*i*BP™

Instrumented Bone Preserving Elbow System

Surgical Technique

Spine Trauma BioMaterials Cement **Joint Replacement**

Instrumented System Minimal Bone Resection

BIOMET Europe

The Instrumented Bone Preserving Total Elbow System

The iBP™ is the most comprehensive available, offering a true unlinked non congruent surface geometry that accommodates the inter-individual variability of elbow movement.

The unique instrumentation includes humeral intramedullary rods and distal humeral cutting blocks. This permits accurate and reproducible preparation of the distal humerus, allowing it to accept the prosthetic components correctly aligned with respect to both the anatomical axis and the plane of joint movement.

Four Main Design Principles of the iBP™ Total Elbow System

1. Instrumentation which accurately orientates the humeral component with respect to the anatomical axis of the bone and plane of elbow movement.

2. A range of appropriately sized components.
   Humeral components: Small, Standard, Large and Extra Large.
   Ulna Components: Small, Standard and Large.

3. Humeral Components, corresponding to a condylar design, requiring the minimum of bone excision.

4. Unlinked components, non congruous articulating surfaces which accommodate the inter-individual variability in elbow movement.

BIOMET Europe

Disclaimer

Biomet Merck Ltd., as the manufacturer of this device, does not practice medicine and does not recommend any particular surgical technique for use on a specific patient. The surgeon who performs any implant procedure is responsible for determining and utilising the appropriate techniques for implanting the prosthesis in each individual patient. Biomet Merck Ltd. is not responsible for selection of the appropriate surgical technique to be utilised on an individual patient.

iBP™
Total Elbow Replacement Surgical Technique

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Patient Positioning

We recommend the lateral position with the arm supported on a padded rest so that the elbow can be flexed to 90 deg.

A pneumatic tourniquet is applied.

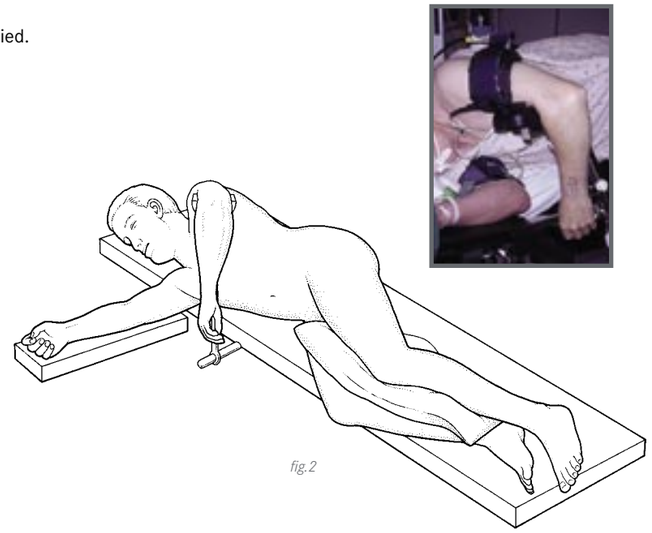


fig.2

Surgical Exposure

Skin incision begins in the midline 10-12cm proximal to the tip of the olecranon and ends 8-10cm distally over the subcutaneous border of the ulna.

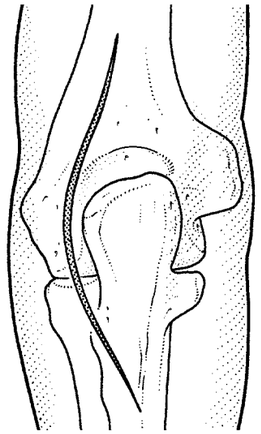


fig.1

fig.3

The skin and the subcutaneous tissues are reflected together with the deep layer of the superficial fascia.

We recommend stay sutures rather than retractors.

fig.4

Although text books refer to the ‘triceps tendon’ the insertion of triceps is essentially muscular.

The muscle is covered by a thickening of the deep fascia the triceps aponeurosis - a deep extension of this constitutes an intermuscular aponeurosis which separates the lateral head of triceps from the medial and long heads.

The intermuscular aponeurosis indicated by the arrow is readily palpable and can be palpated along a line indicated by the arrow.

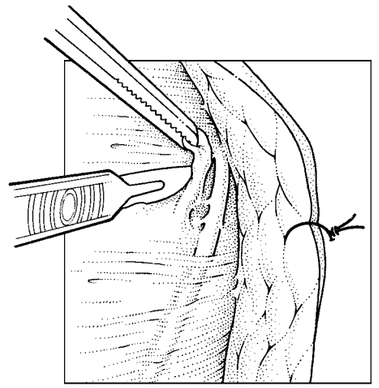


fig.5

The ulnar nerve is mobilised, beginning proximally.

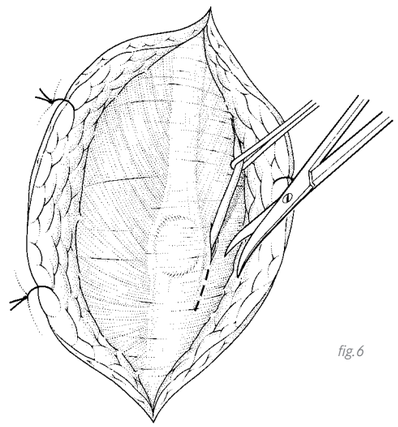


fig.6

The ulnar nerve is decompressed by dividing the roof of the cubital tunnel between the two heads of the flexor carpi ulnaris, retracted and protected during the remainder of the procedure.

A transverse incision is made through the triceps aponeurosis beginning at the intermuscular aponeurosis 8-10cm proximal to the tip of the olecranon.

The incision is then directed distally through the aponeurosis covering lateral head of triceps and the fascia covering anconeus to end at the subcutaneous border of the ulna.

The triceps aponeurosis strips from the underlying muscle and can then be separated from the intermuscular aponeurosis by sharp dissection.

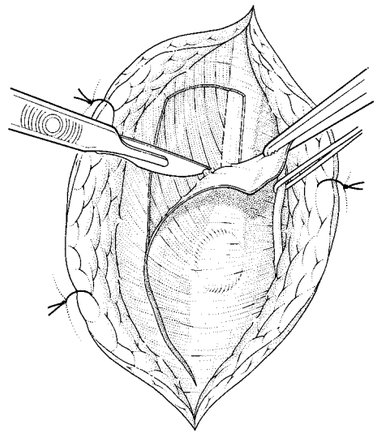


fig.7

The distally based flap of triceps aponeurosis can be secured with a stay suture. Anconeus is erased from its insertion into the subcutaneous border of the ulna by sharp dissection. Dissection is continued proximally by separating the insertion of the lateral head of triceps from the posterior border of the olecranon.

The lateral head of triceps is then separated from the intermuscular aponeurosis. By directing the scalpel along the line of the fibres no muscle tissue is divided.

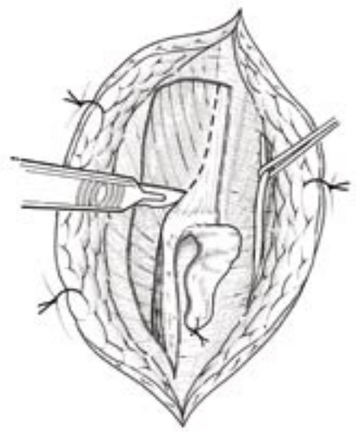


fig.8a

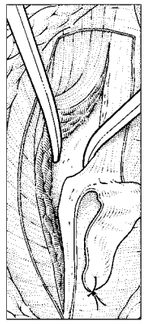


fig.8b

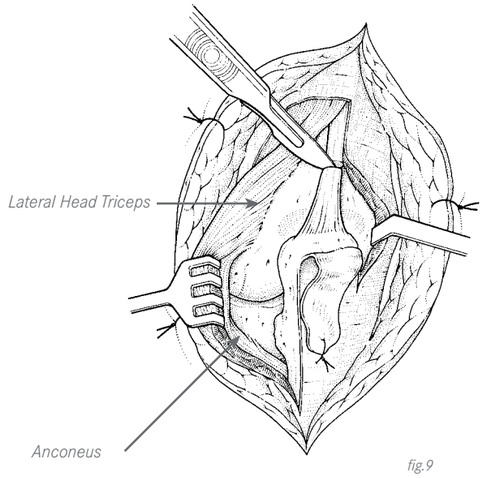


fig.9

At this stage the lateral head of triceps can be retracted with anconeus as a single unit. An incision is made along the medial aspect of the distal 2-3cm of the intermuscular aponeurosis to separate this from the medial and deep heads of triceps. This incision is carried onto the olecranon. The intermuscular aponeurosis is divided 2cm proximal to its insertion into the olecranon. The distal part of the intermuscular aponeurosis can be conveniently secured with a stay suture.

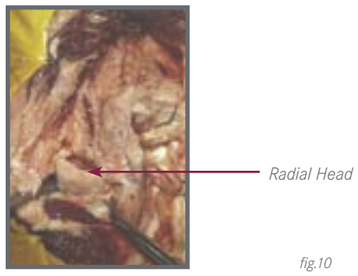


fig.10

Bone levers are inserted around the radial neck to protect anterior structures (particularly deep branch of the radial nerve).

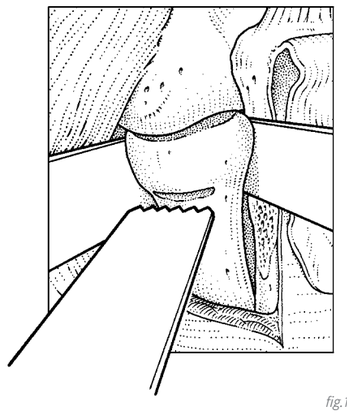


fig.11

Osteotomy through the radial neck is performed.

The radial head is then removed.

Dislocation of the elbow is begun by flexing the joint.

Further exposure is gained by excising the tip of the olecranon.

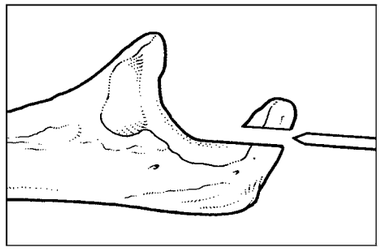


fig.12

The tip of the coronoid process is also excised. This helps to release the anterior capsule and improves exposure particularly in a tight osteoarthritic joint.

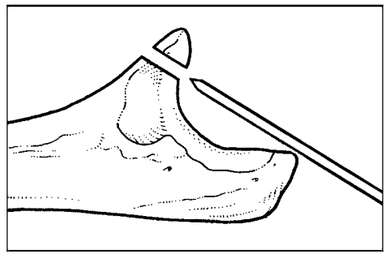


fig.13

A considerable degree of flexion contracture often persists at this stage.

Completion of the dislocation is now prevented only by the intact medial joint capsule (ulnar collateral ligament and associated bony spur).

Excision of this tissue allows dislocation to be completed and provides a wide exposure of the articular surfaces.

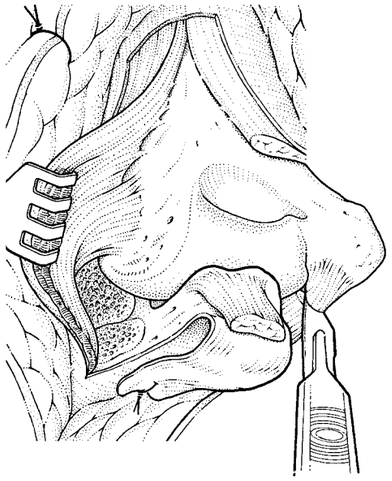


fig.14

fig.15

Exposure can be further improved in patients with a marked pre-operative flexion contracture by elevating the anterior joint capsule from the anterior aspect of the coronoid process.

fig.16

Following excision of tight medial structures practically full extension is achieved.

Bone Preparation & Implant Insertion

- The size of the implant to be inserted is determined by either using the X ray templates pre-operatively or by direct comparison of the trial components with the bone during surgery.
- Use the largest humeral component possible which does not encroach on the ulnar nerve to conserve humeral bone.
- The ulnar component must be the same size as the humeral component.

The posterior cortex of the humerus is fenestrated in the midline at the apex of the olecranon fossa using a high speed rotating burr.

Note: The 5mm humeral shaft reamer cannot yet be inserted fully into the medullary canal in patients with good bone stock due to contact against the trochlear articular surface

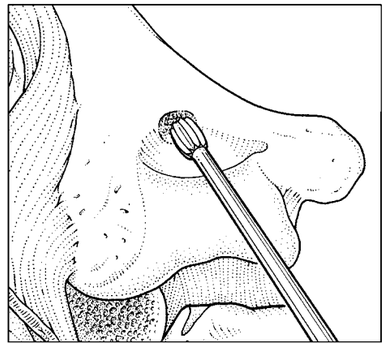


fig.17

The tip of a 5mm side cutting reamer is engaged in the cortical window and the handle is depressed until it aligns with the axis of the bone. This removes a trough from the posterior aspect of the trochlea.

Note: Take care not to insert the reamer into the canal

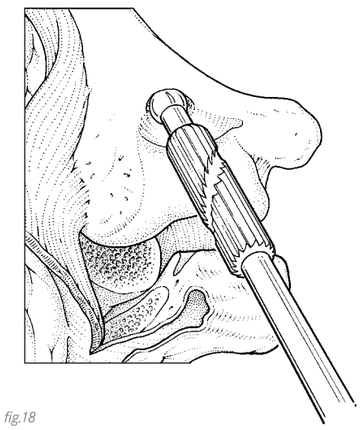


fig.18

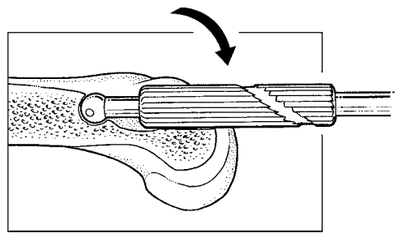


fig.19

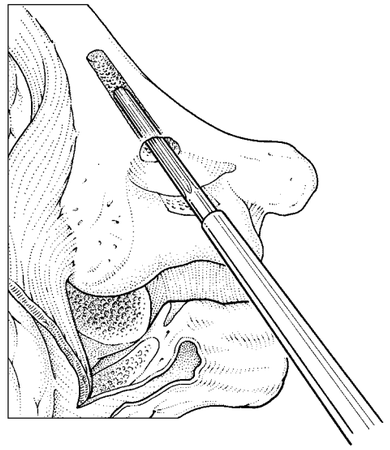


fig.20

The side cutting reamer is removed and the 5mm humeral shaft reamer can then be inserted.

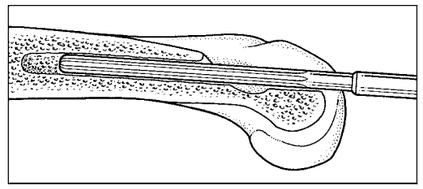


fig.21

The stepped intramedullary guide rod is now inserted and this identifies the anatomical axis of the humerus.

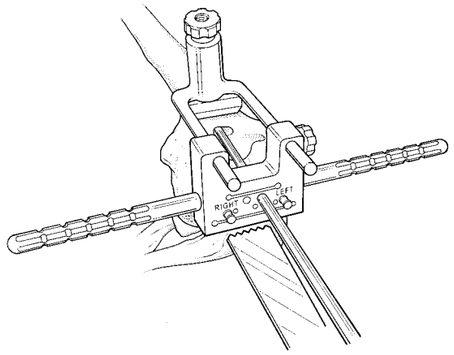


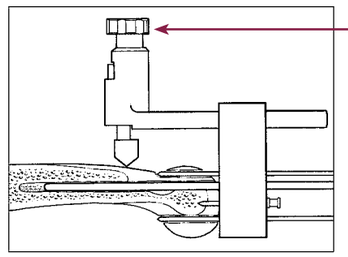
fig.22

The humeral jig and cutting block corresponding to the size of the implant chosen are assembled and applied to the distal humerus by inserting the end of the intramedullary rod through the guide hole in the cutting block (right or left depending upon the side of the elbow) and then advancing the cutting block until it makes contact with the articular surface.

The foot plate of the humeral jig is set to make contact with the posterior cortex of the humerus 1·5cms proximal to the apex of the olecranon fossa (3·5cms proximal to the medial epicondyle).

The foot plate is lowered until it makes *light* bone contact, this then rotates the cutting block in line with the axis of the flexion/extension arc of elbow movement.

The cutting block is now correctly orientated and can be secured with two pins tapped through the pin holes in the block.



Note: Take care not to overtighten the jig as this will cause the cutting block to tilt.

fig.23

Anterior and posterior condylar bone cuts are made with a saw inserted through the slots in the cutting block which is then removed.

fig.24

The detached segments of articular bone are separated from any soft tissue attachments and discarded.

The humerus is prepared to accommodate the stem of the humeral component by using a series of humeral rasp reamers incorporating a slap hammer.

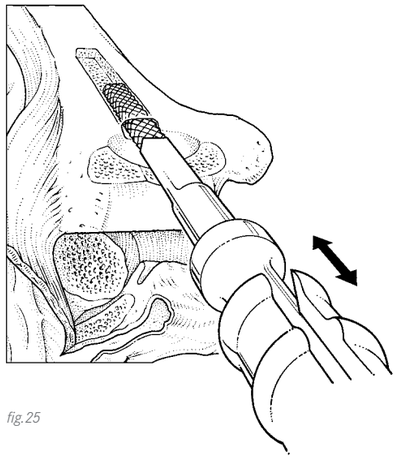


fig.25

A template is available to indicate the area from which further bone resection is required in order to accommodate the condylar portion of the humeral component. The bone is removed by using a rotating burr.

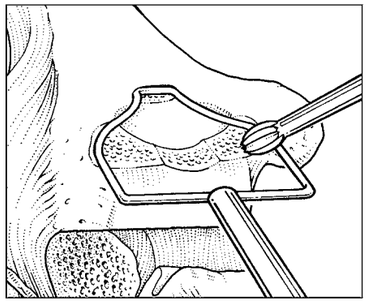


fig.26

This step has been completed when the condylar trial component corresponding to the size of implant chosen can be seated.

fig.27

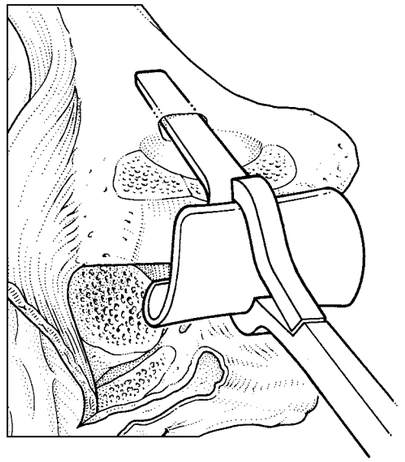


fig.28

A humeral trial component is now inserted.

When a satisfactory insertion of the humeral trial component has been performed this can then removed using the extractor if desired.

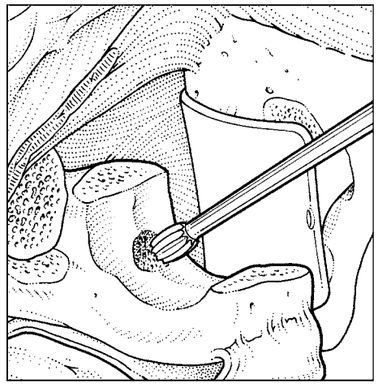


fig.29

The trochlear notch of the ulna is now prepared to accept the same sized component as that inserted into the humerus.

The cortex of the ulna is fenestrated at the base of the coronoid process at a point diametrically opposite the subcutaneous border and the burr is then directed into the bone parallel to the subcutaneous border of the ulna at this level in order to allow insertion of the ulna rasp reamer.

An alignment guide can be attached to the handle of the ulnar rasp reamer ensuring that the reamer is inserted into the proximal ulna parallel to the subcutaneous border.

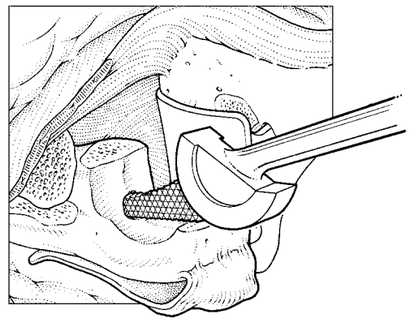


fig.30

Further reaming is carried out with the trochlear notch reamer until the trial component fits snugly.

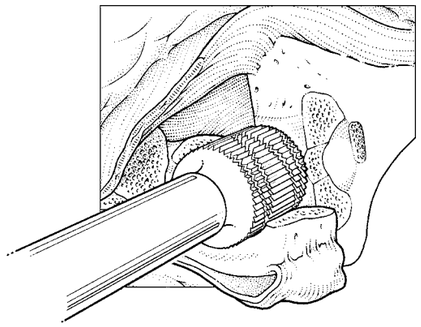


fig.31

This completes the ulna preparation.

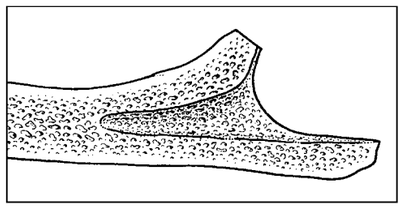


fig.32

The trial components are inserted.

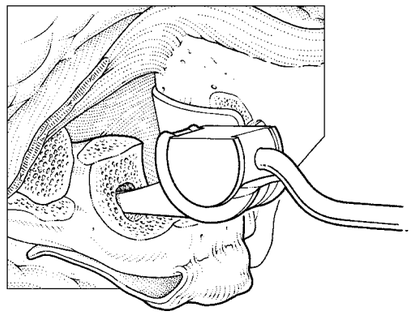


fig.33

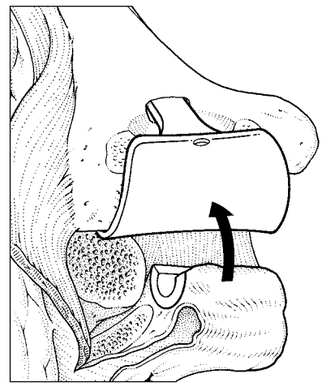


fig.34

If an acceptable range of extension has not been achieved then further anterior and medial soft tissue release may be required

When a satisfactory reduction has been performed with the trial components in situ they are then removed.

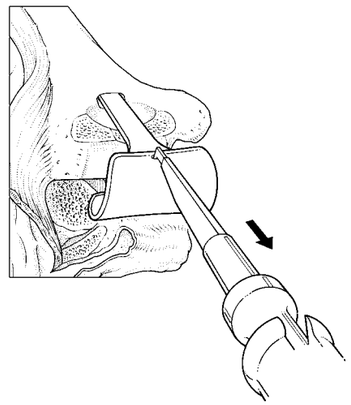


fig.35

The definitive components are inserted.

The humeral component is available either in uncemented or cemented options. We routinely use the uncemented option.

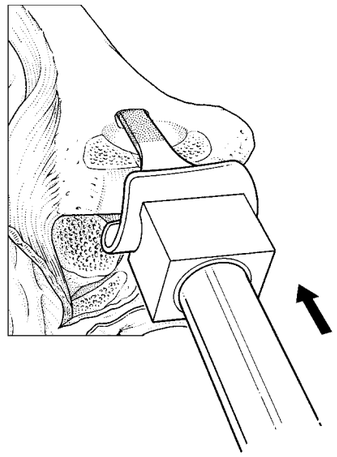


fig.36

The ulna component is also available in uncemented and cemented options. We routinely use the cemented option for the ulna component in our patient population.

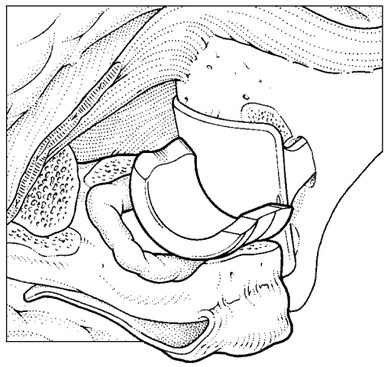


fig.37

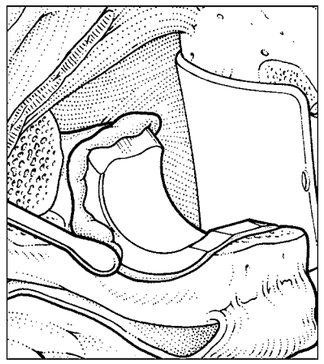


fig.37b

The joint is then reduced.

fig.38

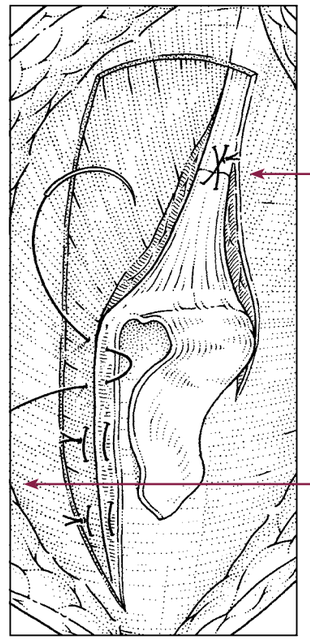


fig.39

Soft Tissue Reconstruction

a. The first step in obtaining soft tissue balance is to repair the divided intermuscular aponeurosis.

   By adjusting the tension of this repair soft tissue laxity resulting from advanced degenerative joint disease can be corrected and subsequent muscle function improved.

b. Anconeus is reattached to the subcutaneous border of the ulna by sutures passed through the free edge of the muscle then the deep fascia and back through the free edge of muscle again.

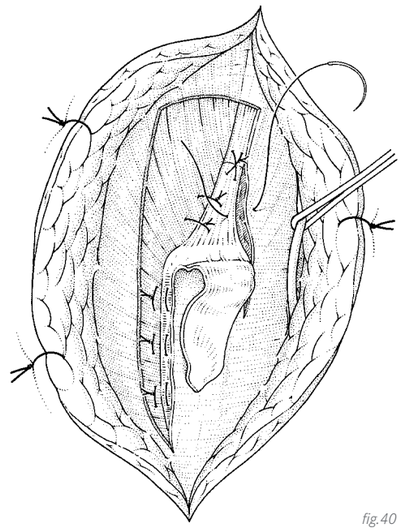


fig.40

This repair is continued proximally by suturing the lateral head of triceps to the lateral edge of the intermuscular aponeurosis.

The deep layer of the closure is completed by suturing the free edge of the long and deep heads of triceps to the medial edge of the intermuscular aponeurosis.

The deep fascial repair is carried out by suturing the fascia covering anconeus and the reflected triceps aponeurosis back on to its bed.

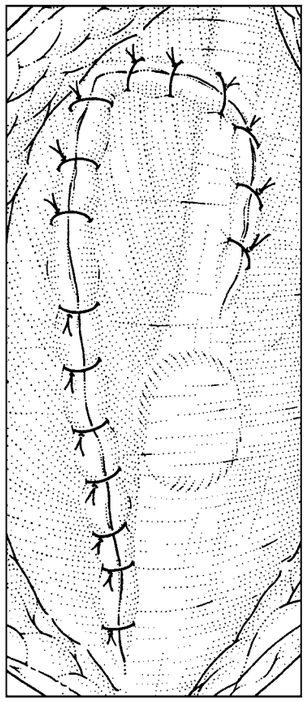


fig.41

We routinely insert a wound drain before closing the subcutaneous layer and the skin.

fig.42

Postoperative Care

We apply a padded bandage extending from the level at which the tourniquet was applied to the wrist at the end of the procedure. If there is concern about the quality of the soft tissues during wound closure particularly in revision surgery we also apply a plaster back splint which is retained until the skin sutures are removed. The wound drain is removed on the first postoperative day and a postoperative radiograph is obtained. If this is satisfactory, unless there is concern about the soft tissue closure, active flexion exercises are then begun under the supervision of a physiotherapist. Most patients are discharged home on the fourth or fifth postoperative day and supervised physiotherapy is continued until a functional range of flexion is achieved at around six weeks.

Ordering Information

iBP™

Primary Implants

114323	Porous Small Humerus Left
114324	Porous Std Humerus Left
114325	Porous Large Humerus Left
114326	Porous Ex.Large Humerus Left
114327	Porous Small Humerus Right
114328	Porous Std Humerus Right
114329	Porous Large Humerus Right
114330	Porous Ex.Large Humeral right
114339	Porous Small Ulna Left
114340	Porous Std Ulna Left
114341	Porous Large Ulna Left
114342	Porous Small Ulna Right
114343	Porous Std Ulna Right
114344	Porous Large Ulna Right
114351	Interlok® Small Humerus Left
114352	Interlok® Std Humerus Left
114353	Interlok® Large Humerus Left
114354	Interlok® Ex.Large Humerus Left
114355	Interlok® Small Humerus Right
114356	Interlok® Std Humerus Right
114357	Interlok® Large Humerus Right
114358	Interlok® Ex.Large Humerus Right
114367	Interlok® Small Ulna Left
114368	Interlok® Std Ulna Left
114369	Interlok® Large Ulna Left
114370	Interlok® Small Ulna Right
114371	Interlok® Std Ulna Right
114372	Interlok® Large Ulna Right

Long Stemmed Implants - Made To Order

114331	Porous Small Humerus Long Stem Left
114332	Porous Std Humerus Long Stem Left
114333	Porous Large Humerus Long Stem Left
114334	Porous Ex.Large Humerus Long Stem Left
114335	Porous Small Humerus Long Stem Right
114336	Porous Std Humerus Long Stem Right
114337	Porous Large Humerus Long Stem Right
114338	Porous Ex.Large Humerus Long Stem Right
114359	Int. Small Humerus Long Stem Left
114360	Int. Std Humerus Long Stem Left
114361	Int. Large Humerus Long Stem Left
114362	Int. Ex.Large Humerus Long Stem Left
114363	Int. Small Humerus Long Stem Right
114364	Int. Std Humerus Long Stem Right
114365	Int. Large Humerus Long Stem Right
114366	Int. Ex.Large Humerus Long Stem Right
114373	Int. Small Ulna Long Stem Left
114374	Int. Std Ulna Long Stem Left
114375	Int. Large Ulna Long Stem Left
114376	Int. Small Ulna Long Stem Right
114377	Int. Std Ulna Long Stem Right
114378	Int. Large Ulna Long Stem Right

iBP™

Instruments

402055	Case 1 Complete with instruments
402057	Case 2 Complete with instruments
402054	Case 1
402056	Case 2
402001	Olecranon Cutting Guide Small
402002	Olecranon Cutting Guide Standard
402003	Olecranon Cutting Guide Large
402008	Humeral Cutting Block Small
402009	Humeral Cutting Block Standard
402010	Humeral Cutting Block Large
402012	Humeral Standard Reamer
402013	Humeral Large Reamer
402017	Humeral Trial Small Left
402018	Humeral Trial Standard Left
402019	Humeral Trial Large Left
402021	Humeral Trial Small Right
402022	Humeral Trial Standard Right
402023	Humeral Trial Large Right
402025	Humeral Trial Inserter
400957	Humeral Pusher
402047	Humeral Rasp Small
402048	Humeral Rasp Standard
402049	Humeral Rasp Large
402050	Olecranon Side Cutter
402051	Cutting Block Pins
402052	Humeral Trial Extractor
402029	Ulna Trimmer Small
402030	Ulna Trimmer Standard
402031	Ulna Trimmer Large
400944	Ulna Rasp Small
402033	Ulna Rasp Standard
400945	Ulna Rasp Large
402038	Ulna Trial Small Left
402039	Ulna Trial Standard Left
403040	Ulna Trial Large Left
402041	Ulna Trial Small Right
402042	Ulna Trial Standard Right
402043	Ulna Trial Large Right
402044	Small Ulna Pusher
402045	Standard Ulna Pusher
402046	Large Ulna Pusher
402053	Ulna Alignment Jig
32-420160	Pin Puller

Notes

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