AGILON®

The modular shoulder system

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implantcast

Surgical Technique
trauma shoulder treatment

AGILON®

The modular Shoulder system trauma shoulder treatment

The following surgical technique was developed
in co-operation with Dr. N. Hellmers and
Dr. A. Betthäuser, Hamburg.

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Nota Bene: The author of this technique has outlined the procedure for the uncomplicated surgical scenario. Ultimately however it is the operating surgeon who is best placed to assess and address the individual needs of each patient.

System overview

The highly modular AGILON® system provides multiple treatment options to closely match the individual requirements of each patient. A choice of trauma or omarthrosis metaphyseal components are available which can be used for anatomical or reverse geometry reconstruction. The modular design allows the surgeon to freely switch between geometries intraoperatively as well as to revise from an anatomic to an reverse geometry without necessarily changing the metaphyseal component. Additionally in the revision scenario the modular humeral diaphyseal stem and the modular glenoid plate can be left in-situ which not only shortens anaesthetic time but also preserves bone stock. The cap offset, the metaphysea engthand the metaphysea rotat on can eas y be nterdependent y adjusted after mp antat on of the d aphysea stem offer ng enhanced ntroperat ve fex b ty.

Pre-operative planning

Pre-operative planning and precise surgical techniques are mandatory for optimal results. The instructions and the procedure given in the surgical technique to the system must be adhered to. Familiarity with the recommended surgical technique and its careful application is essential to achieve the best possible outcome.
Before surgery a surgical planning with regard to the dimensions of the prosthetic model and the positioning of the implant components in the bone has to be carried out by the surgeon.

For this purpose, X-ray templates are available:

Digital templates: Digital templates are included in the data base of the common planning systems. For missing templates, please contact the provider of the planning software and request for these templates.

Radiographic templates: Alternatively radiographic templates are available in various scale factors, which can be obtained on demand from your local representative.

For the analysis of case, X-rays in three sections vertical to each other are necessary. Preoperativethe following X-rays have to be prepared:
- True A-P-Grashev view
- Y-view
- Axillary Lateral

Other studies that may be helpful:
- True A-P of the opposite shoulder
- B atera Long Humera fi ms w th a engthmeasuring gauge
- Thin slice CT or MRI

M/L View

A/P View

Important information:
Prior to surgery the following should be ensured:
- all needed components are available during surgery. An adequate number of various implant components should be available for surgery. It should be determined whether the implantation should be done with or without the use of bone cement.
- all instruments for the implantation are present and are matching the corresponding implants. The implants may only be used with the instruments of the implantcast GmbH. The only exception being standardized instruments used during surgery.

Note: For further information regarding postoperative instructions as well as indication, contraindication and risk factors please see the instruction for use for "Shoulder Endoprostheses" (09300031GB) and this surgical technique on page 43.

Compatibility

Humeral options

Heads

anatomical

AGILON® cap

AGILON® CTA cap

Ø: 44, 47, 50 and 53mm
cap height: 14, 17 and 20mm

revers

AGILON® cap invers

AGILON® retentive cap invers

Ø: 36, 40 and 44mm
neck length: K, M (+3mm) and L (+6mm)

Metaphyseal components

metaphyseal angle: 135° and 155°

Screws

length: 22.5mm - 40mm

Extension pieces

length: 7.5mm
10mm
12.5mm
15mm
17.5mm

Stems

cementless

Ø: 9-18mm (in 1mm steps)*
length: 30mm**, 60mm, 120mm,
180mm and 240mm

*Stems of 30mm length are not available in diameter 9mm. Diameters of 17mm and 18mm are only available in length of 30mm and 60mm.
**30mm stems can not be used with the trauma metaphyseal components with REF 3821-0001 and REF 3821-0011!

cemented

Ø: 6-12mm (in 2mm steps)
length: 60mm, 90mm and 120mm

compatible according to sizes/diameters

compatible to all sizes

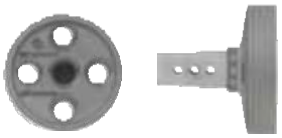
glenoid options

cementless

PE-component

glenoid PE-insert	PE- glenosphere
 sizes: sz. 2 sz. 3 sz. 4	 sizes: sz. 2 sz. 3 Ø: 36mm (neutral, eccentrical) 40mm (eccentrical) 44mm (eccentrical)

Cementless glenoid

anatomical	round
 sizes: sz. 2 sz. 3 Versions: short long	 sizes: sz. 3

Screws

cancellous screw angle stable

length: 20mm - 40mm

cancellous screw

length: 26mm - 34mm

cemented

PE- glenoid

sizes: sz. 2
sz. 3
sz. 4

→ compatible according to sizes/diameters

→ compatible to all sizes

Compatibility humerus prosthesis to glenoid

cementless glenoid with PE-insert

cemented PE-glenoid

↕ compatible to all sizes

AGILON® cap

AGILON® CTA cap

cementless glenoid with PE-glenosphere

↕ compatible according to sizes/diameters

AGILON® cap invers

AGILON® retentive cap invers

Surgical Technique

Patient Positioning

The patient should be bedded in the „Beach-chair"-position (Fig. 1 and Fig. 2) at the edge of the table to dislocate and extend the arm freely. A movable side table for the forearm enables a stable rotation control and bed for the forearm.

Fig. 1

Fig. 2

Deltopectoral Appoach

Perform the deltopectoral skin incision (Fig. 3) from the top of the coracoid, following the front edge of the deltoideus, straight to the humeral beginning of the M. deltoideus.

Fig. 3

After the skin incision and mobilization of the atera sk n fap, undertake the nc s on of the fascia between M. pectoralis and M. deltoid. The cephalic vein may be taken laterally as shown or medially (more tedious because of feeder vessels from deltoid but, more anatomic as it crosses the fie d when taken atera y and s at ncreased r sk of damage from retractors) (Fig. 4).

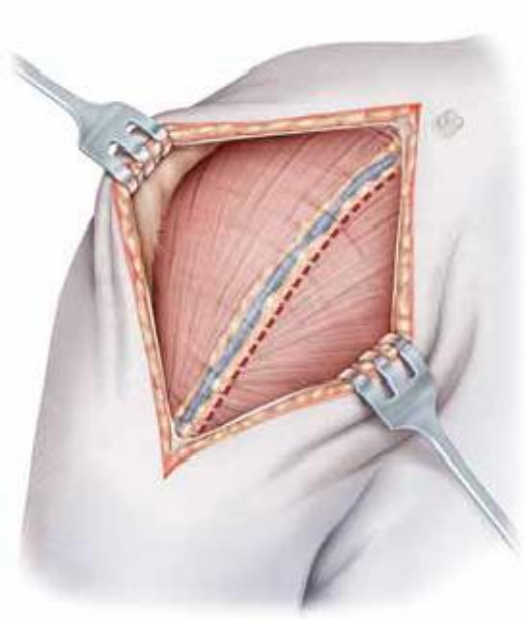


Fig. 4

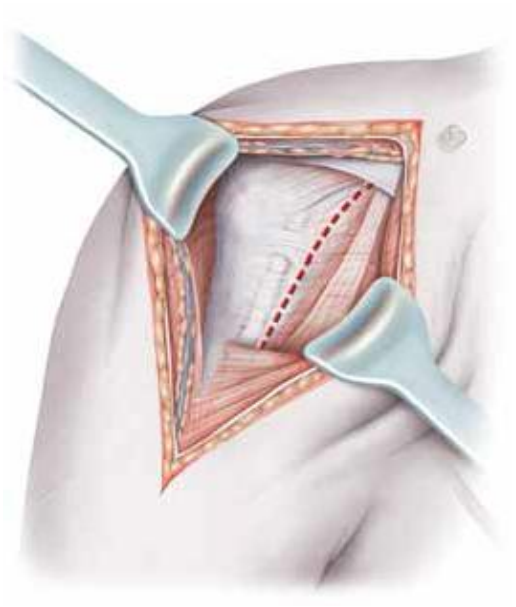


Fig. 5

Vertical incision of the clavi-pectoral fascia between the ong and short b ceps fiber up to but not through the Lig. Coracoacromiale (Fig. 5).

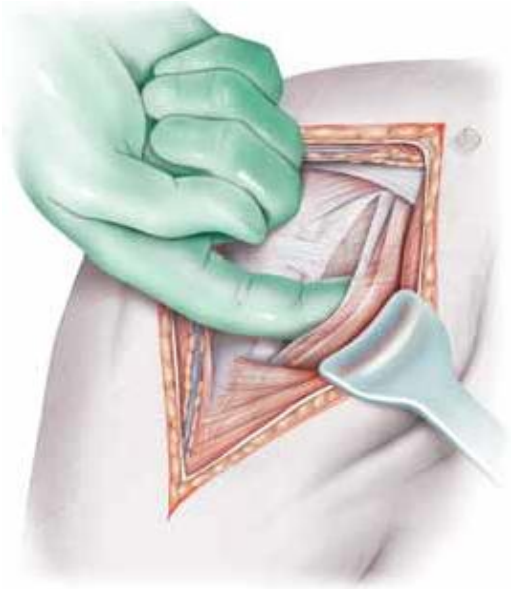


Fig. 6

Mobilization of the conjoined tendon as well as palpation of the musculocutaneus nerve.
In add t on the ax ary nerve can be dent fied at the lower edge of the subscapularis to avoid iatrogenic damages at the further preparation (Fig. 6). Both nerves must be protected during the whole operation. Avoid sharp blade self retractors under the conjoined tendon.
The long biceps tendon helps to the orientation for the dent ficat on of the greater and esser tuberosities in fracture cases and the rotator interval in arthroplasty.

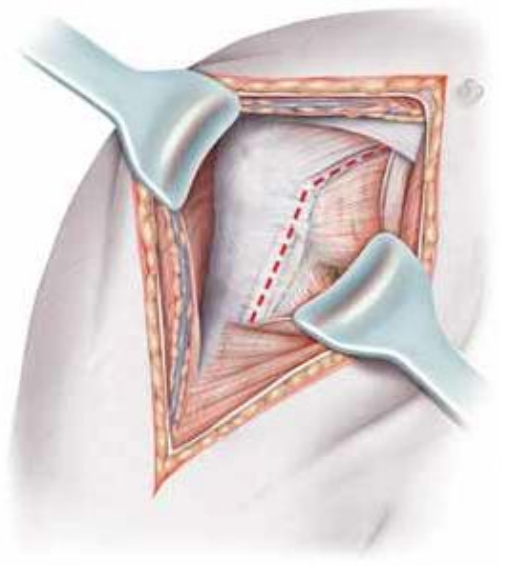


Fig. 7

Inc s on above the b ceps fibre n prox ma d rection up to the Lig. Coracoacromial and splitting of the rotator cuff nterva between Subscapu ar s and Supraspinatus (Fig. 7 and Fig. 8). If possible the biceps tendon should be attached. A biceps tenotomy is performed. In general a biceps tenodesis is performed to the pectoralis major or rotator interval or the short head of the biceps.

Subscapularis take down is left to the individual surgeons preference. This can include lesser tuberosity osteotomy's of varying thicknesses, subscapularis peel, subscapularis tenotomy performed 1cm medial to the lesser tuberosity and in extreme cases Z-lengthening of the subscapularis can be performed when external rotation contractures are -30° or more. Likewise capsulotomy and/or capsulectomy can also be performed individually. At the very least the capsule must be incised from the labrum from 5:00 to 12:00 on the left or 12 to 7 on the right (Fig. 8). In patients with posterior subluxation if an anatomic shoulder is to be performed no posterior release should be performed and one should be prepared to imbricate the posterior capsule.

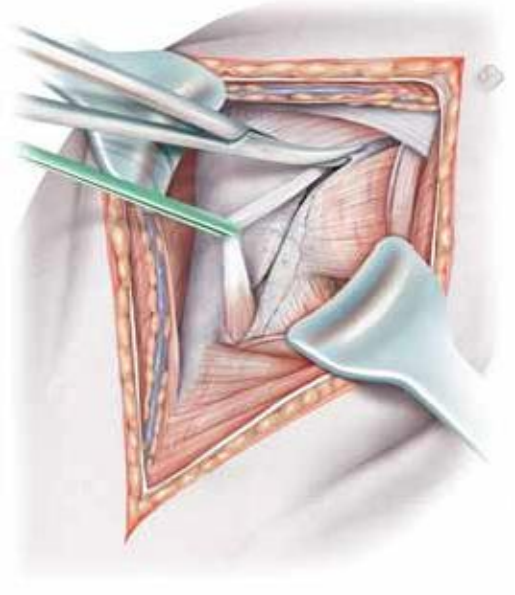


Fig. 8

Exposure of the fracture

Preparation of the head fragments and the adherent segments of the rotator cuff. Trace the b ceps into the rotator interval then isolate the greater and lesser tuberosity fragments with the attached rotator cuff. Mob zat on beg ns at the subscapu ar s including the lesser tuberosity complex (Fig. 9).

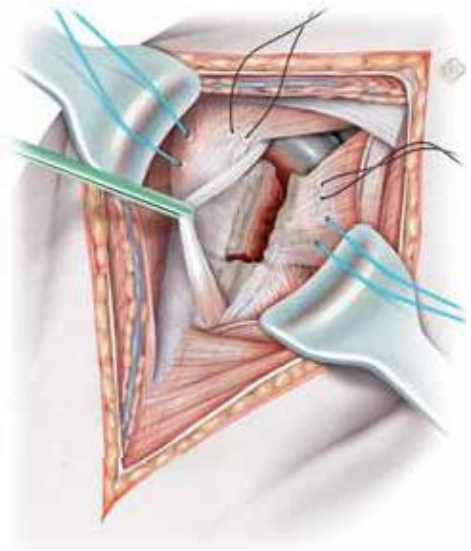


Fig. 9

Heavy retention sutures are placed at the junction of the muscle tendon and bone of the lesser tuberosity and these structures are retracted medially. Follow the same procedure with the greater tuberos ty w th ts parts of the rotator cuff by attaching the sutures at the tendon bone junction. This fragment is retracted laterally posteriorly and superiorly and retracting to lateral

After fin sh ng these maneuvers the v ew to the head fragment is unobstructed, however, the head fragment may be luxated or tilted dorsally or medially and stuck. It has to be removed carefully and kept for the determination of the dimension of the prosthetic head and also for cancellous bone to add for bone grafting (Fig. 10).

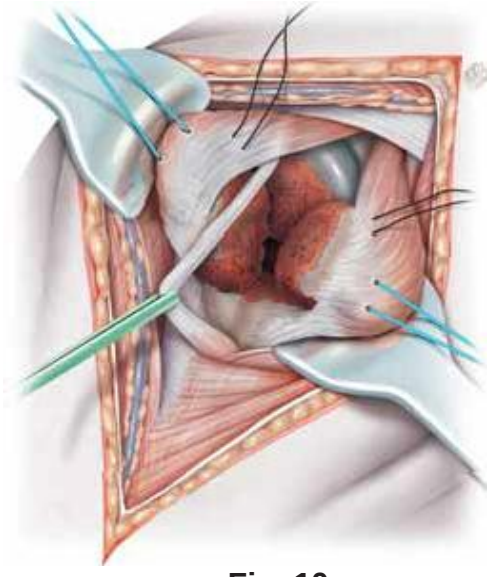


Fig. 10

Fig. 11

Fig. 12

Preparation of the medullary cavity

The humerus stem is exposed distal to the fracture w th suffc ent ength and ustrated w th bone forc-ipes. The end of the stem has to be cleaned. In order to have good access to the medullary cavity, the forearm is adjusted with the table to position the upper arm in abduction and vertical position.

Ream the intramedullary cavity according to the planned stem. Perform the reaming manually by use of the T-handle (Fig. 11). Start with the small-est reamer and increase the diameter (8-18mm) in 1mm steps.

Use of cemented stems

For a cemented stem the reaming should be 2mm b gger than the d ameter of the stem to have suff-cient space for bone cement. Be aware to add the length of the intramedullary plug to the reaming depth.

stem length (cemented stem)	reaming depth
60mm	85mm
90mm	105mm
120mm	145mm

Additionally, the conical stem portion need to be prepared for stems with a diamenter up to 10mm. Use the conical reamer with the T-handle (Fig. 12).

Use of cementless stems

For cement ess fixat on the cav ty shou d be reamed to the diameter of the planned cementless stem ("line to line").

stem length (cemented stem)	reaming depth
60mm	60mm
120mm	120mm
180mm	180mm
240mm	240mm

Note: Regularly the loan shipments include cementless stems from 60 to 120mm only. If longer cementless stems (180mm and 240mm) are required, these stems have to be ordered separately. Longer reamers are also required.
When 180mm or 240mm long cementless are to be used, leave the last reamer in the medullary canal, as there are no trial stems available for these stems lengths.

For the suture, holes are drilled underneath the edge of the fracture into the humerus before implanting the stem. Following non absorbable high-strength suture material is attached to the stem for vert ca refixat on (F g. 13).

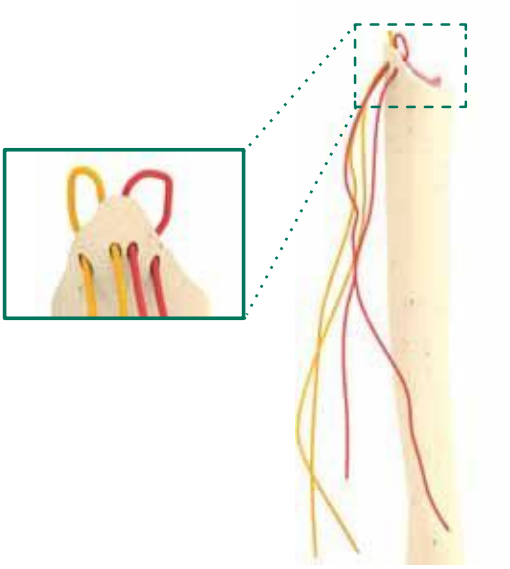


Fig. 13

cemented stem implantation

After preparing the medullary cavity for the cementation a intramedullary plug has to be inserted with the adequate instrumentation. Alternatively a cement stop of cancellous bone from the humeral head can be inserted into the medullary cavity.

Place the impaction sleeve M6 on the trial stem and connect both instruments with the impactor (Fig. 14).

Fig. 14

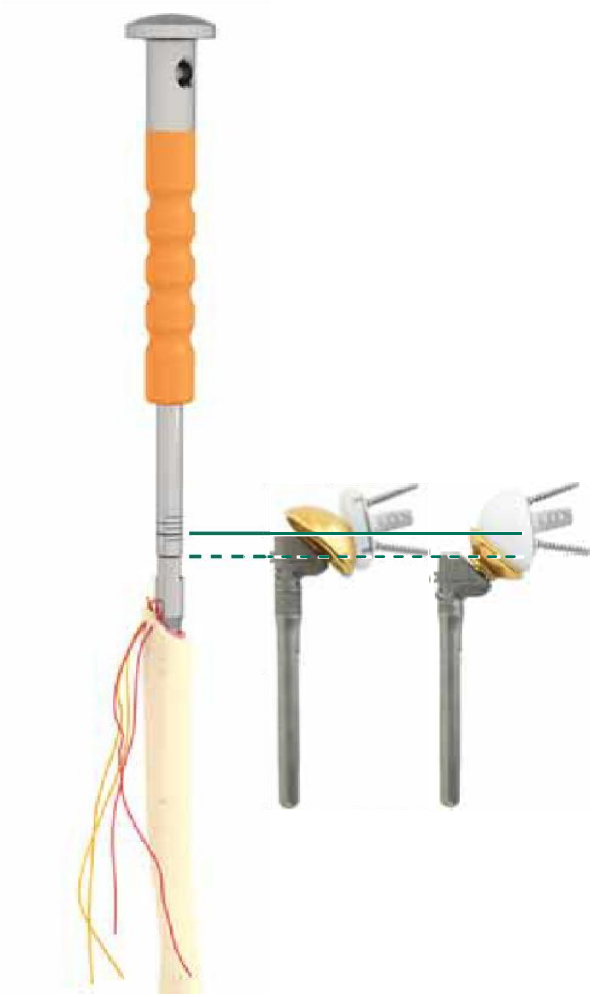


Fig. 15

Prior to stem implantation the height of the prosthesis is planned. Therefore the tubercles are repositioned around the stem impactor instrument. The expected height of the metaphyseal component can be seen on the stem impactor and can be brought in relation to the height of the tubercles. The bolt laser markings show the possible heights. If a 10mm extension sleeve is used the biggest line is reached. The slot between the impaction sleeve and the impactor shows the height, if only a metaphyseal component is used (i.e. for reverse shoulder) (Fig. 15).

For implanting the stem bone cement is placed in the medullary cavity and the selected stem with stem impactor and impaction sleeve is inserted up to the marking. If possible cemental residuals should be removed in soft condition. Take care that the serration for the extension piece or the metaphyseal component is free of cement.

Remove the impactor and the impaction sleeve afterwards (Fig. 16).

Note: If the impaction sleeve is hard to remove, the guide rod can be inserted to achieve a better stabulity when removing.

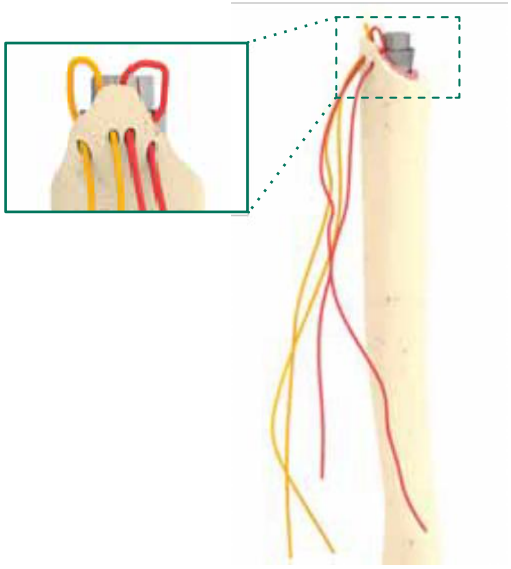


Fig. 16

cementless stem implantation

For cementless stem implantation, use the stem impactor and the impactor sleeve. The diameter of the cementless stem used should be the same as the last reamer used.

Remove the impactor and the impaction sleeve afterwards (Fig. 16).

Note: If the impaction sleeve is hard to remove, the guide rod can be inserted to achieve a better stabulity when removing.

Height and retrotorsional determination

After hardening of the cement, screw a guide rod on the implanted stem. Place the trial extension piece as well as the trial metapjyseal component over the guide rod on the stem (Fig. 17).
The choice of the extension piece determine the length of the screw, to connect the trial components. See below:

extension piece	screw
none	22.5mm
7.5mm	30mm
10mm	32.5mm
12.5mm	35mm
15mm	37.5mm
17.5mm	40mm

Fig. 17

Use of the anatomical setup

Place the implant impactor on the metaphyseal component. Optionally both can be connected by the screw **(a).**

For the alignment of the adequate retrotorsion of the prosthesis of 30° the alignment rod is set to 30° and positioned on the impactor (Fig. 18).

In parallel position of alignment rod and forearm ax s at 90° fect ona e bow jo nt, the prosthes s s in 30° retrotorsion (Fig. 19). Lock the items in this position by the use of an adequate trial screw.

Note: In case the implant components are changed nto an reverse configurat on during the surgery the height has to be reduced by app. 10mm and the retrotorsion has to be changed to 10° or 0°. Because of this it is highly recommended to **always use a 10mm extension piece in primary cases.** So the implant can be easily switched into an reverse implant by leaving stem in place.

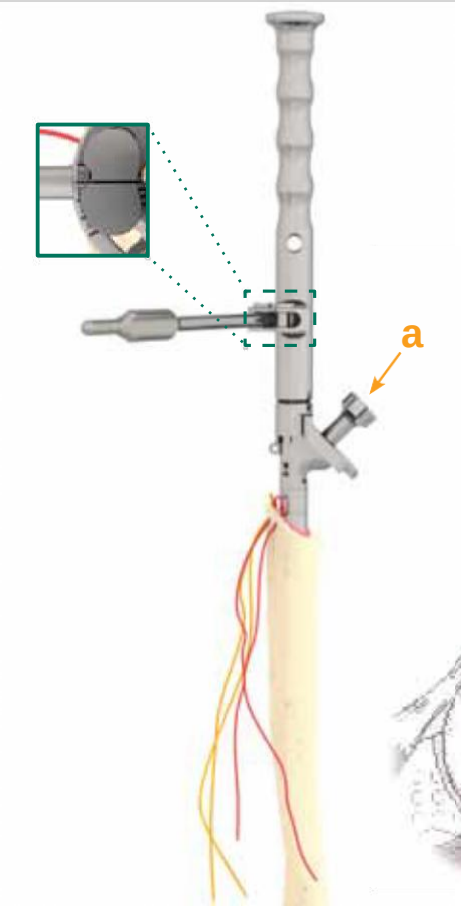


Fig. 18

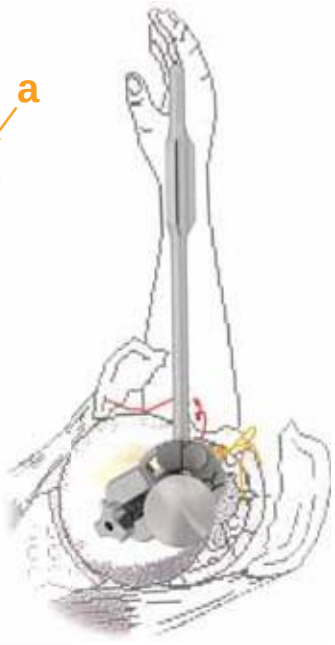


Fig. 19

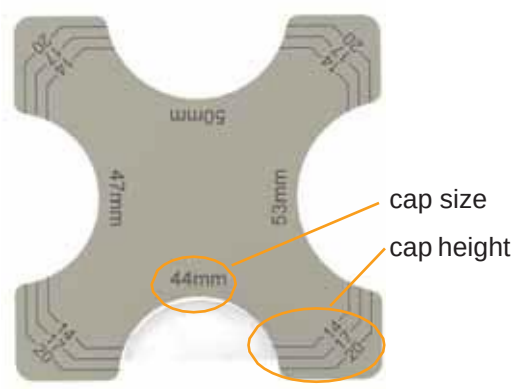


Fig. 20

The size of the trial cap is determined by the resected calotte head (or the fragments of this) with the measurement template (Fig. 20).

Fig. 21

Place the appropriate trail head on the implant (Fig. 21).

Note: If the glenoid should be replaced as well, please prepare this before repositioning. Follow the instructions on page 20 (cementless glenoid) or page 24 (PE-glenoid)

Perform the repositioning after attaching the adequate trial cap (Fig. 22 and Fig. 23).

Fig. 22

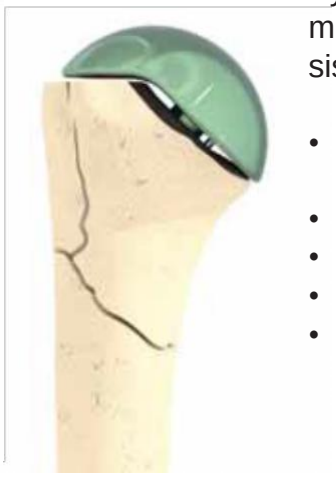


Fig. 23

By pulling and moving the arm, the exact adjustment of the length and the rotation of the prosthesis is controlled with the following points:

- distance between tuberculum majus and head (at least 5mm)
- level of retroversion
- head size
- art cu at on n d fferent pos t ons of the arm
- height of the prosthesis (subacromial space, ligament tension)

Adjustment of the Offset

The position and alignment of the prosthesis can be optimized by changing the modular parts (cap, extension piece, metaphyseal component).

If necessary, please change the eccentricity of the cap and adjust the rotation of the cap (Fig. 24) and the s ze and he ght of the cap. You w find the aser mark ngs (1-12) on the back of the fina implant components as well (Fig. 25).

Additionally the position and alignment of the prosthesis can be optimized by changing the modular parts (cap, extension piece). To have the closest reconstruction of the anatomical circumstances and to optimize the alignment of the prosthesis the surgeon has the cho ce between 4 d fferent cap diameters (44, 47, 50 and 53mm) with respectively 3 d fferent he ghts (14, 17, 20mm).
The eccentricity of the caps enables the variation of the med o atera offset between -2mm and +2mm within the steps between the 1 and 12 o'clock positions (turn of respectively 30 degrees). W th th s cho ce comb ned w th the d fferent cap heights options, the surgeon can position any med a offset from 2.6mm to 12.8mm.

The exact height of the prosthesis can be changed by the use of the extension pieces of 7.5, 10, 12.5, 15 and 17.5mm.

Fig. 24

Fig. 25

Fig. 26

Fig. 27

Implantation for anatomical treatment

After checking the function and obtaining a satisfying alignment of the prosthesis, the trial components can be replaced by the original components (Fig. 26).

Screw the guiding rod into the implanted stem. Slide the proximal implant components (the metaphyseal component and the extension piece) over the guiding rod (Fig. 27).

Make sure that the serration of all components are clean.

Please double check the correct retrotorsional alignment (Fig. 18 on page 12).

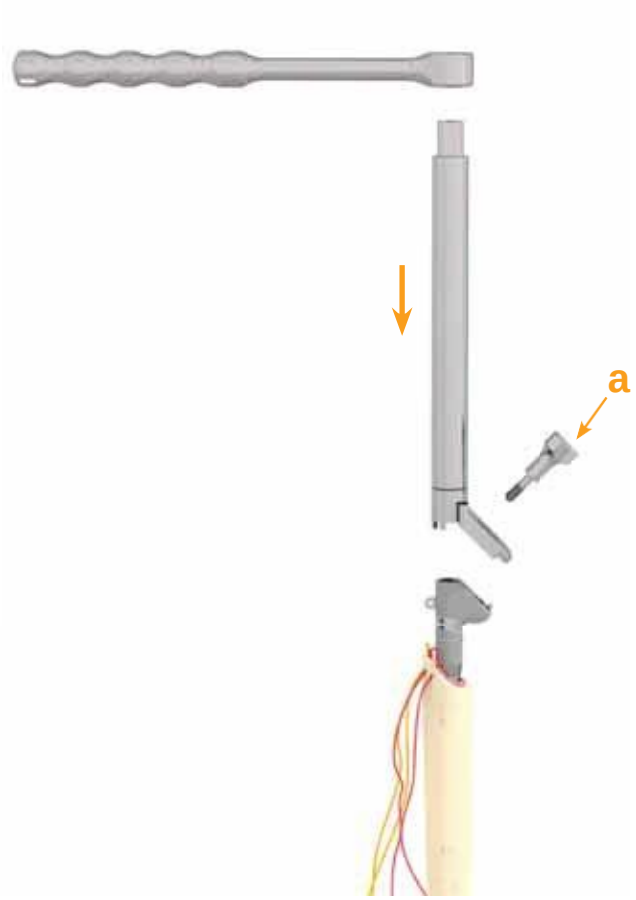


Fig. 28

Slide in the screw of the correct length in the metaphyseal component:

extension piece	screw
none	22.5mm
7.5mm	30mm
10mm	32.5mm
12.5mm	35mm
15mm	37.5mm
17.5mm	40mm

Mount the two-part countering instrument on top. Optionally, the countering instrument can be connected to the implant by the screw "trauma" **(a)** (Fig. 28).

Slide the torque screw driver through the sleeve of the countering instrument and lock the implant components.

When the arrow on the handle of the torque screw driver has reached the 15Nm mark, the recommended torque is applied (Fig. 29).

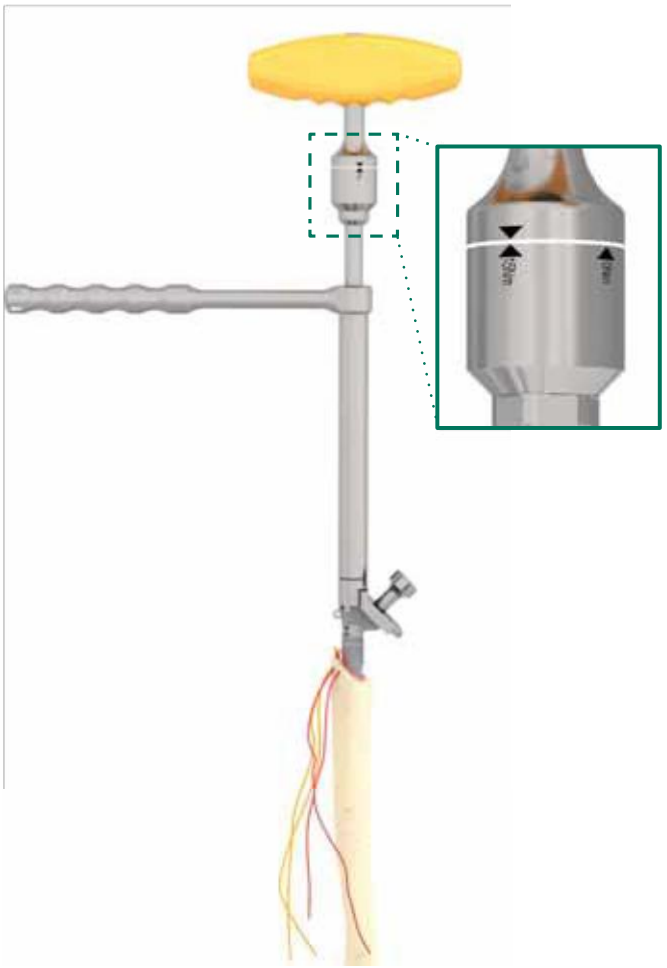


Fig. 29

Fix the safety screw in the same way (Fig. 30).

Fig. 30

Please clean the taper of the metaphyseal component and impact the cap or CTA cap (of the correct size and height) by the use of the cap impactor in the correct previously determined position with a few slight strokes on the cap impactor (Fig. 31).

Note: A CTA cap is intended for the use as a hemi-arthroplasty without a glenoid component, to treat a patient after a reverse shoulder has failed. The curvature of the caps allow the combination with all glenoid components.

Fig. 31

Fig. 32

Optionally, the components can be inserted and mounted in the cap assembly block if it is required to insert the mounted implant (Fig. 32).

Note: If necessary a cemented PE-glenoid is available (see page 24). Alternatively a cementless glenoid can be used, that is suitable both for anatomical or reverse treatments (see page 20).

Osteosynthesis of the tubercles

The fixat on of the tubercu a on the prosthes s s crucial for a successful treatment.

The suture technique below is a suggestion. The AGILON® trauma metaphyseal component is designed in a way that makes it compatible for various other suture techniques. Non resorbable high strength suture material should be used for the fixat on of the tubercu a.

Start by ay ng hor zonta sutures for the fixat on of the tubercu a (b ue F g. 33). For fixat on of the tuberculum majus pass the suture close to the bone through the infraspinatus tendon, followed by the posterior ear on the metaphyseal component and back. Proceed accordingly with the tuberculum minus. Pass the suture through the middle part of the subscapularis tendon and the anterior eye on the metaphyseal component.

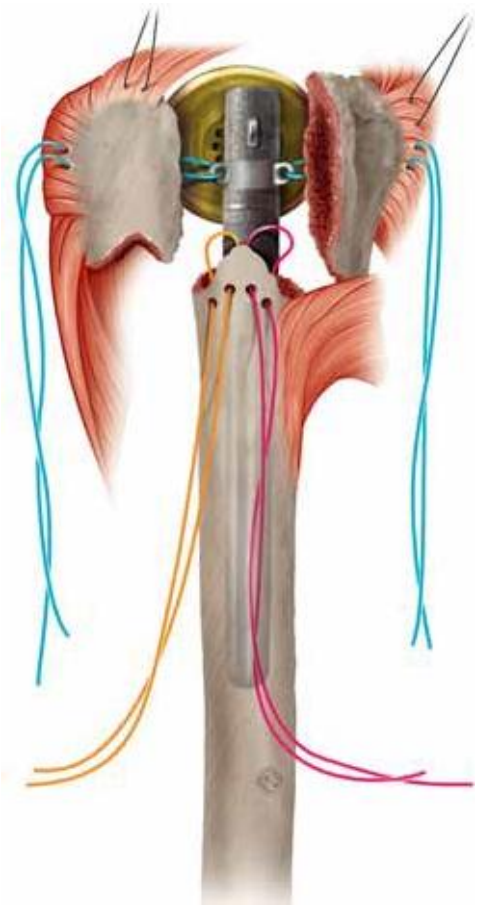


Fig. 33

Next lay two horizontal cerclages (green and purple Fig. 34). The purple suture should be placed through the lower part of the infraspinatus tendon, around the medial prosthesis neck and through the lower part of the subscapularis tendon. Act accordingly with a second cerclage (green).

The lateral ear, located in 90°-position, can be used optionally. The tubercles have to be adapted and fixed n anatom ca pos t on at the prosthes s and the humeral stem.

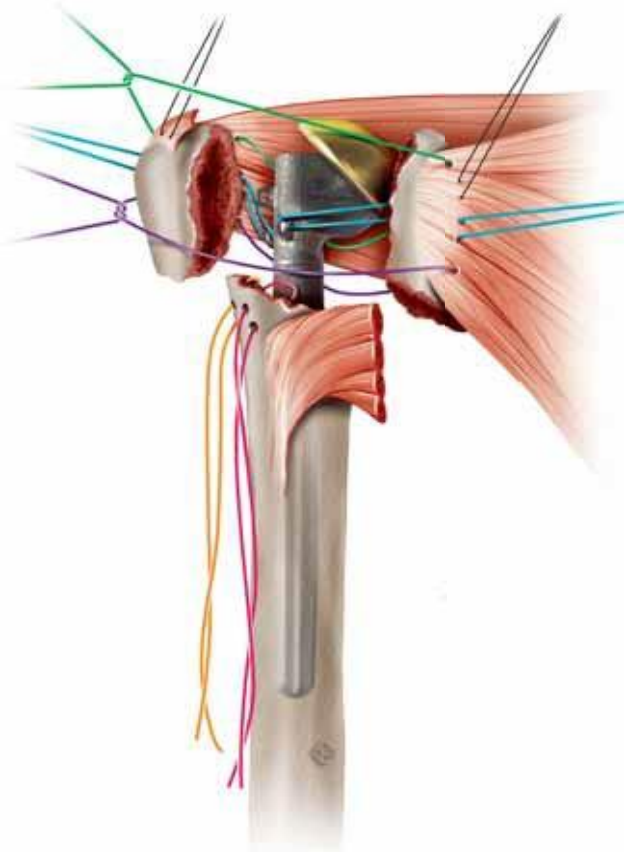


Fig. 34

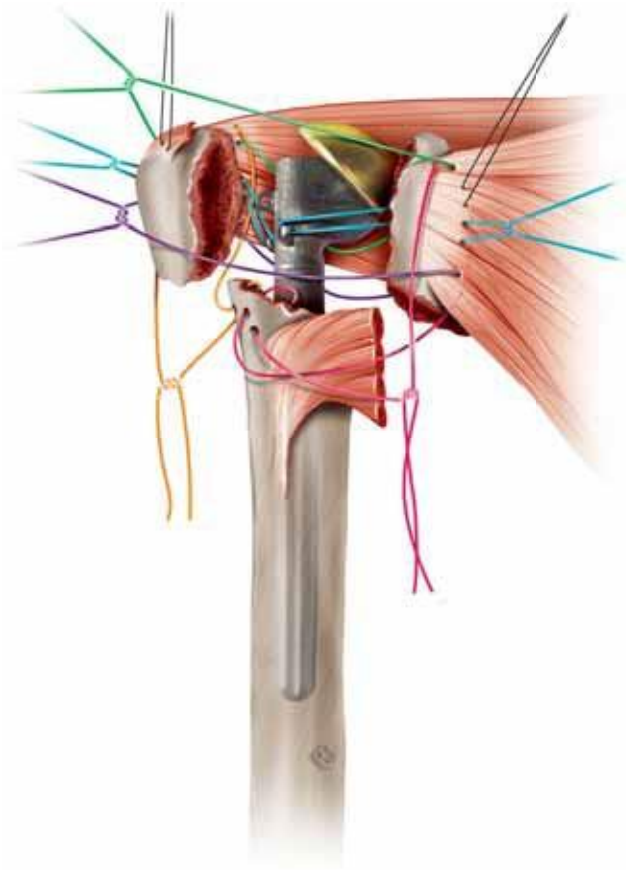


Fig. 35

The fixat on of the tuberc es to the humera stem is done with the previously placed transosseus fibers (F g. 13 page 10) n vert ca d rect on.
Take the poster or fibre (orange) through the nfra-sp natus tendon and the anter or vert ca fibers (red) through the subscapularis tendon (Fig. 35).

The tubercula are brought to a anatomic position and adapted to the prosthesis if needed. Additional fragments and spongiosa bone from the natural calotte can be used to improve the osseointegration in the cavities and between tubercles and the neck of the prosthesis.

Fig. 36

When the sutures are tighten pay attention to not change the position of the tubercula (Fig. 36). Fasten the b ue fibers first. Leave the ends ong for later use.
Next tighten the green and purple sutures as shown.
Afterwards fix the vert ca fibers (orange and red) one after the other.
Connect the ends of the blue sutures.

Ex st ng es ons of the rotator cuff shou d be closed. It is also indicated to close the rotator cuff nterm ttent w th prev ous y p aced (F g. 13 page 10) (b ack) fibers, because t contr butes to secure the antero-poster or cuff. Pay attent on that the ong b ceps fi ament s und sturbed. If th s is not possible a tenodose or resection has to be considered. Redon-Drains are recommended for the wound closure.

The correct position of the tubercles should be checked by performing a trial reduction preferably using an image converter.

A good result is reached when the tubercle refixat on s stab e, secured and anatom ca y aligned.

Cementless glenoid preparation
Mark the centre of the glenoid (Fig. 37).

Note: mp antcast offers CT based pat ent spec fic drill guides on special request.

Fig. 37

Connect the drill guide with the handle and place it onto the surface of the glenoid bone. It should be caudally positioned with full bone contact (Fig. 38). The drill guide has the same size as the implant and its entire rear surface should be in contact with bone.

In cases with eroded glenoids a free handed placement leads to a better positioning: The guide pin should be in a perpendicular direction to the glenoid neck, compensating for any eroded glenoid surface (as for example posterior glenoid wear). Remove the drill guide afterwards.

Fig. 38

Use the universal glenoid reamer to expose the subchondral bone. The reamer is guided by the guide wire (Fig. 39). Make sure that the reamer is turning already at full speed before it hits the bone surface.

Insert the 3.2mm bone pin through the central hole of the drill guide (Fig. 40). Choose the length of the drill matching the planned glenoid peg length.

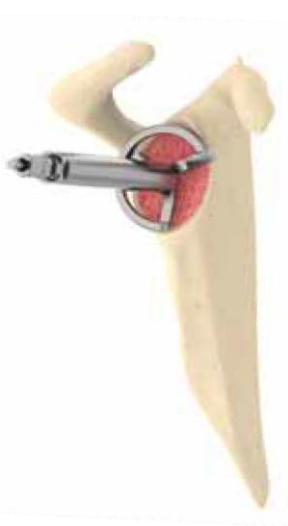


Fig. 39

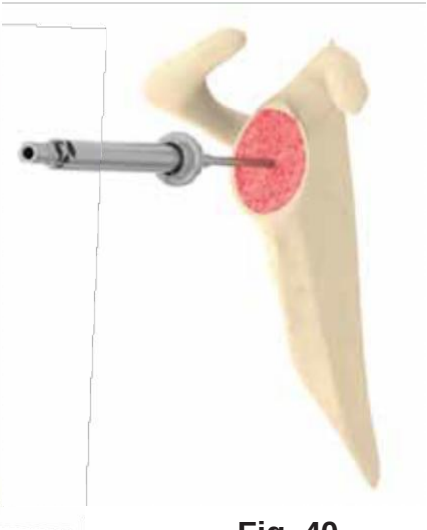


Fig. 40

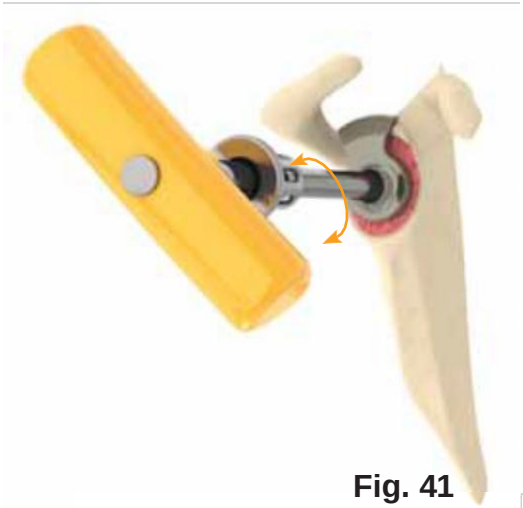


Fig. 41

Should an reverse treatment be planned you can optionally use the glenoid preparator 44mm to remove bone that could hinder the optimal positioning of the glenosphere. Attach the glenoid preparator to the T-handle (**do not use a machine** to prevent soft tissue damage) and slide it over the pin. Carefully rasp back and forth caudal and cranial to create room for the glenosphere (Fig. 42).
Remove the guide pin, afterwards.

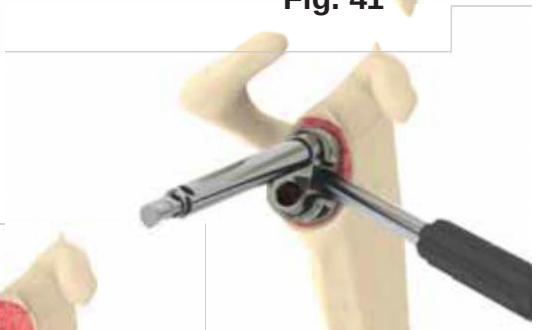


Fig. 43

Fig. 42

Insert the special drill guide for the cranial and caudal groove of the implant (Fig. 43).
Use the drill with stop through the drill guide to prepare the holes for the grooves (Fig. 46).

Fig. 44

Implantation cementless glenoid
Remove the drill guide. Connect the glenoid with the cannulated glenoid impactor. Align the upper screw hole to the coracoid-base. If necessary reinsert the guide pin into the central hole.

Impact the implant carefully until the glenoid rests comp ete y fush on the reamed bone surface (F g. 47). Afterwards release the impactor from the implant and remove the guide pin.

Note: The central hole will be slightly smaller than the peg. The Peg will be locked in the bone by pressfit. The subchondra bone offers the ideal mounting of the implant.

Fig. 45

You can freely angle the screw up to 15°, as the screw head is self-threading into the glenoid material (Fig. 48).

Drill the holes for the locking screws with 2.5mm (alternatively 2.0mm) drill and the angled drill guide (Fig. 49).

Fig. 46

Determine the screw length using the depth gauge and insert the screws of the correct lengths (Fig. 47). Lock the screws with the hexagonal screw driver 2.5mm (Fig. 48). The screw head need to be in the glenoid base.

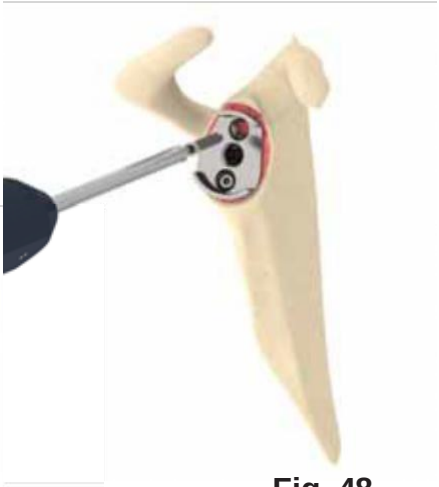


Fig. 48

Fig. 47

Add the trial insert of the appropriate size (Fig. 49 and Fig. 50) and perform a trial reduction. Please note the correct comaptility:

size cementless glenoid	trial insert to be combined
2	2
3	3
3	4

Perform a trial reduction.

Fig. 49

Fig. 50

Fig. 51

Implantation anatomical PE-insert for cementless glenoid

Combine the PE-insert of the previously determined size with the glenoid (Fig. 51). Please note the correct comaptility:

size cementless glenoid	trial insert to be combined
2	2
3	3
3	4

Fig. 53

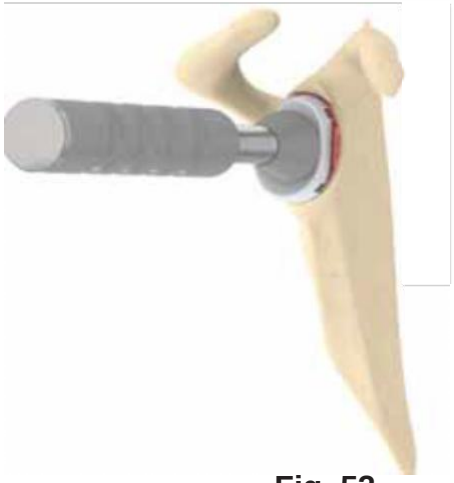


Fig. 52

Impact the PE-insert by the use of the special impactor. Make sure that the insert is completely seated and has reached the inner surface of the glenoid (Fig. 52 and Fig. 53).

Cemented PE-glenoid preparation

Determine the size by the use of the glenoid drill guide.

Connect the modular handle to the glenoid drill guide and place it onto the articulating bone surface of the glenoid (Fig. 54). If necessary repeat this step with the glenoid drill guide of the other size. After the size is determined, please insert a guide pin through the central hole of the glenoid drill guide (Fig. 55).

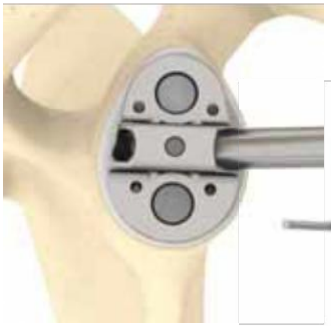


Fig. 54

Fig. 55

Please remove the drill guide afterwards (Fig. 56). Choose the glenoid reamer of the correct size and remove the remaining cartilage and bone from the glenoid surface.

Glenoid size	reamer
2	universal reamer
3	universal reamer
4	reamer size 4

Make sure that the reamer is turning already at full speed before it hits the bone surface. Ream until the reamer has reached the subchondral bleading bone (Fig. 57).

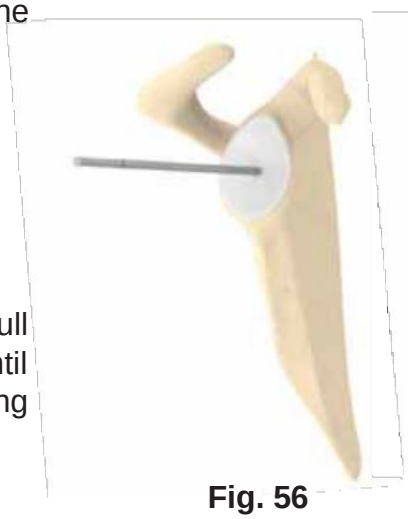


Fig. 56

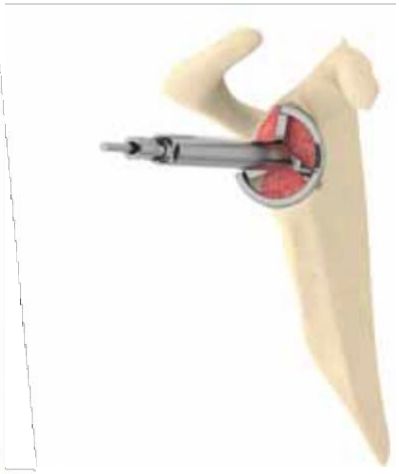


Fig. 57

Remove the reamer, but leave in the guide pin. Place again the previously used glenoid drill guide on the surface of the bone and drill the cranial and the caudal peg hole using the special drill with stop (Fig. 58).

Remove all instruments and continue with the trial reduction.

Impact the trial glenoid of the correct size (Fig. 59) and perform a trial reduction.

Note: All glenoid components can be combined with all cap sizes.

Fig. 58

Fig. 59

Add the trial cap (Fig. 60) or the CTA trial cap (Fig. 61) of the previously determined size and height to the trial implant.

Note: A CTA cap is intended for the use as a hemi-arthroplasty, to treat a patient after an reverse shoulder has failed. Although the curvature of the caps allows the combination with all glenoid components it is normally not combined with a glenoid implant.

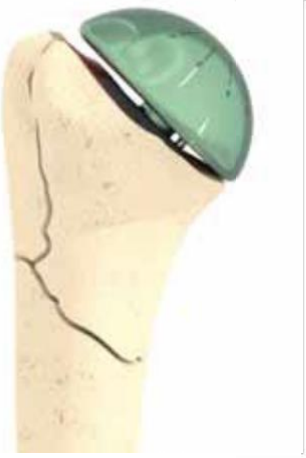


Fig. 60

Fig. 61

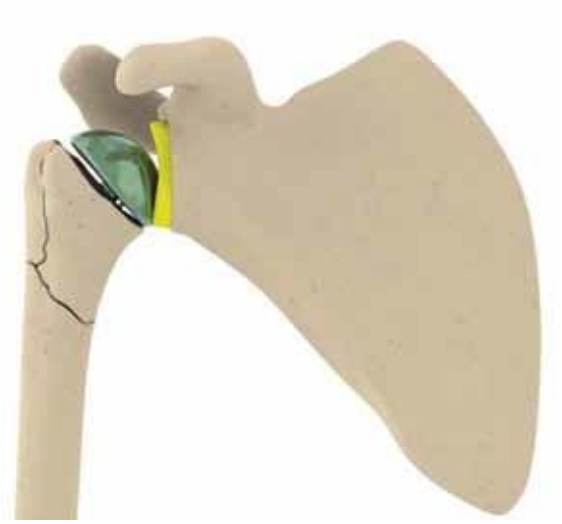


Fig. 62

Perform a trial reduction and check the range of mot on and the stab ty as we as the offset of the joint (Fig. 62).

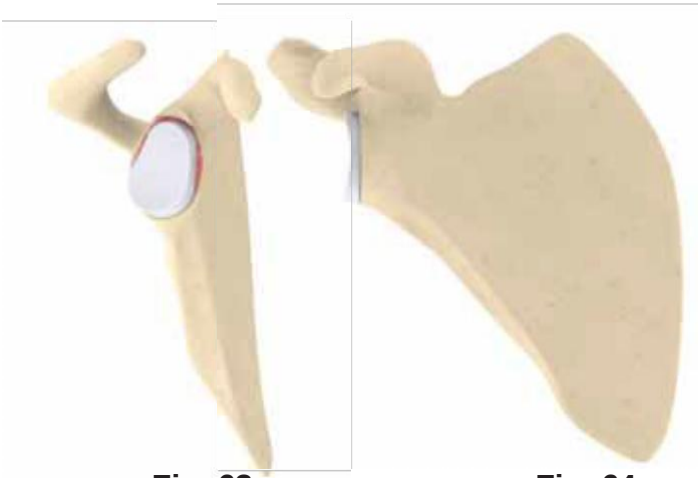


Fig. 63

Fig. 64

Impact the PE-insert by the use of the special impactor. Make sure that the insert is completely seated and has reached the inner surface of the glenoid (Fig. 63 and Fig. 64).

Reverse implantation

Double check the retrotorsion by the use of the alignment rod (Fig. 65). For reverse shoulder arthroplasty the retrotorsion should be set to 10° or even 0°.

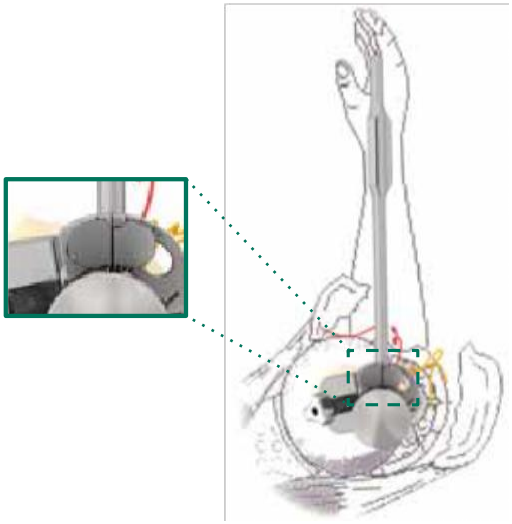


Fig. 65

Note: In case the implant components are changed nto an reverse configurat on during the surgery the height has to be reduced by app. 10mm and the retrotosion has to be changed to 10° or 0°. Because of this it is highly recommended to **always use a 10mm extension piece in primary cases**. So the implant can be easily switched into an reverse implant by leaving stem in place.

Insert the inverse trial cap of a medium neck length M (Fig. 66). The neck length of the inverse caps S, M and L d fferes by 3mm (F g. 67).

Fig. 66

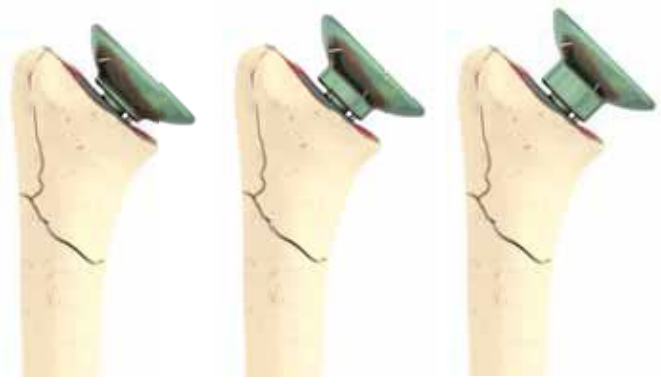


Fig. 67

Fig. 68

Fig. 69

Reverse cementless glenoid

Attachment of the glenosphere: To avoid an inferior impingement of the articulating surfaces on the scapula the glenospheres of the sizes 36, 40 and 44mm can be positioned eccentrically. Therefore the trial glenospheres show a degree adjustment with the clock between 9 and 3 o'clock. These markings can be found on the inner surface of the implant and should be positioned cranial (Fig. 68). This positions the overhang caudal.

Then screw the trial glenosphere onto the glenoid using the 3.5mm hex screw driver (Fig. 70) and perform a trial reduction. The markings on the trial glenosphere help to obtain the optimal position of the glenosphere (Fig. 69).

Fig. 70

Check the range of motion (ROM) and the eccentricity of the glenosphere. If necessary, please adjust the neck length of the inverse cap. The difference of the caps S, M and L is 3mm neck length (Fig. 71).

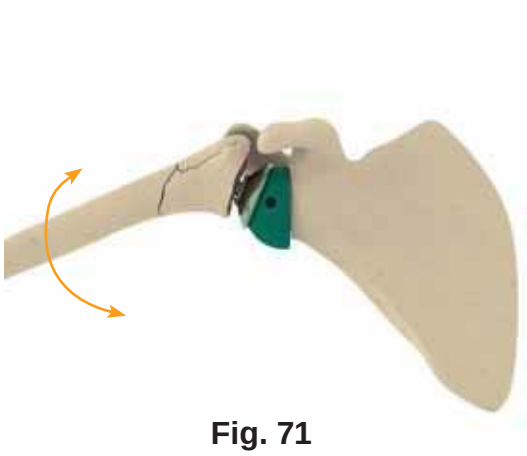


Fig. 71

Use of the captured glenosphere positioner

Choose the glenosphere of the previously determined size and place it into the captured glenosphere positioner. Lock the screw **1** clockwise until the two gripper arms hold the glenosphere in place (Fig. 72). If the gripper arms are loose previously turn screw **1** counterclockwise until stop and insert the arms. Then change direction to clockwise. Lock the screw **2** until the gripper arms hold the glenosphere in place.

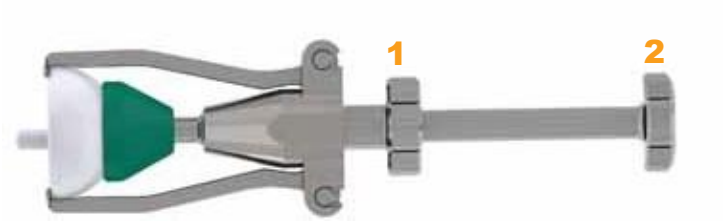


Fig. 72

Adjust the glenosphere to the correct, previously during the use of the trial glenosphere determined, rotation (Fig. 73 and Fig. 74). Make sure that the rotational marking (9 to 3 o'clock) is orientated towards the superior gripper arm and tighten the glenosphere by turning screw **2** clockwise (Fig. 72).

Fig. 73

Fig. 74

Impaction of the glenosphere

Position the glenosphere onto the glenoid. Make sure that the glenosphere is positioned with the correct eccentricity (Fig. 75).
Please hit the platform of the captured impactor lighty to lock the glenosphere to the glenoid.
Unlock the captured impactor by unlocking the screws **1** and **2**. The lip of the glenosphere is locked to the rim of the glenoid

Fig. 75

Use the head impactor to ensure the connection between the components (Fig. 76).

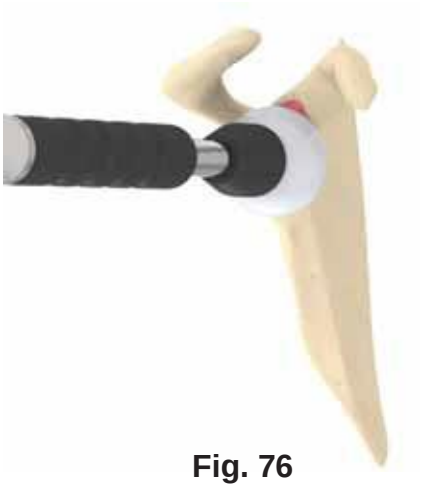


Fig. 76

Fig. 77

Fig. 78

Make sure the coupling of the two implant components is complete (Fig. 77). Use the AGILON® control gauche for glenosphere superior and inferior only very small movements of the gauche should be possible if the glenosphere is seated correctly (Fig. 78).

If needed perform another trial reduction by the use of the trial cap inverse.

Please clean the taper of the metaphyseal component and impact the inverse cap of the correct size an height previously determined during the trial reduction, by the use of the cap impactor (Fig. 79). Before impacting the cap make sure, that the pin is seated in the correct position.

Fig. 79

Reduce the jo nt and perform a fina stab ty check of the joint (Fig. 80).

Fig. 80

If necessary, please use the retentive inverse cap to achieve joint stability (Fig. 81).

W th the preservab e structures the rotator cuff should be reconstructed.

Fig. 81

Postoperative treatment and X-Ray controls after AGILON® Trauma Treatment:

1. day:
- Gilchrist's bandage
- isometric exercises
- decongestant (ice) and tonus-lowering actions on the neck, shoulder girdle and arm

2. day:
- removal of the redon drains
- bearing of the arm on an abduction pad for 3 weeks at 30° secured inner rotation of the forearm
- 1. x-ray control in a.p.-layer

3. – 10. day:
- isometric exercises
- decongestant (ice, lymphatic drainage) and tonus-lowering actions on the neck, shoulder girdle and arm
- mobilization of the adjacent joints and scapula pattern

10. day:
- beg nn ng of pass ve phys otherapy: 30° abd., 30° fex., 60° ro, 0° aro
- 2. x-ray control in 2 layers for the control of the position of the prosthesis and the tubercular. If a dislocation of the tubercular is detected, the revisional operation has to be made immediately

21. day:
- pass ve phys otherapy: 60° abd., 60° fex., 60° ro, 0° aro
- 3. x-ray control in 2 layers for the control of the position of the prosthesis and the tubercular.

35. day:
- act ve ass st ve phys otherapy: 90° abd., 90° fex., 60° ro, 30° aro
- water aerobics without water resistance

42. day:
- liberalization of full range of motion
- active physiotherapy without resistance
- occupational therapy
- 4. x-ray control in 2 layers for the control of the position of the prosthesis and the tubercular

42. – 84. day:
- the intention is to reach a humane and fully function of the shoulder

Fig. 82

Implants

AGILON® Cap

Mat.: implatan®; TiAl $_{6}$V $_{4}$ acc. to ISO 5832-3 with TiN-coating

	14mm	17mm	20mm
ø 44mm	38004414	38004417	38004420
ø 47mm	38004714	38004717	38004720
ø 50mm	38005014	38005017	38005020
ø 53mm	38005314	38005317	38005320

AGILON® CTA Cap

Mat.: implatan®;TiAl $_{6}$V $_{4}$ acc. to ISO 5832-3 with TiN coating

	14mm	17mm	20mm
ø 44mm	38224414	38224417	38224420
ø 47mm	38224714	38224717	38224720
ø 50mm	38225014	38225017	38225020
ø 53mm	38225314	38225317	38225320

AGILON® Cap inverse

Mat.: implatan®;TiAl $_{6}$V $_{4}$ acc. to ISO 5832-3 with TiN coating

	S	M	L
ø 36mm	38013600	38013605	38013610
ø 40mm	38014000	38014005	38014010
ø 44mm	38014400	38014405	38014410

AGILON® retentive Cap inverse

Mat.: implatan®;TiAl $_{6}$V $_{4}$ acc. to ISO 5832-3 with TiN coating

	S	M	L
ø 36mm	38015600	38015605	38015610
ø 40mm	38016000	38016005	38016010
ø 44mm	38016400	38016405	38016410

Cancellous screw ø4mm

Mat.: implatan®;TiAl$_{6}$V$_{4}$ acc. to ISO 5832-3

REF	length
57934026	26mm
57934028	28mm
57934030	30mm
57934032	32mm
57934034	34mm

AGILON® screw M6

mat.: implavit® ; CoCrMo acc. to ISO 5832-12 with TiN coating

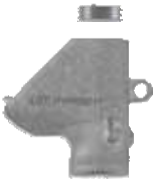
REF	length
38210022	22.5mm
38210030	30mm
38210032	32.5mm
38210035	35mm
38210037	37.5mm
38210040	40mm

AGILON® metaphyseal component incl. safety screw

Mat.: implatan®; TiAl V_{6} $_{4}$ acc. ISO 5832-3

REF	type	angle	length
38210001	Trauma	135°	30mm
38210011	Trauma	155°	30mm*

*metaphyseal components with a 155° angle are not shipped with loan shipments on the regular base and can be ordered additionally!



AGILON® extension piece M6

mat.: implatan®; TiAl V_{6} $_{4}$ acc. to ISO 5832-3

REF	length
38210075	7.5mm
38210100	10mm
38210125	12.5mm
38210150	15mm
38210175	17.5mm

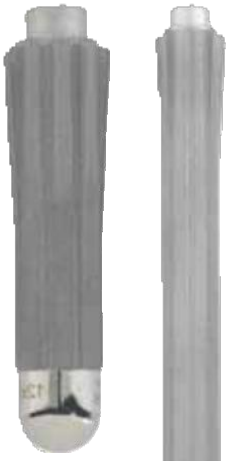
AGILON® stem cementless M6

Mat.: implatan®; TiAl V_{6} $_{4}$ acc. to ISO 5832-3

	60mm	120mm	180mm***	240mm***
ø 9mm	38506009	38512009	38518009	38524009
ø 10mm	38506010	38512010	38518010	38524010
ø 11mm	38506011	38512011	38518011	38524011
ø 12mm	38506012	38512012	38518012	38524012
ø 13mm	38506013	38512013	38518013	38524013
ø 14mm	38506014	38512014	38518014	38524014
ø 15mm	38506015	38512015	38518015	38524015
ø 16mm	38506016	38512016	38518016	38524016
ø 17mm	38506017			
ø 18mm	38506018			

** 30mm stems can not be used with the trauma metaphyseal components with REF 3821-0001 and REF 3821-0011!

*** stems with 2 interlocking holes ø4mm. These stems are not shipped with loan shipments on the regular base and might be ordered additionally!



AGILON® stem cemented M6 *N

Mat.: implavit® ; CoCrMo acc. to ISO 5832-4

	60mm	90mm	120mm
ø 6mm	38406006	38409006	38412006
ø 8mm	38406008	38409008	38412008
ø 10mm	38406010	38409010	38412010
ø 12mm	38406012	38409012	38412012

***N: For anti-allergic treatment TiN coated implants are available!**

glenoid cementless anatomical

Mat.: Pure titanium (cpTi) acc. to ISO 5832-2 with implaFix®;
HA-coating acc. to ISO 13779-2

REF	size
38004028	2 short
38004029	2 long
38004009	3 short
38004010	3 long

glenoid PE-insert

Mat.: UHMW-PE acc. to ISO 5834-2

REF	size	combined with
38031028	2	glenoid cementless size 2
38031032	3	glenoid cementless size 3
38031036	4	glenoid cementless size 3

AGILON® PE-glenosphere

Mat.: UHMW-PE acc. to ISO 5834-2

REF	glenoid size	diameter
38032836	2	36mm eccentrical
38032840	2	40mm eccentrical
38032844	2	44mm eccentrical
38033236	3	36mm neutral
38033240	3	40mm eccentrical
38033244	3	44mm eccentrical

cancellous screw angle stable lock Ø 4,2mm

Mat.: implatan®; $TiAlV_4$ acc. to ISO 5832-3

REF	length
57944220	20mm
57944222	22mm
57944224	24mm
57944226	26mm
57944228	28mm
57944230	30mm
57944232	32mm
57944234	34mm
57944236	36mm
57944238	38mm
57944240	40mm

PE-Glenoid cemented

Mat.: UHMW-PE acc. to ISO 5834-2

REF	size
38030032	2
38030036	3
38030040	4

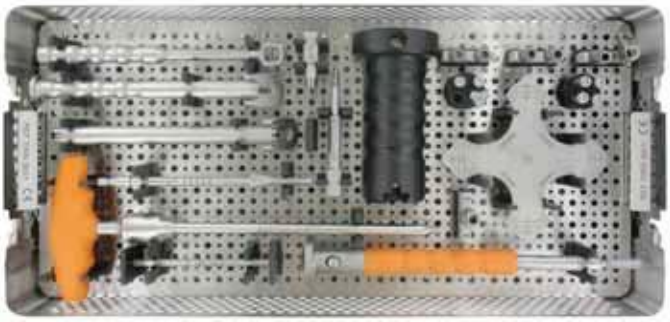
Glenoid cementless (optional for inverse option)

Mat.: Pure Titanium (cpTi) acc. to ISO 5832-2 with implaFix®; HA-coating acc. to ISO 13779-2

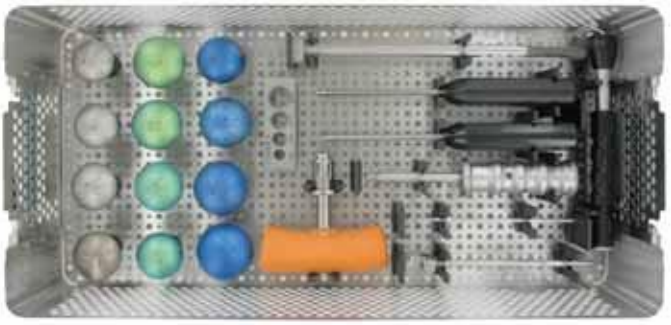
REF	size
38004001	3 round

Instrument trays

79993831
AGILON® basic container



(tray 1)

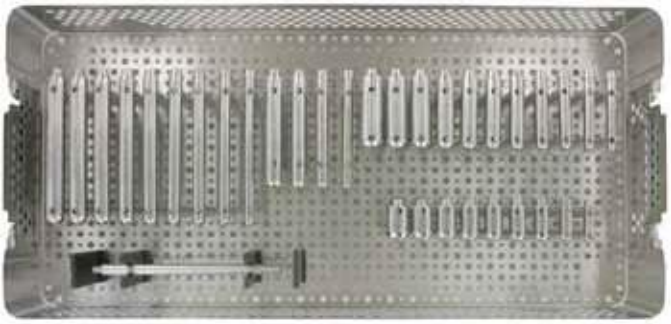


(tray 2)

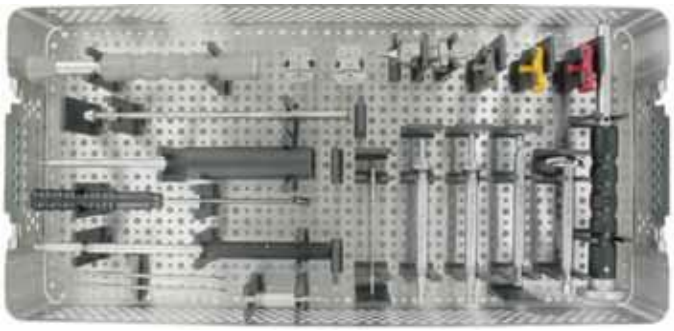
(tray 3)

(tray 4)

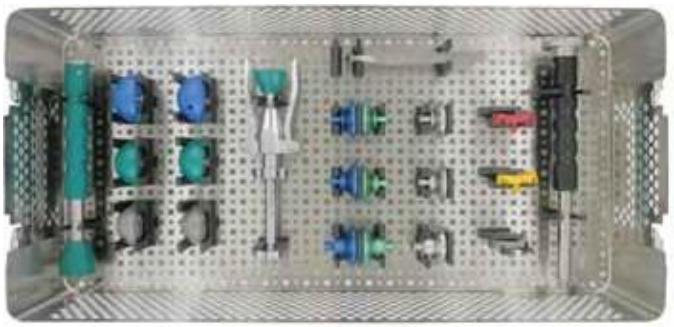
79993833
AGILON® trial stem container



79993837
AGILON® glenoid container

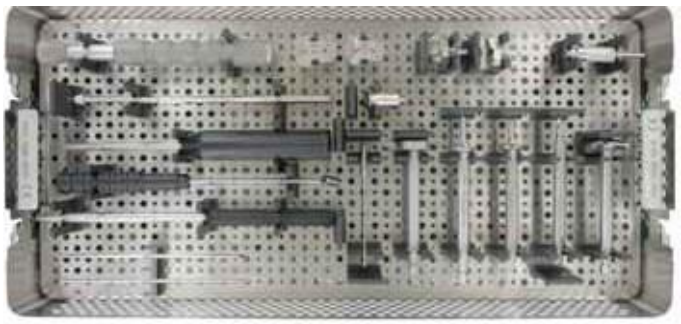


(tray 1)

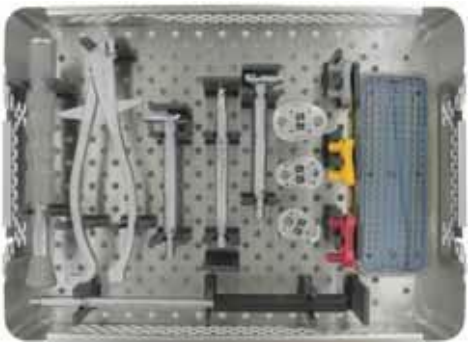


(tray 2)

Note: The instruments are delivered nonsterile.



(tray 3)



(tray 4)

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