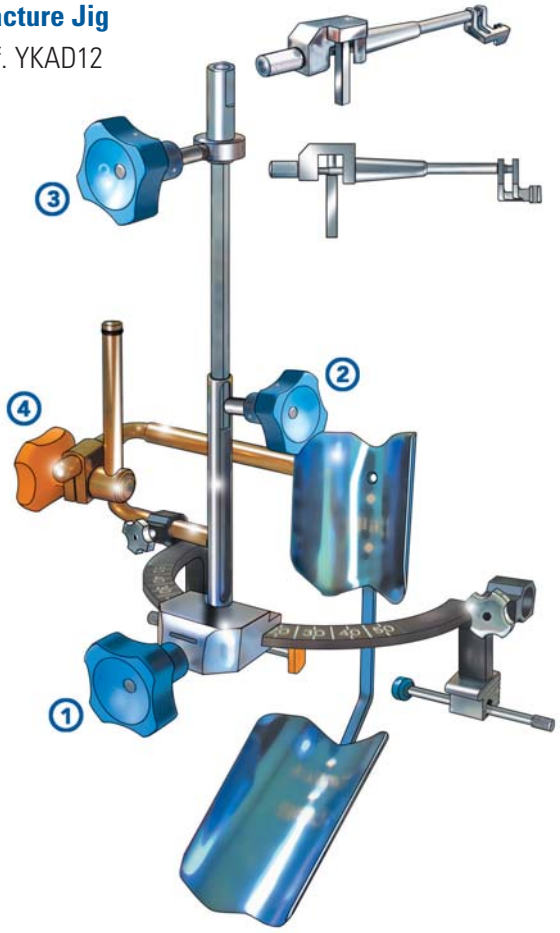
Impaction support

Ref. MWA302

INSTRUMENTS

Fracture Jig

Ref. YKAD12



IMPLANTS

IMPLANTS

Aequalis®-Fracture

Head

Size	Ref.
39 x 14	DWB239
41 x 15	DWB241
43 x 16	DWB243
46 x 17	DWB246
48 x 18	DWB248
50 x 16	DWB250
50 x 19	DWB251
52 x 19	DWB252
52 x 23	DWB253

Extended sizes

Head

Size	Ref.
37 x 13.5	DWB237
54 x 23	DWB254*
54 x 27	DWB255*

**available upon special request*

Humeral stems HA coated

Size	Ref.
Ø 6.5 mm / L 130 mm	DWA171
Ø 9 mm / L 130 mm	DWA172
Ø 12 mm / L 130 mm	DWA173

Humeral long stems HA coated

Size	Ref.
Ø 6.5 mm / L 170 mm	DWA178*
Ø 9 mm / L 180 mm	DWA179*
Ø 12 mm / L 180 mm	DWA180*

Humeral extra-long stems HA coated

Size	Ref.
Ø 9 mm / L 210 mm	DWA195*
Ø 12 mm / L 210 mm	DWA196*

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161, rue Lavoisier. Montbonnot. 38334 Saint-Ismier Cedex. France. Tél. : 33 (0)4 76 61 35 00. Fax : 33 (0)4 76 61 35 33. **www.tornier.com**

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