Surgical Technique

DePuy ASR™

Articular Surface Replacement

DePuy
a Johnson & Johnson company

Introduction

Total surface replacement of the hip joint involves the replacement of the articulating femoral and acetabular surfaces with thin prostheses, leaving the healthy host bone largely intact. Smith-Petersen performed some of the very first procedures in the 1920's, using glass, Viscaloid, Pyrex, Bakelite and Vitallium. Sir John Charnley also performed Surface Replacement procedures in the early 1950's, using two thin cups of Teflon which unfortunately demonstrated rapid wear, necrosis of the femoral head and loosening of the acetabular cup.

In the 1960's a wide variety of large diameter prostheses were implanted, these varied from Metal-on-Metal (M-o-M) total hip replacements to uncemented and cemented Metal-on-Polyethylene resurfacing implants (M-o-PE). These designs had varying degrees of success, with some demonstrating successful design features, but with the majority of the longer term clinical results being unacceptable.

Despite this history, total surface replacement has remained a conceptually attractive procedure, as there is no fundamental, physiological or anatomical reason why it should not work as well in the hip as it does in the knee.[1] This is particularly true in the case of patients with early stage osteoarthritis, as the pathology is found in the articular cartilage and therefore removal of the femoral head is unnecessary if there is a viable alternative.[1]

In the late 1980's Mr Derek McMinn developed the first contemporary surface replacement implant, which then went through a series of design iterations, and was a precursor to both the Cormet Resurfacing Hip system (Corin, UK) and the Birmingham Hip Resurfacing (MMT, UK). At the same time Harlan Amstutz in the US began a series of developments which culminated in the Conserve Hip System (Wright Medical Technologies, US).

These contemporary total M-o-M Surface Replacement systems incorporate many of the design principles of conservative hip arthroplasty and the successful design characteristics of both earlier M-o-M resurfacing and THR. As a result, they have produced satisfactory short-term results with exceptional functional outcomes.[2]

Based on the success of these early designs, the DePuy ASR™ System presents a technologically advanced 4th generation M-o-M Articular Replacement system supported by currently available scientific, engineering and clinical knowledge:

Maximised bone and soft tissue **Preservation** for early intervention and faster recovery enabled by:

- Low profile instrumentation specifically designed for smaller incision surgery to reduce soft tissue trauma and encourage earlier recovery.
- A large range of variable thickness sub-hemispherical acetabular components available in 2 mm increments minimise the need for acetabular over reaming.
- The optimised tapered internal geometry with progressively sized central pin maximises bone preservation.

Enhanced Surgical **Precision** for easier and reproducible implantation by:

- A novel femoral alignment instrument assures correct positioning of the initial reamer guide resulting in reproducible component positioning.
- Precise and unified tapered reaming instrumentation ensures accurate femoral preparation and tailored implant fit.
- An acetabular impactor with a unique release mechanism allows direct visualisation of the host acetabulum and implant to ensure secure component fixation and accurate positioning.

Advanced implant **Performance** for enhanced function restoration by:

- Optimised implant tribology and maximised fluid film thickness result in a high performance low wear bearing proven in vitro.[1]
- Optimised femoral cementing techniques with clinically proven acetabular fixation provide long-term implant stability.[1]
- The unique tapered internal geometry, combined with slim central guide pin reduces the risk of stress shielding.[1]

The success of the contemporary Surface Replacement procedure means it is predicted to account for a significant part of all primary procedures in the future[3] and it is now considered an appropriate management option for the following groups of patients:[4]

- Aged less than 65 years.
- Aged 65 years and over who participate in activities predicted to shorten the life of a traditional total hip replacement.

The DePuy ASR™ Surgeon Design Team.


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ASR Surgical Technique Summary

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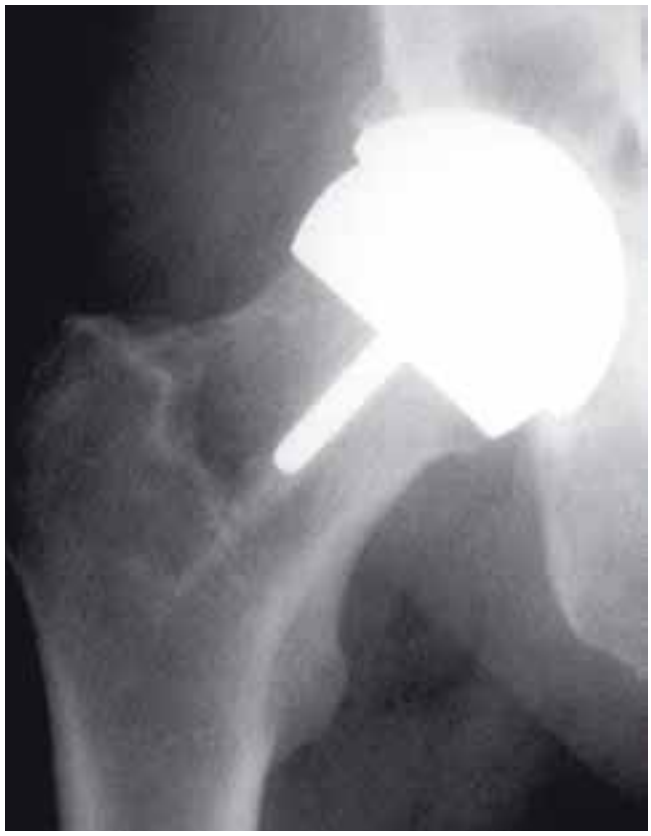
Indications, Contraindications and Patient Selection

Introduction

Optimal clinical outcomes with Surface Replacement are predicated upon:

- Implantation in patients with appropriate clinical indications.
- The pre-operative assessment of the femoral head and neck bone quality.
- The use of a precise surgical technique.
- Optimisation of implant geometry and size.
- Achievement of durable fixation of the implants to the bone.
- Low wear from M-O-M bearings.



Indications

The DePuy ASR™ System is indicated for total joint replacement in patients with severe pain and disability secondary to structural damage in the hip joint caused by rheumatoid arthritis, osteoarthritis, post-traumatic arthritis, collagen disorders and avascular necrosis.

The DePuy ASR™ System is also indicated for patients with congenital hip dysplasia, protrusio acetabuli, slipped upper capital femoral epiphysis and disability due to previous fusion, where bone stock is inadequate for non-implant reconstruction techniques.

We recommend that simple cases should be initially under taken to build experience before attempting the more difficult cases.

Contraindications

A number of patient based factors affect the relative suitability of patients to receive a Surface Replacement.

These patient based factors are associated with a possible increased risk of early failure.

The combination of two or more of these risk factors further lowers the relative suitability of patients to receive a Surface Replacement.

- Femoral head cyst >1 cm.
- Decreased bone mineral density.
- Lateral head-neck remodelling:

  (Loss of contour of lateral head-neck).
- Poor shape / biomechanics.
- Short femoral neck < 2 cm.
- Shallow or small acetabulum.
- Poor head to neck ratio.

Use of the DePuy ASR™ System is contraindicated in cases with active or recent joint sepsis, osteoporosis, insufficient bone stock, marked atrophy or deformity in the upper femur, skeletal immaturity, or where loss of musculature or neuromuscular disease would render the procedure unjustifiable.

Cautions

Implantation of a Surface Replacement system, like the DePuy ASR™ System prosthesis, can be a more technically demanding procedure than traditional total hip arthroplasty.

Familiarity with the general surgical requirements for hip surface replacement arthroplasty and instructions specific to the instrumentation and proper implantation of the DePuy ASR™ System are required prior to its use in patients.

Note: this page is for guidance only.

Nomenclature and Sizing

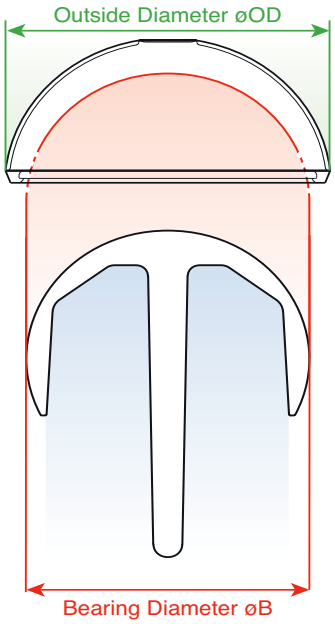


Figure 1. The relationship between Bearing Diameter and Outside Diameter.

	Colour Code	øB (mm)	øOD (mm)
Small		39	44
		41	46
		43	48
		45	50
Medium		46	52
		47	54
		49	56
		51	58
		53	60
		55	62
		57	64
Large		59	66
		61	68
		63	70

Figure 2. Colour Coding and respective implant dimensions.

Nomenclature

The size of the DePuy ASR™ System femoral prosthesis is linked to the size of the DePuy ASR™ System acetabular component and vice versa.

The size specific nomenclature which refers to:

- The true spherical diameter of the external porous coated ingrowth surface of the cup.
- The spherical diameter of the bearing surface of the femoral head. *(Figure 1).*

To aid the recognition of matched implant pairs, all compatible acetabular cups, femoral heads, and unipolar heads are marked with identical 2-colour colour marking *(Figure 2).*

All DePuy ASR™ System components and size specific instrumentation have laser marked sizing nomenclature. The DePuy ASR™ System components also have colour coding on the packaging to identify compatibility. DePuy ASR™ System components MUST ONLY be used with correctly size marked instrumentation and components with the same colour coding.

The effective neck diameter represents the maximum diameter of the patient's femoral neck that can be accommodated in the specific implant and still avoid notching the femoral neck. (This is determined with the femoral neck sizing gauges which are marked with bearing diameter).

Pre-operative Planning: Implant Sizing

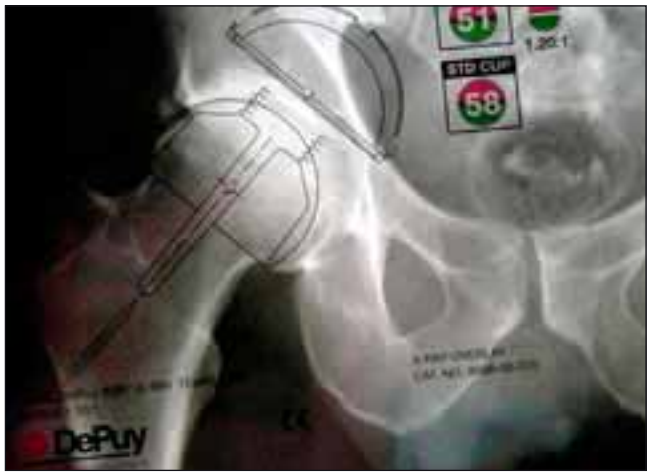


Figure 3.

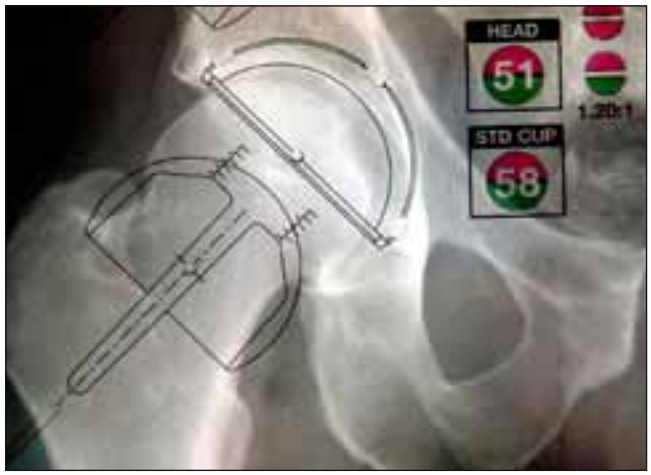


Figure 4.

Femoral Sizing

The DePuy ASR™ System femoral component must be sized to create an exact fit of its outer diameter with the inner diameter of the DePuy ASR™ System acetabular component without:

- Over reaming the femur to the point that the retained femoral neck sustains a "notch".

It is critical to ensure that the distal diameter of the femoral implant (effective neck diameter) is slightly greater than the widest diameter of the femoral neck (actual neck diameter). This takes precedence over matching the outside diameter of the native articulation, which may be distorted.

Femoral Positioning

The femoral implant should ideally be positioned between neutral and up to 10° of valgus compared to the anatomical neck angle, as viewed on the AP X-ray *(Figure 3).*

The femoral implant must not be positioned in a varus angle when compared to the anatomical neck angle.

Assessment of the postoperative offset can be estimated by using the graduated marks on the femoral component X-ray template.

Three graduations on the template are equivalent to the thickness of the DePuy ASR™ femoral component at the implant dome (Each graduation = 2 mm).

Acetabular Sizing

An acetabular component should be selected in a size that fills the acetabular fossa and accommodates the selected femoral component.

The sizing should be chosen, such that there is an exact fit between the inner diameter of the acetabular component with the outer diameter of the chosen femoral component without:

- Compromising fixation of the acetabular component.
- Over-reaming the acetabulum and removing excessive amounts of healthy bone stock.

If it appears that the appropriate DePuy ASR™ System acetabular component dictates a femoral component that is too small to ensure there is no risk of notching the femoral neck, then upsizing of the acetabular component by 2 mm will be required.

Acetabular Positioning

The landmarks for acetabular component positioning are the medial wall of the acetabulum (the radiographic tear drop) and the lateral-superior rim of the acetabulum.

In most cases, the medial aspect of the acetabular template will be within a few millimetres of the teardrop and the lateral aspect of the template will be covered by the lateral-superior acetabular rim when the abduction angle of the component template is 45° *(Figure 4).*

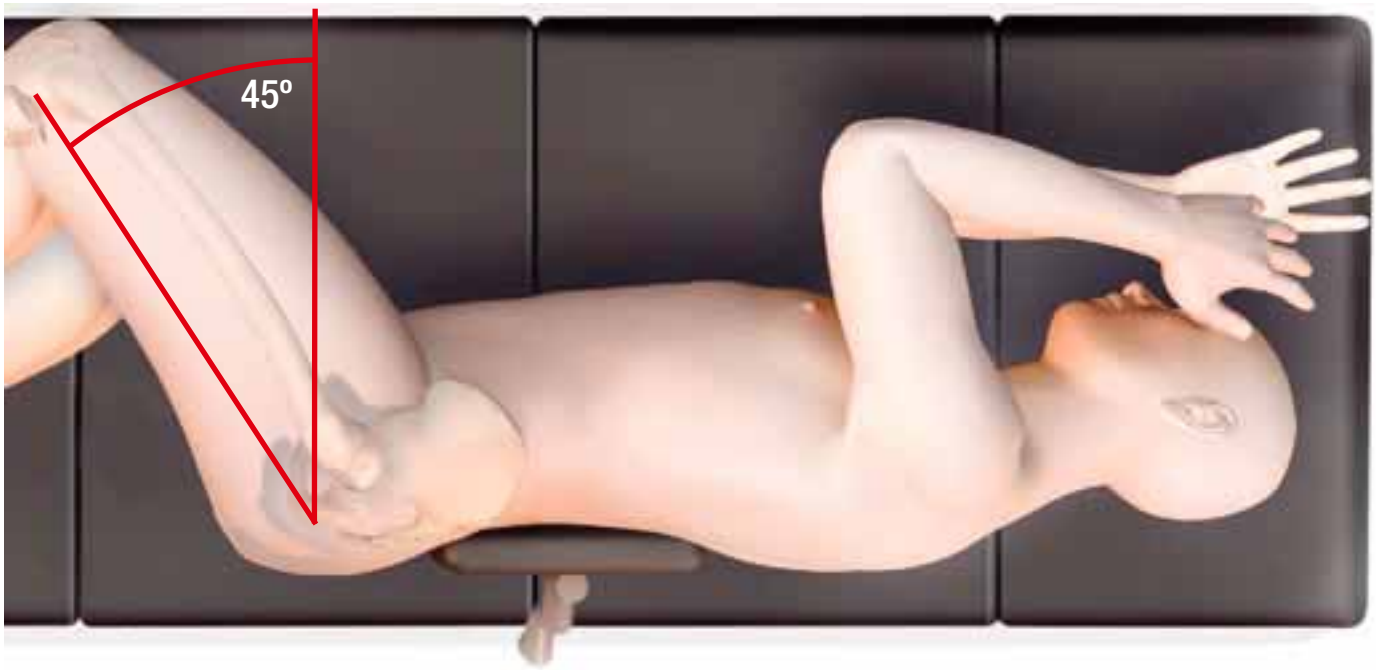


Figure 5.

Patient Positioning

The patient is supported in the lateral decubitus position using table supports placed against the sacrum and the anterior superior iliac spine, taking care to see that the pelvis is at right angles to the table and not excessively flexed.

The underlying leg is placed straighter than the operated leg, the knee and hip of the operated leg is flexed 45º each *(Figure 5)*.

Surgical Exposure

Implantation of DePuy ASR™ System can be achieved through any conventional surgical approach, however a standard posterior approach to the hip joint is described in this surgical technique.

The minimum requirement is the exposure of the femoral head and neck enabling sufficient visualisation of, and access to, the maximum anatomical femoral neck diameter with sizing, reaming and impaction instrumentation that results in minimal soft tissue trauma.

The desire to reduce soft tissue trauma, to aid early recovery and faster rehabilitation, should not override the critical requirement to ensure that sufficient exposure is gained to assess the maximum diameter of the anatomical femoral neck and that accurate component positioning can be achieved.

Note:
It is important when doing a Posterior Approach to the hip joint to keep in mind the Siactic Nerve. It is palpable just behind the short external Rotators, it is not necessary to expose it, yet palpate it and be aware where it is at all times.

Surgical Exposure

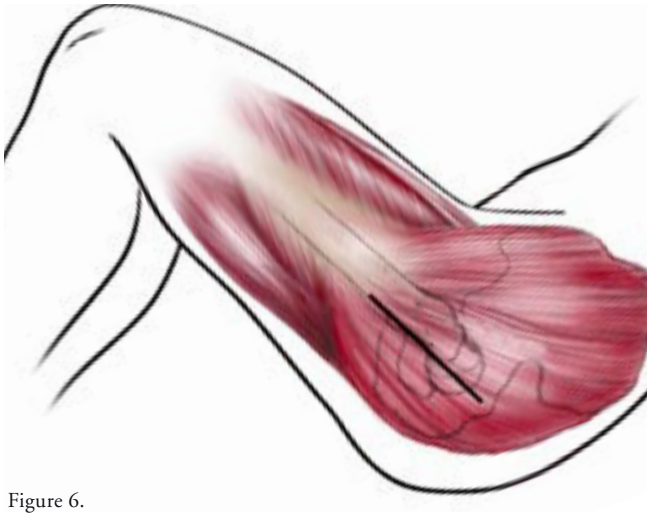


Figure 6.

Skin Incision

A straight incision is made centred on the tip of the trochanter and in line with the femur.

The length of the incision necessary to gain sufficient exposure will dependant on the individual patient but incision lengths of 10 to 15 cm have been successfully used with the DePuy ASR™ System *(Figure 6).*

Note:
If greater visualisation or access is required because the patient is obese or tightness of the soft tissues prevents adequate exposure of the femoral head and neck, the skin incision may be extended until the exposure is sufficient.

Figure 7.

Exposure

The deep fascia is opened at the lower end of the wound and the muscle fibres are split proximally by a blunt dissection *(Figure 7).*

A Charnley retractor is placed under the fascia/tensor muscle.

Figure 8.

Initial Muscle Release

The trochanteric bursa is divided sharply in the line of the skin incision and swept down to expose the short external rotator muscles.

A sharp Hohmann or Langenbeck is placed under the posterior edge of the gluteus medius muscle and lifted to expose the piriformis tendon and the interval between it and the gluteus minimus *(Figure 8).*

The retractor can now be adjusted to lie beneath the gluteus minimus and used to lift it off the capsule of the hip joint.

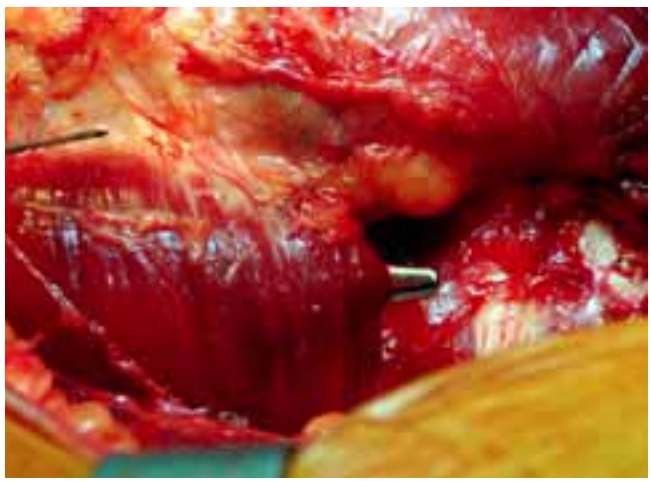


Figure 9.

Dissecting scissors are placed under the quadratis femoris muscle, the muscle is released close to the bone using cutting diathermy, leaving a 5 mm cuff of muscle on the bone for re-attachment *(Figure 9).*

Surgical Exposure

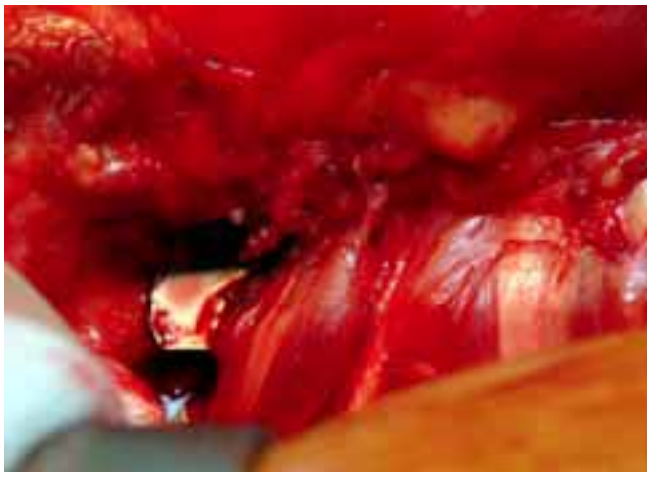


Figure 10.

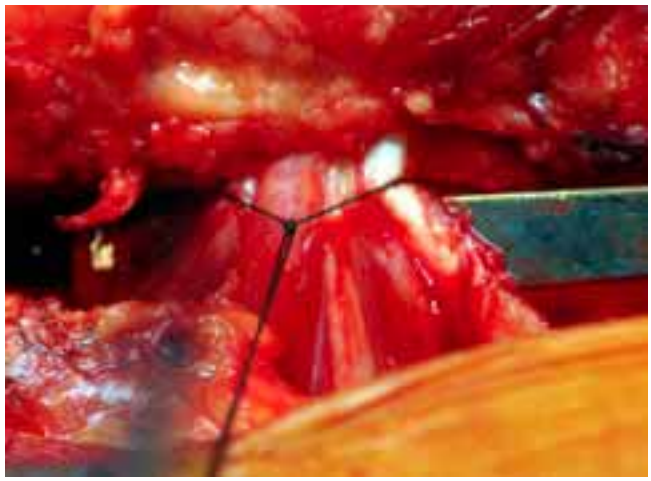


Figure 12.

Strong non-absorbable sutures are placed underneath the tendons of piriformis and obturator internus to retract them (superiorly to the capsule) *(Figure 10, 11, 12).*

The tendons are then both detached from the bone keeping the blade close to the piriformis fossa to maximise the length of the tendons.

Note:
If greater visualisation or access is required because the patient is obese or tightness of the soft tissues prevents adequate exposure of the femoral head and neck then the insertion of the gluteus maximus may be divided from its attachment to the linea aspera until the exposure is sufficient.

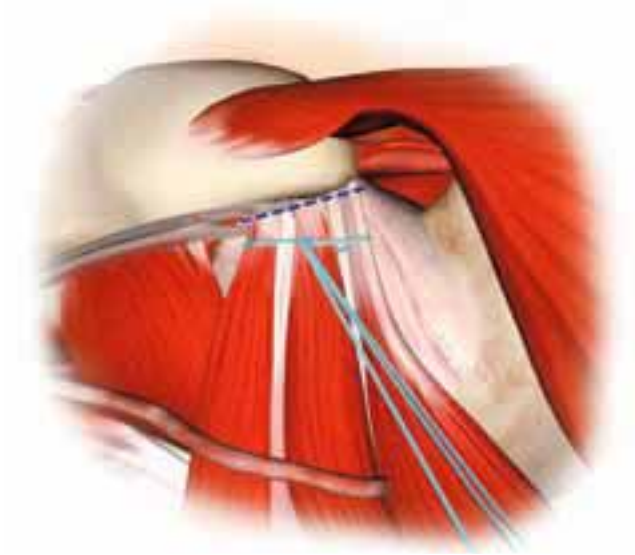


Figure 11

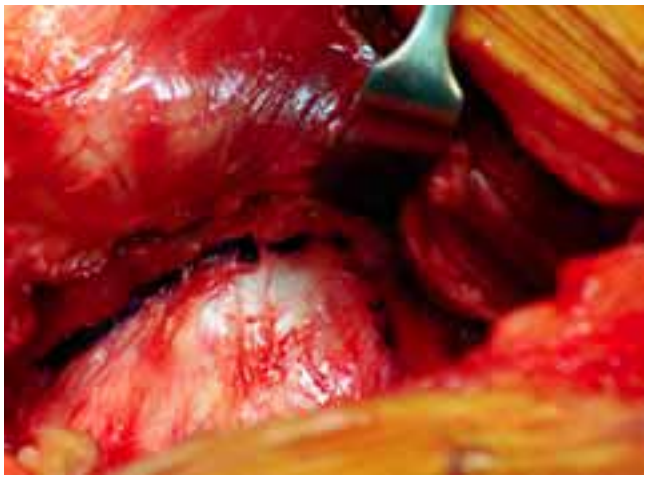


Figure 13.

Capsule release

The capsule is then released medially from the femoral head with an L-shaped incision (the superior limb of this runs parallel to the lower border of gluteus minimus). *(Figure 13, 14).*

Bleeding points in the capsular margin should now be cauterised.

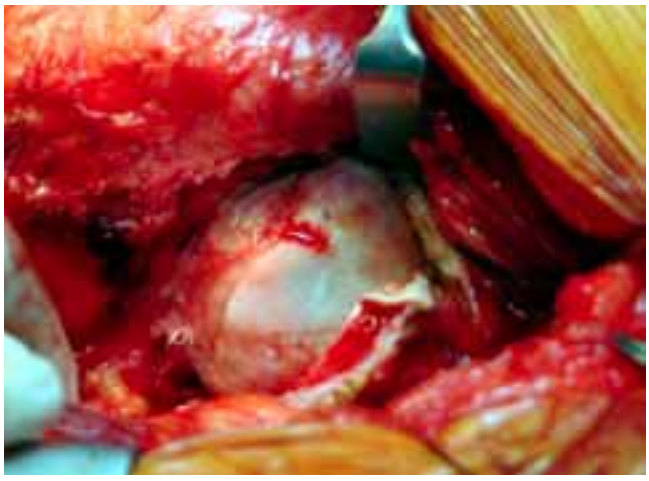


Figure 14.

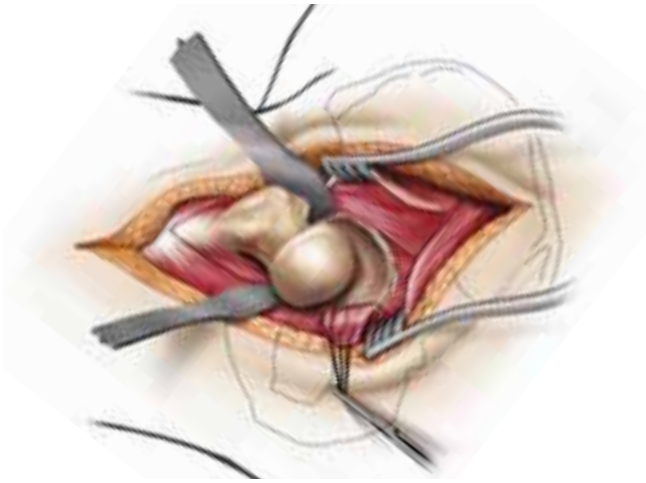


Figure 15.

Dislocation of the Femoral Head

With the knee flexed 90°, the femoral head is dislocated by internally rotating the leg *(Figure 15).*

Anterior capsule is further released to facilitate the mobilisation of the head, presenting it in the centre of the wound *(Figure 16).*

A forked retractor is placed under the neck to deliver the head out of the wound, so that the whole of the head and anterior and superior aspects of the femoral neck are visible.

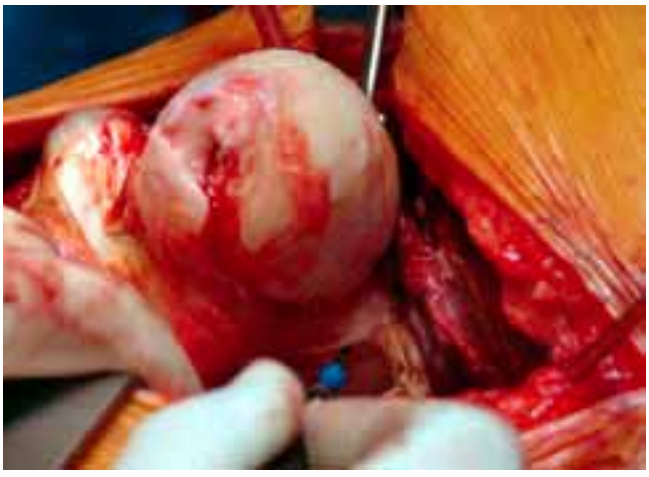


Figure 16.

If greater visualisation of the femoral head and neck or access is required further soft tissue release is necessary then the anterior capsule may be divided completely until the exposure is sufficient.

Femoral Gauging

Figure 17.

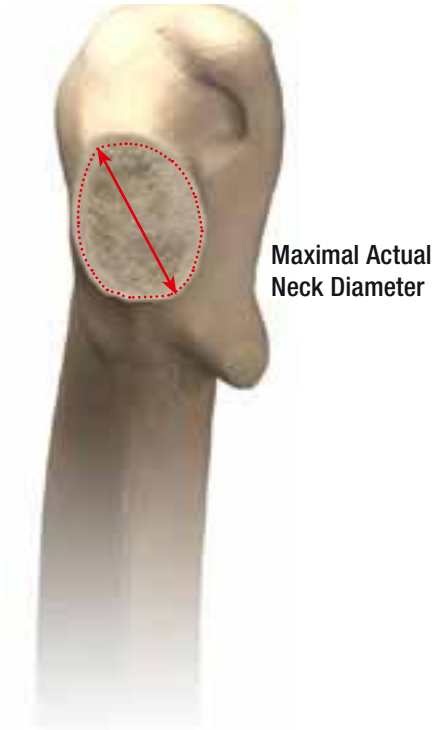


Figure 17a.

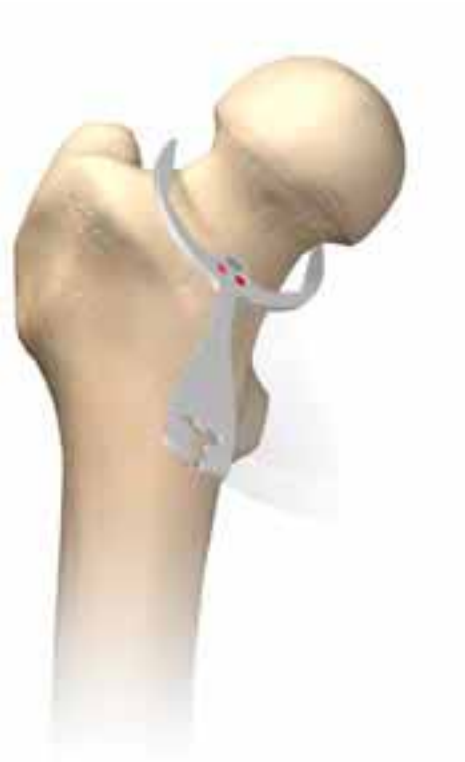


Figure 17b.

Femoral Gauging

With the femoral head out of the wound and presented so that the femoral neck can be easily visualised, an assessment of the maximum femoral neck diameter is made.

Note:
To reduce the risk of post operative femoral neck fracture it is critical that the femoral neck is not notched during preparation.

This means an implant with an effective neck diameter slightly larger than the maximal diameter of the femoral neck should be used. *(Figure 17a).*

The Femoral Gauge *(Figure 17)* must be placed across the widest portion of the femoral neck, usually the superior inferior side, ensuring that there is some clearance between it and the widest diameter of the femoral neck. *(Figure 17b).*

This maximum actual neck diameter is used as a guide to the definitive femoral component that might be used. (The neck gauges are marked with the bearing diameter).

Most femoral heads being resurfaced will have some degree of eccentricity relative to the femoral neck because of secondary remodelling.

Femoral Component Positioning Objectives

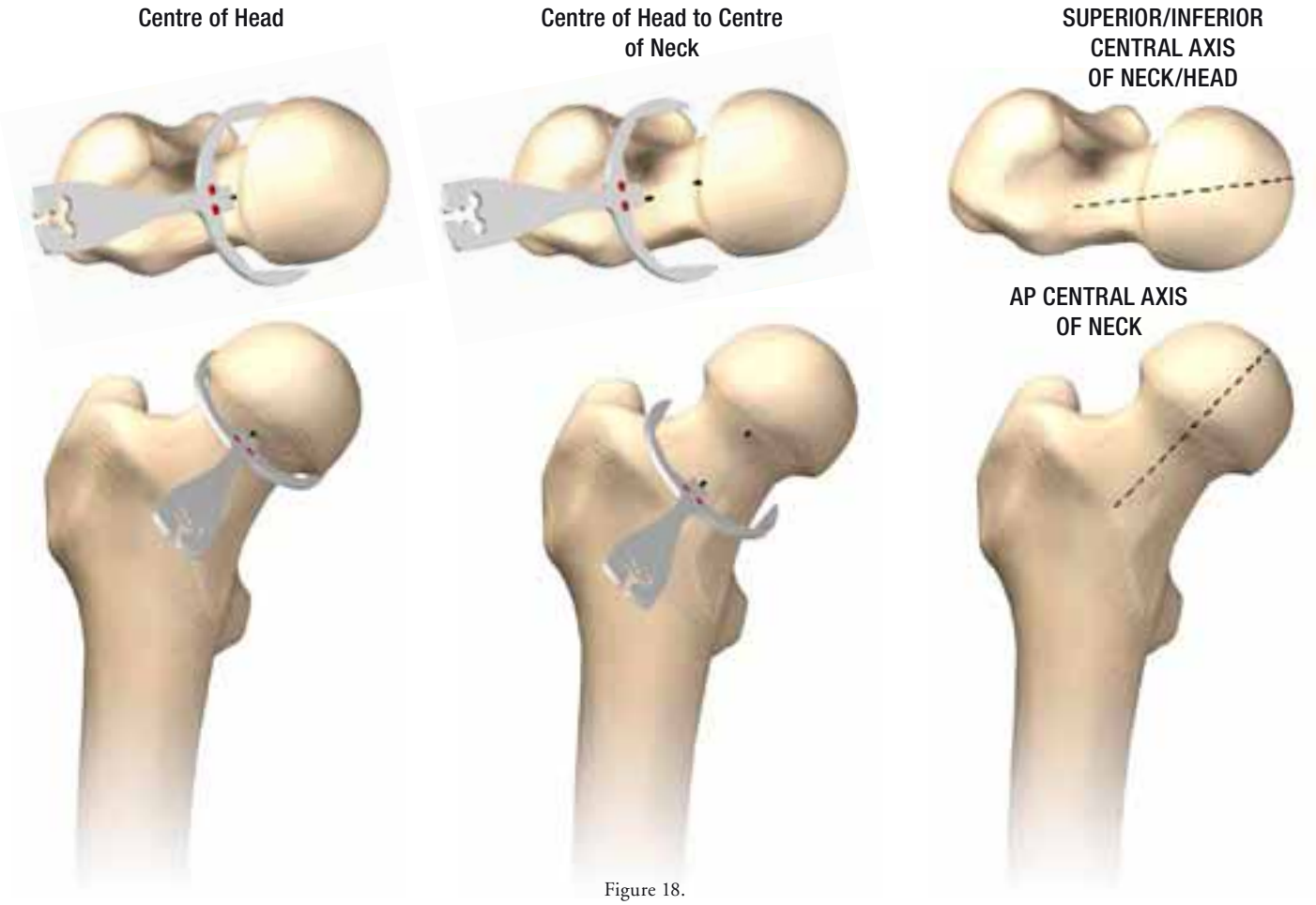


Figure 18.

Guide Pin Alignment

Once an implant size is chosen, the appropriate Femoral Gauge is utilised to mark the centre of the femoral neck at two points along the axis in the anterior posterior plane. These two points are then connected by drawing a line using a surgical diathermy.

Figure 19.

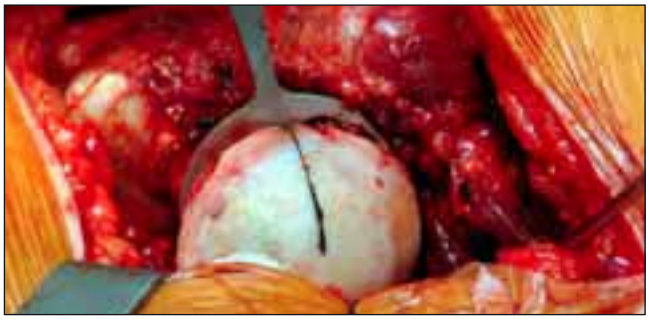


Figure 19a.

In the lateral plane the centre of the head and the centre of the neck is marked. A line joining these 2 points will give the correct alignment in this plane. This will take into account femoral head antiversion or translation and ensure good bone fill of the femoral component *(Figure 18, 19, 19a, 19b).* These lines should be drawn as accurately as possible.

Accurate placement of the Initial Reference Pin down the centre of the femoral neck can be accomplished by using a Tripod. This alignment guide can be used to control the angulation and translation of the Initial Reference Pin through its entry point on the femoral head, where the two lines intersect and down the central axis of the femoral neck *(Figure 20).*

For alternative pin alignment guides see page 25.

Figure 19b.

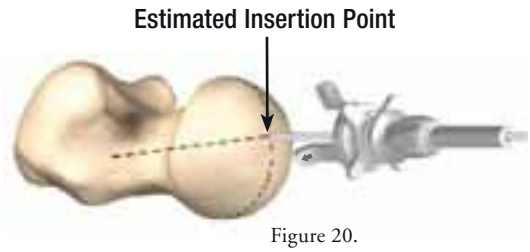


Figure 20.

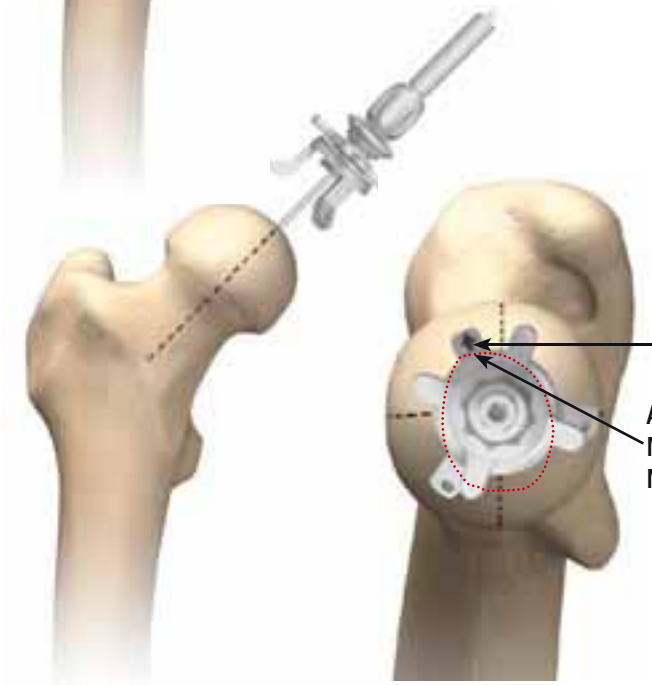


Figure 20a.

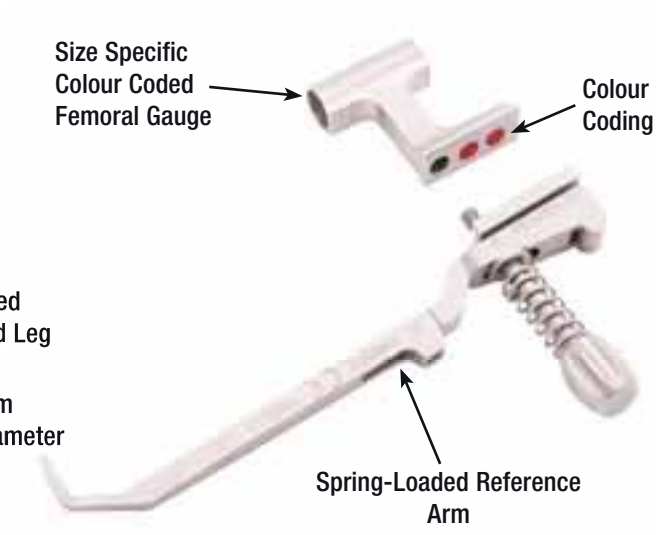


Figure 20b.

Tripod Positioning

The Tripod is presented to the surgeon locked in a neutral position for both angulation and translation with the initial reference pin already inserted in the guide. Lubricating the tripod with sterile water before use, makes it easier to angulate and translate.

The Tripod is placed with the initial reference guide pin and guide in line with the *estimated insertion point* previously marked on the superior/posterior aspect of the femoral head.

The Tripod leg with the laser marked arrow is aligned in the direction of translation along the axis of the maximum diameter of the femoral neck with the laser arrow pointing superiorly *(Figure 20a).*

The other two tripod legs are anchored in position with two quick release pins, which are inserted at a 45˚ angle to the femoral head.

Once in the correct position the tripod can be checked for tightness and the guide locked in position.

Whether the objective is to debulk the head or complete the preparation of the femoral head before the acetabular component is impacted, a size specific, colour coded Femoral Gauge Block equivalent to the definitive implant (projected by femoral gauging) is attached to the reference arm. This is placed over the initial reference pin guide on the tripod *(Figure 20b).*

The Reference Arm is spring-loaded so that it can be easily passed over the widest diameter of the femoral head and enables negotiation around any osteophytes that are present.

Initial Reference Pin Insertion

Figure 21.

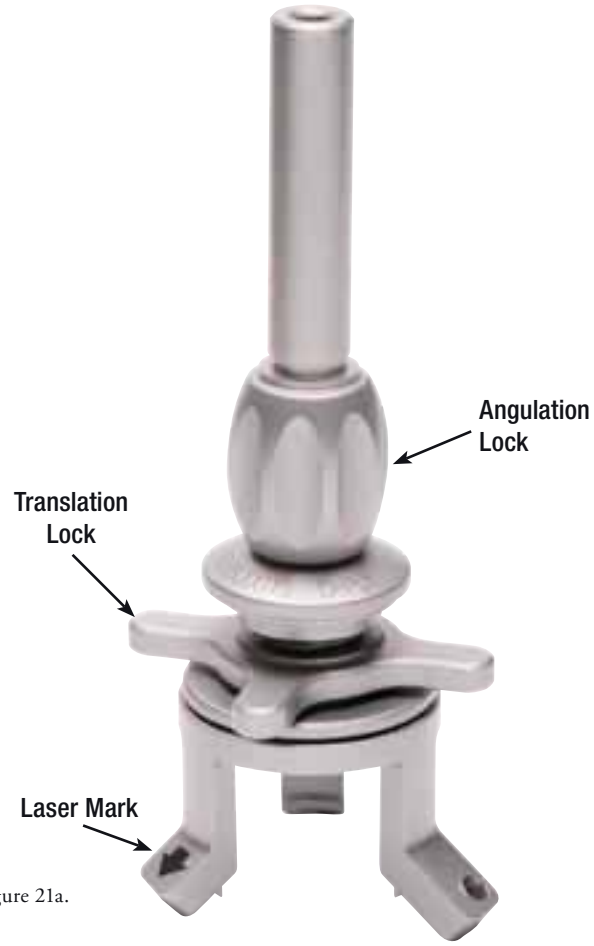


Figure 21a.

Initial Reference Pin Insertion

If the reference arm stylus point contacts the femoral neck or is not aligned parallel to the lines on the femoral neck, the position of the initial reference pin guide can either be independently translated and/or angulated to align to the lines marked on the neck.

- Firstly translation is achieved by loosening the distal wing screw collar on the tripod and moving the assembly in the direction of the arrow on the tripod foot *(Figure 21).*
- Secondly angulation can be achieved by loosening the proximal olive screw collar on the tripod *(Figure 21a).*

Once the angulation and orientation of the initial reference pin guide are considered to be correct the initial reference pin should then be inserted through the Tripod guide, far enough into the femoral neck to give stability to the subsequent reaming instruments.

The initial reference pin can also be inserted in either neutral or up to 10° of extra valgus, by aligning the reference arm parallel to the lines previously marked on the femoral neck in the superior and anterior quadrants.

If the aim is to insert the initial reference pin in neutral the reference stylus should be aligned parallel to the line marked on the central axis of the neck.

If the aim is to put the femoral implant in or upto 10° of valgus the reference arm should be approximately parallel to the calcar.

When this is done the quick release anchor pins and the tripod are removed, leaving the central pin still in position.

Once in the appropriate position the initial guide pin should be used as a guide for all further femoral reaming instruments.

Femoral Reaming

Figure 22.

Femoral Reaming

Femoral reaming is performed using a series of size specific cannulated reamers, Pin Reamer, Chamfer Reamer and Profile Reamer

- The preferred technique (called debulking technique) to assure that the femoral and acetabular component sizes will match the patient's anatomy is to ream the femoral head and neck at least one size larger than the size of the anticipated definitive femoral implant *(Figure 22).*
- Final preparation of the femur can then be completed after implantation of the definitive acetabular component.
- This gives the advantage of debulking the femoral head that allows for easier access to the acetabulum.
- The chosen Pin Reamer must be the match of the smallest femoral size measured by the femoral gauges. (Larger Chamfer + Profile Reamers can fit over the matching Pin Reamer Guide, when using the debulking technique as mentioned above).

The 1st reamer is the pin reamer *(Figure 22a).*

Surgical Tip: Place a transparent protection drape with small fenestration over the head prior to reaming to collect debris.

Debulking Technique

The ASR debulking technique gives the surgeon all the intraoperative flexibility to address any possible femoral and acetabular mismatch. The debulking technique may also allow the surgeon improved access and visibility to the acetabulum.

It is important to ensure that the femoral neck is not notched when letting the acetabulum dictate the femoral size.

Debulking is best explained with this example.

Lets assume the templated size of the head is 51 mm and the cup is 58mm. Whilst using the femoral gauges or alignment guides it may be decided that the smallest size is 51 mm.

Start with a guide pin reamer for 51 mm followed by 51 mm pin reamer guide and debulk the head with a profile reamer one size larger ie 53 mm. Now go and prepare the acetabular side. If the acetabular side is larger than expected i.e. 60 mm as apposed to 58 mm, upsize the guide pin reamer from 51 mm to 53 mm, use the profile reamer for 53 mm If the acetabular side is 58 mm then use the profile reamer for 51 mm.

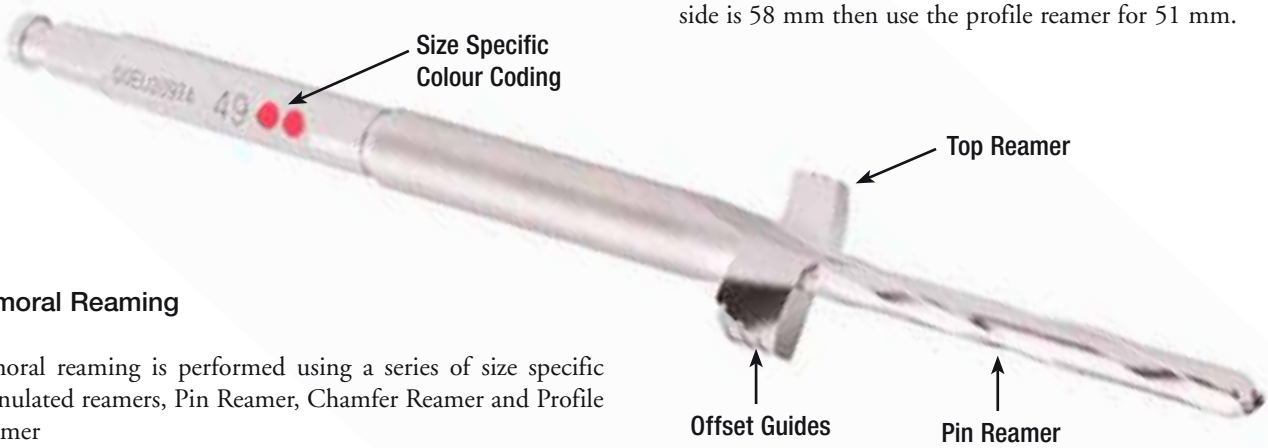


Figure 22a.

Initial Femoral Reaming

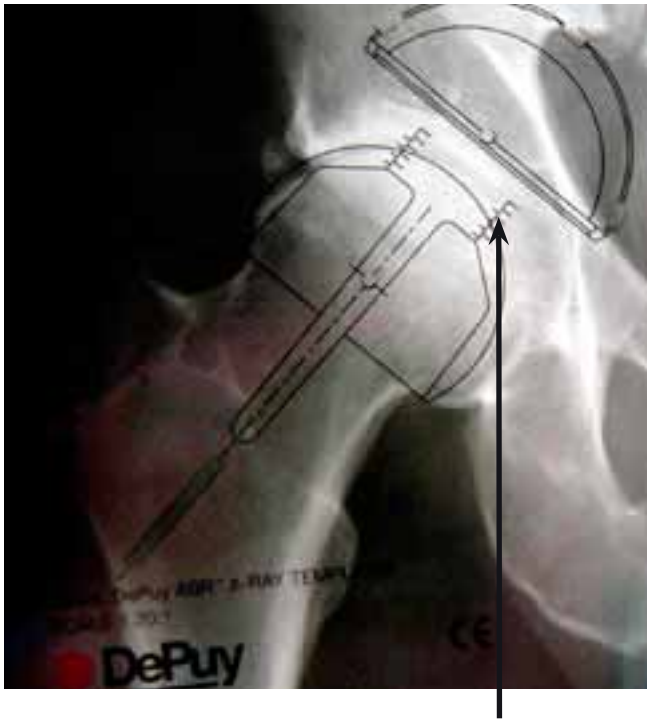


Figure 23.

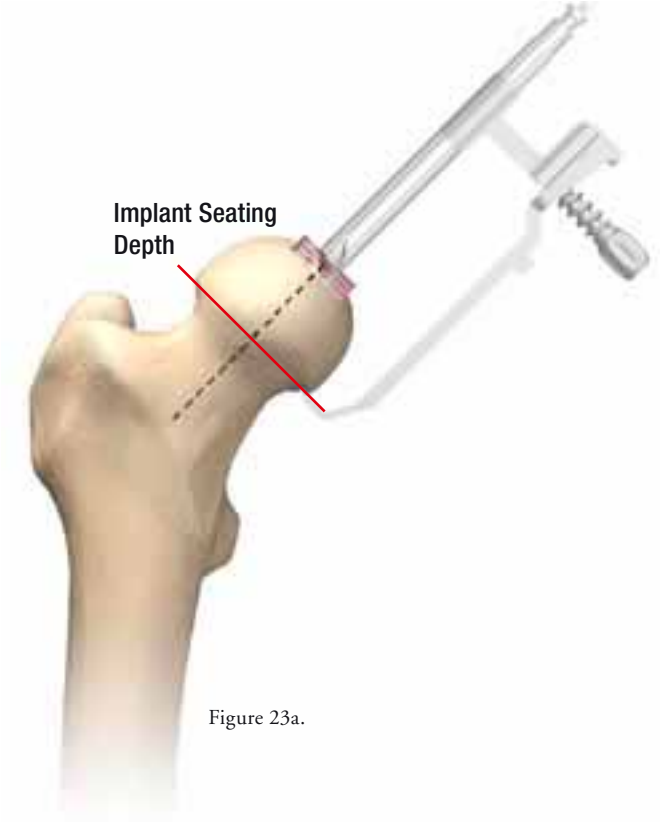


Figure 23a.

Reaming Depth

Lines on the X-ray templates act as a guide to the amount of articular cartilage and bone, which needs to be removed to achieve the desired implant position *(Figure 23)*.

When drilling down with the Pin Reamer, the lines on the collar can be used as a depth guide to the definitive implant or offset *(Figure 23a)*.

Therefore to ream down to the thickness of the femoral implant at the dome (6 mm), reaming should advance as far as the third marker.

The point of the Reference Arm stylus (fully retracted) when attached to the cutting pin reamer is used to assess the final seating position of the definitive implant during reaming.

Once the required depth (offset) is achieved, the pin reamer is removed.

Note:
The Pin Reamer prepares a uniform cylinder down the central axis of the femoral neck and mills the proximal flat corresponding to the internal geometry on the proximal underside of the femoral implant of a similar colour code.

Femoral Reaming

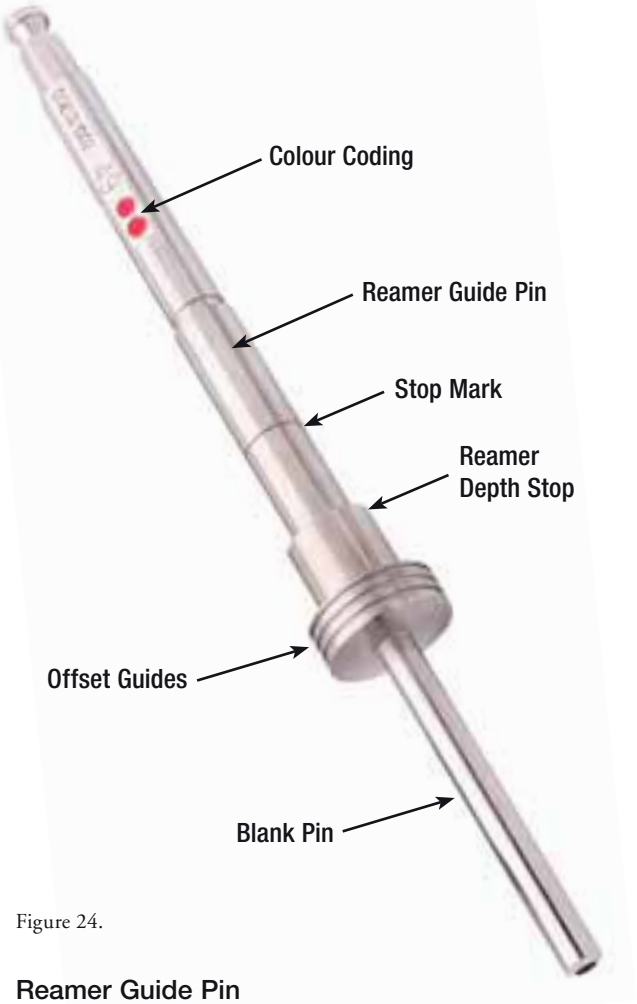


Figure 24.

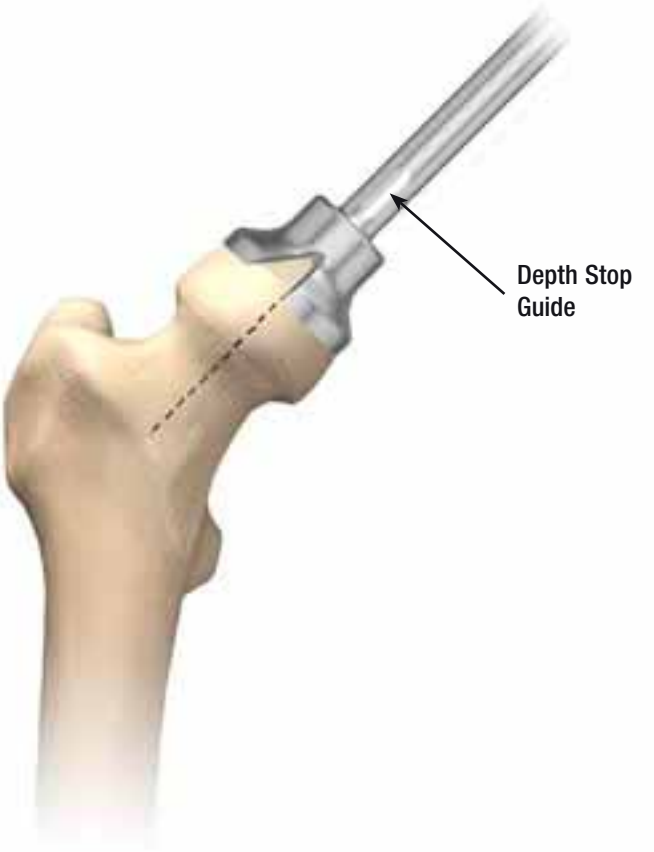


Figure 24a.

Reamer Guide Pin

The Reamer Guide Pin is essentially a non-cutting version of the Pin Reamer *(Figure 24).*

It guides the Chamfer/Profile reamers and also acts as a safety stop.

Make sure that the Reamer Guide Pin has reached the final seating position.

Chamfer Reamer (Optional)

In cases of severe deformity of the femoral head, where bone is very sclerotic, and where there is a possibility of eccentric reaming of the chamfer portion on the proximal femoral head, it may be preferable to utilise the optional size specific, colour coded Chamfer Reamer prior to the Profile Reamer to remove any excess cartilage and cortical bone *(Figure 24a).*

Note:
This should be used on a drill setting on the power tool.

The Chamfer-Reamer is passed over the reamer Guide Pin until it reaches the depth stop.

The depth stop is indicated by the alignment of the laser marking of the two instruments through the window.

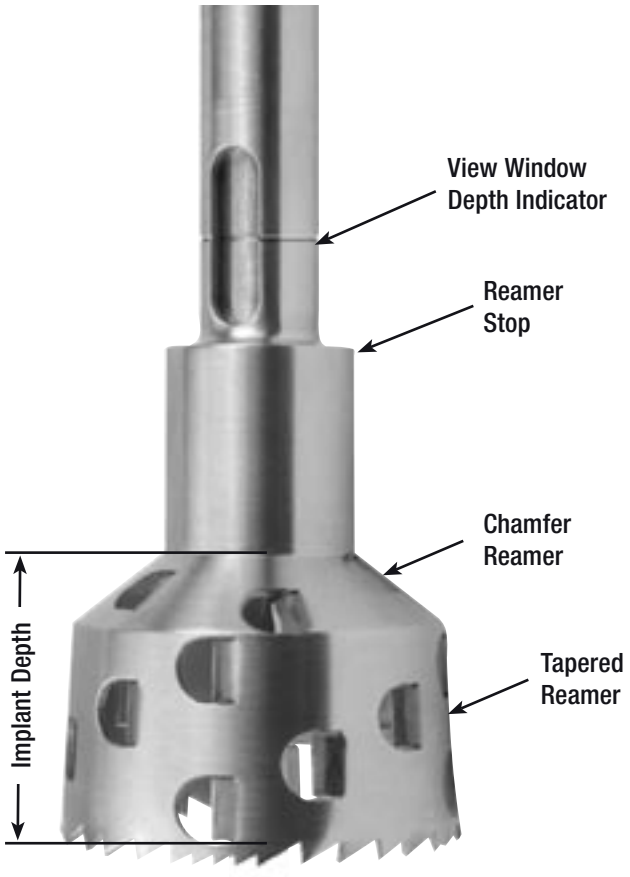


Figure 25.

Profile Reamer (Use Reaming setting on powertool)

The Profile reamer is size specific and is matched with the corresponding femoral implant of a similar colour code and size.

The profile reamer is advanced over the reamer guide pin until it reaches the pre-determined depth stop *(Figure 25).*

The depth stop is indicated by the alignment of the laser marking of the two instruments, the distal cutting surface does not pass the implant seating depth.

As the internal geometry of the femoral implant is tapered, the profile reamer follows suit. This means that as the profile reamer is advanced distally its distal cutting surface is reaming away from the head neck junction *(Figure 25a).*

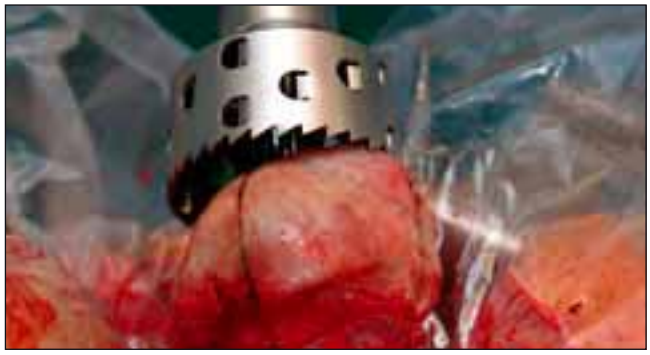


Figure 25a.

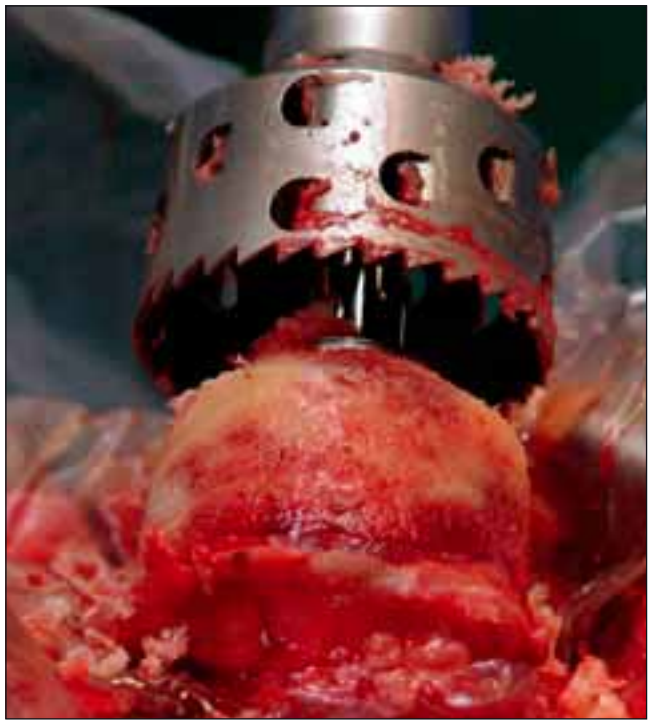
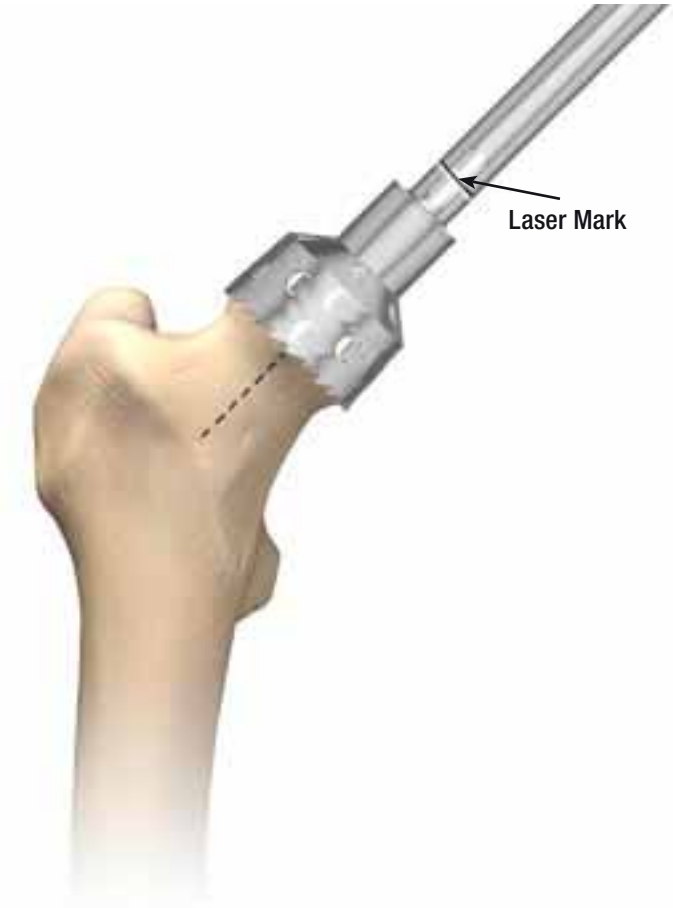


Figure 25a.



Note:
If using the debulking technique a Profile Reamer of one size larger than anticipated femoral implant is used (The definitive profile reamer is used after the acetabulum is implanted).

Acetabular Preparation

Figure 26.

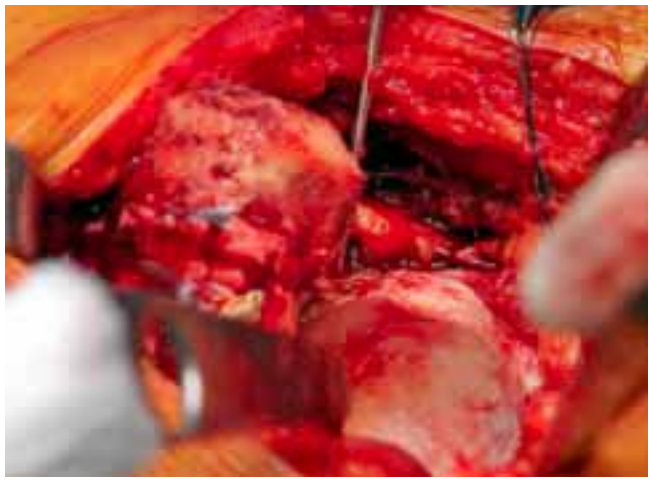


Figure 26a.

Exposure

Once the femoral head has been prepared, and its bulk is reduced, it can be tucked under the gluteus medius into a position supero-lateral to the acetabulum.

With the leg still internally rotated 90° from the anatomical position, a Hohmann retractor is placed under the calcar, and around the supero-anterior wall of the acetabulum, in order to lift the femur upwards and forwards thus exposing the acetabulum *(Figure 26, 26a)*.

A full circumferential view of the acetabular margin is obtained by completing the division of the inferior capsule as far as the acetabular rim, and by excising the labrum.

A second retractor may be placed postero-inferiorly to reflect the capsule, and a self retaining retractor such as a Travers retractor may then be placed to separate the capsule and psoas antero-inferiorly from the external rotator muscles postero-superiorly.

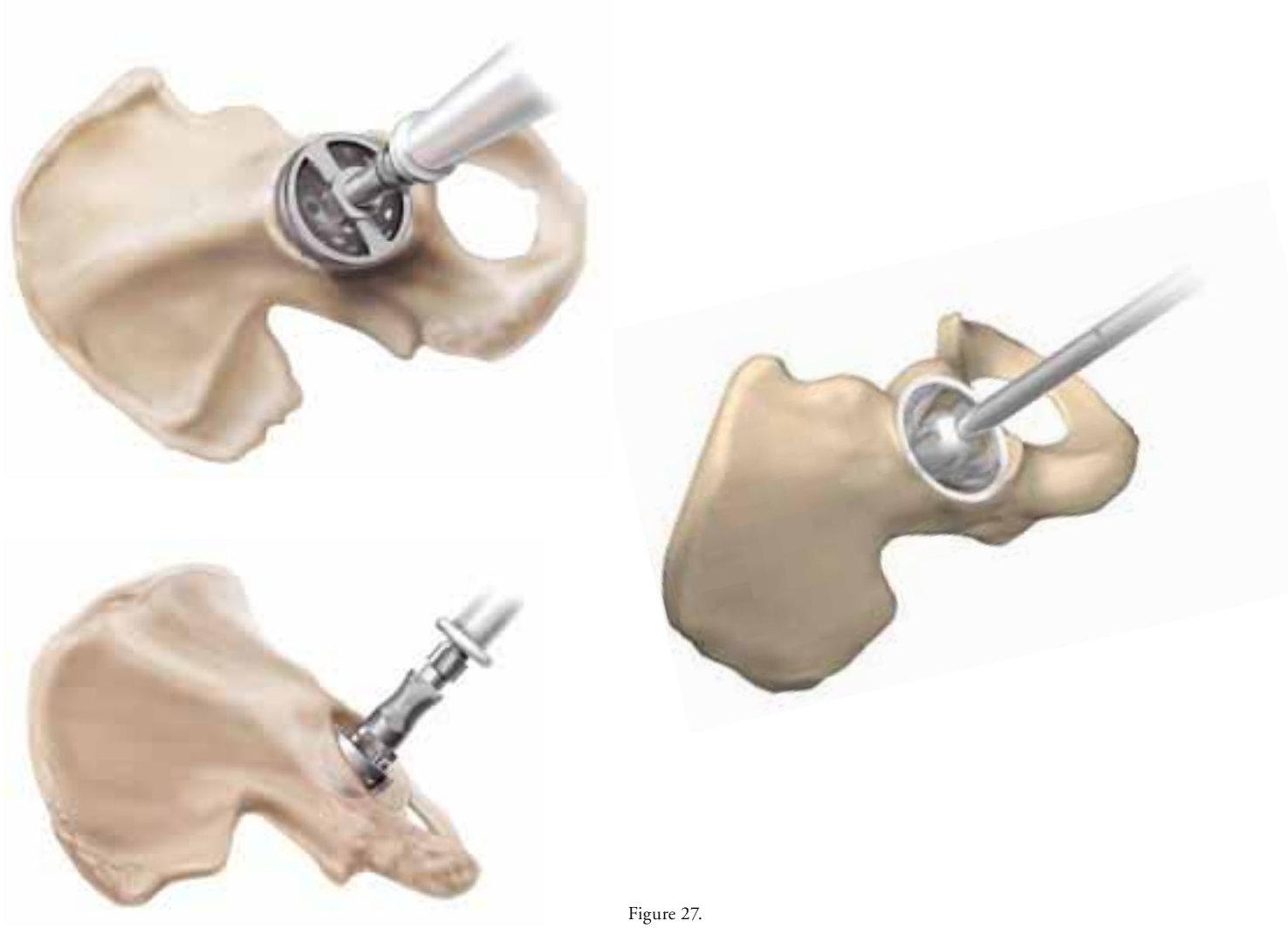


Figure 27.

Acetabular Reaming

The important features are the creation of a sub hemispherical cavity with uniform bone-implant contact, adequate press-fit for initial stability, and placement of the prosthesis at the anatomic centre of rotation of the hip joint whenever technically possible.

Initially a reamer 6 - 8 mm smaller than the anticipated acetabular component is used to deepen the acetabulum to the level determined by preoperative templating.

The reamers should be introduced in 45° of abduction and 15 - 20° of anteversion *(Figure 27).*

Note:
In a lateral decubitus position, the pelvis may be slightly flexed and a 30 - 35° anteversion of the reamer handle and implant impactor is recommended to achieve the desired 15 - 20° of cup anteversion.

The reamer size is progressively increased to remove cartilage and medial osteophytes until healthy bleeding bone is exposed and a symmetrical hemispherical socket is achieved.

Note:
Reaming should progress until the resulting cavity is 1 mm less than the selected acetabular component.

Care should be taken to avoid penetration of the medial wall of the acetabulum and to maintain as much of the subchondral plate as possible, removing only sclerotic bone.

A curette is used to free all cysts of fibrous tissue.

Defects are packed with cancellous bone from the debulked femoral head or acetabular reamings.

Acetabular Preparation

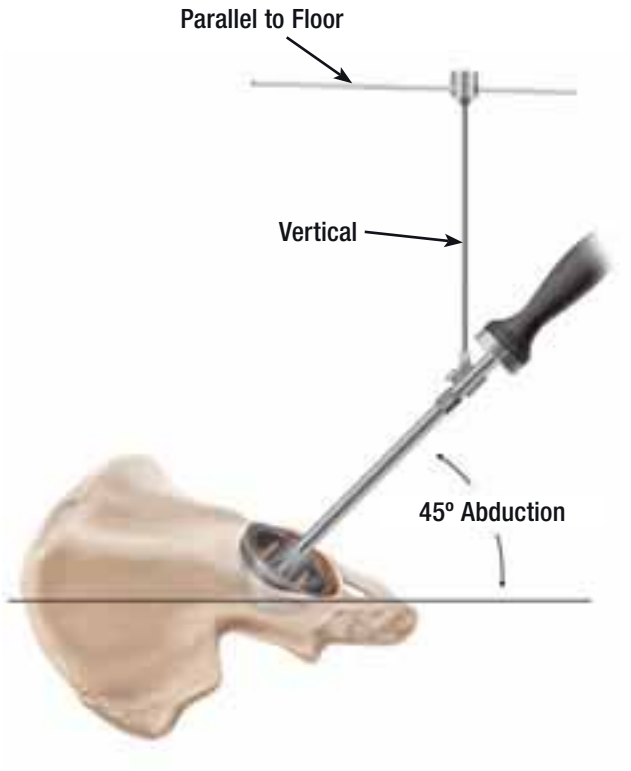


Figure 28.

Figure 28a.

Trial Sizing

The horizontal position of the component is gauged by the depth to which it has been placed within the acetabular fossa.

Once the horizontal and vertical positions have been confirmed to be correct, the angle of inclination of the component can be estimated from the relationship between the lateral rim of the component and the acetabular rim.

The cup trial should be screwed onto the threaded handle adaptor and introduced in to the prepared acetabulum.

The rim fit of the acetabular trial component should be tight enough to make it difficult to change its orientation once it has been seated.

Inspect the surface contact between the trial component and the prepared acetabular cavity through the perforations in the trial.

With the trial cup in the required position, reference marks may be made on the edge of the acetabular rim with a cauterisation tool.

These marks can be later used to gauge the final position of the implant after impaction.

Note:
The alignment guide can also be used to check component alignment.

With the patient in the lateral decubitus position and the version guide parallel to the floor, the component will be in 45° of abduction. When the extended arm of the version guide, which corresponds to the affected hip, also follows the long axis of the patients' body, the trial shell is in 15 - 20° of anteversion depending on the degree of pelvic flexion *(Figure 28a).*

Care should be taken to ensure that the pelvis is not tilted and that the patient has not moved as this will affect the accuracy of the assessment of cup alignment.

Acetabular Component Implantation

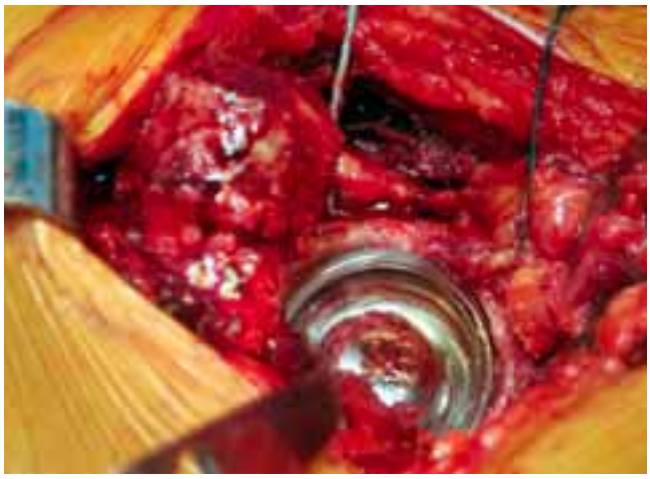


Figure 29.

Cup Impactor

The benefits of the easy view cup impactor are that it is available in 14 colour coded sizes and you can see the rim of the cup and the rim of acetabulum *(Figure 29)*. Additionally it is repositionable and has a unique release mechanism.

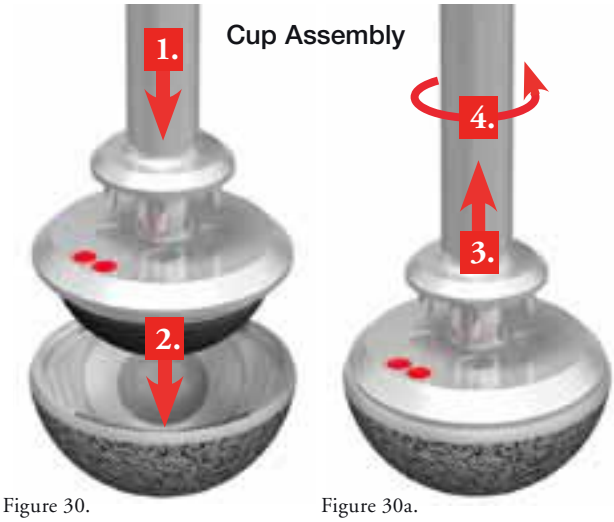


Figure 30.

Figure 30a.

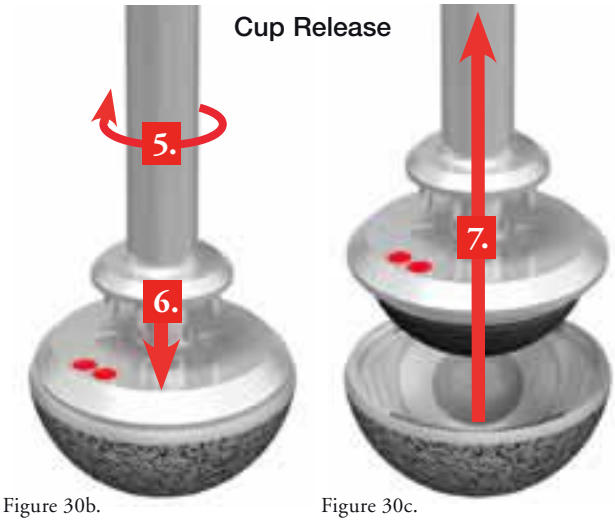


Figure 30b.

Figure 30c.

Cup Impaction

The Impactor head connects to the implant using an extra-articular recess. The impactor head snaps into position when lightly placed into recess.

The acetabular component is attached and released using a locking mechanism, by advancing a sleeve over the impactor handle *(Figure 30, 30a, 30b, 30c).*

The sleeve on the impactor handle is advanced into the impactor head, where the four pins dis-engage the implant.

The alignment guide should be used during cup impaction, as previously described, to control the abduction and anteversion angles of the impacted cup.

After impaction the stability of the cup should be assessed by means of the impactor handle.

Final Femoral Preparation

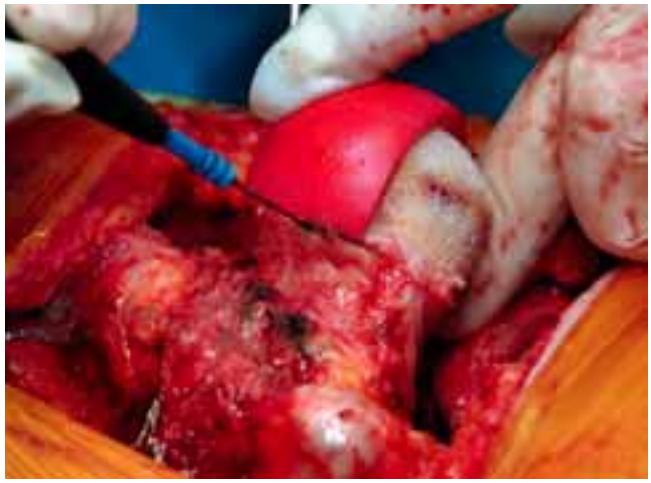


Figure 31.

Femoral Component Sizing

Once the acetabular preparation is complete, and the size of the acetabular component is assured, then the final preparation of the femur can be completed.

If the head has already been prepared to the correct size then cementation can proceed directly.

If however the head needs to be reduced in size to accommodate a smaller femoral head it will be necessary to repeat the femoral reaming and trialing steps after first re-inserting the initial guide pin in its original position and orientation.

This requires that all reaming and trialing be performed with colour coded and size specific instruments, that correspond to the correct size of the definitive acetabular and femoral implant.

Trial sizing of the femur and assessment of the match of the reamed femur to the internal implant geometry is carried out using the appropriate size specific and colour coded femoral trial. The lowest edge of the trial is marked with a surgical marker or diathermy to guide the implant depth *(Figure 31).*

Note:
The quality of fixation of the femoral component is dependant upon the amount of contact between its internal surface and the femoral neck.

Thus, placing the prosthesis above the resected surface will diminish the bone prosthesis contact area and create a cement mantle that is excessively thick.

i.e. Femoral implant should be gently impacted until it reaches 1 mm above diathermy mark.

Final Femoral Preparation

Figure 32.

Finishing Pin Reamer

The pin is not designed to transfer load or stresses to the femoral head post operatively.

This is particularly important at the distal tip to reduce the risk of proximal stress shielding.

Therefore a cylindrical finishing pin reamer is utilised to ensure the tapered pin is debonded from the prepared head along the majority of its length.

The above step must be utilised when using the following pin reamers:

999802439	Femoral Pin Reamer Size	39
999802441	Femoral Pin Reamer Size	41
999802443	Femoral Pin Reamer Size	43
999802445	Femoral Pin Reamer Size	45
999802446	Femoral Pin Reamer Size	46
999802447	Femoral Pin Reamer Size	47
999802449	Femoral Pin Reamer Size	49
999802451	Femoral Pin Reamer Size	51
999802453	Femoral Pin Reamer Size	53
999802455	Femoral Pin Reamer Size	55
999802457	Femoral Pin Reamer Size	57
999802459	Femoral Pin Reamer Size	59
999802461	Femoral Pin Reamer Size	61
999802463	Femoral Pin Reamer Size	63

There are therefore four sizes of finishing pin reamer, one for each Femoral implant size grouping.

		Colour Code	øB (mm)	øOD (mm)
• Sizes 39 – 45	Small		39	44
			41	46
			43	48
			45	50
• Sizes 46 – 53	Medium		46	52
			47	54
			49	56
			51	58
			53	60
• Sizes 55 – 57			55	62
			57	64
• Sizes 59 – 63	Large		59	66
			61	68
			63	70

NB: These instruments are not colour coded but are laser marked with the relevant FEMORAL head diameters.

It is not necessary to remove all of the osteophytes from the femoral neck distal to the area covered by the DePuy ASR™ prosthesis.

Aggressive removal of osteophytes and leaving exposed cancellous bone surface distal to the area of the femoral neck covered by the DePuy ASR™ component can lead to weakening of the femoral neck.

Nevertheless, it is appropriate to remove large osteophytes that would impinge or lead to restricted range of motion of the hip joint.

Final Femoral Preparation

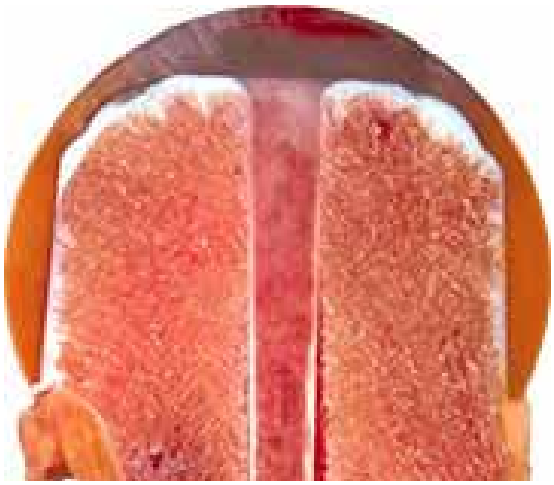


Figure 33.

Femoral Head Preparation

Once the bone cuts and pin reaming are completed, final preparation of the femoral bone to maximize the cement interface is required.

This preparation includes curettage of cysts, drilling of sclerotic bone, removal of loose or mechanically inferior bone and pulsed lavage.

In sclerotic bone, as is often present in the anterior quadrant of the femoral head, small drill holes, about 3 mm deep and 5 - 10 mm apart, can improve cement penetration.

A 1-2 millimetre depth of bone cement interdigitation is advised for mechanical stability with negligible damage to bone *(Figure 34).*

Excessive interdigitation of cement may result in necrosis of bone secondary to the heat of polymerisation and should be avoided.

The negative pressure generated by a suction cannula, most commonly inserted into the lesser trochanter, can be effective in reducing or eliminating bleeding of the reamed femoral head as well as reducing embolic phenomena during insertion of the prosthesis *(Figure 33).*

The suction may be left on until the cement cures to minimise bleeding into the cement-bone interface.

Figure 34.

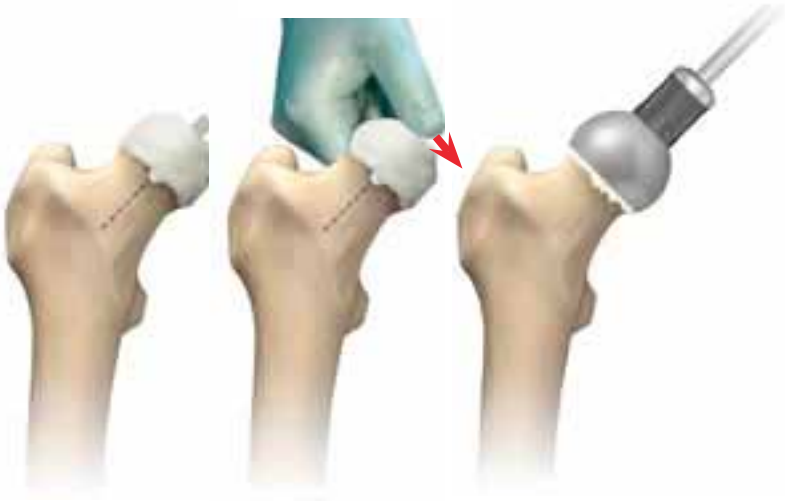


Figure 35a. Figure 35b. Figure 35c.

High Viscosity Cementing Technique

With high viscosity cement such as SmartSet® HV Cement, this can be achieved by manual (digital) application of doughy cement, tightly pressed onto the bone surface *(Figure 35a).*

Prior to applying the femoral component all excess cement should be removed from the most proximal surface of the prepared femoral head. This will ensure correct seating of the component without the possibility of cement lock *(Figure 35b).* The head can be tapped into the final position using the head impactor *(Figure 35c).*

This method has the benefits of control and time, since SmartSet HV® Cement can be picked up very early (typically within 2 minutes from the start of mixing) and is characterised by an extended working phase during which the viscosity remains relatively constant and allows optimum time for cement placement, pressurisation and implant seating.

The result of this method is the desired layer of interdigitated cement, and it has the advantage of not relying on implant placement to provide pressurisation of the cement.

It also allows for a clean procedure, since excess cement does not run onto the soft tissues, does not stick to gloves, and therefore avoids potential contamination of the bearing surface.

Femoral Component Placement

After cement application, the femoral component is pushed onto the prepared femoral head and pressed into its final position with the femoral head impactor. Use of exessive force could damage the femoral neck.

The final position should match that of the previous mark made on the bone during trial sizing.

Any excess cement that has escaped from the distal end of the implant bone interface is removed.

Final Femoral Preparation

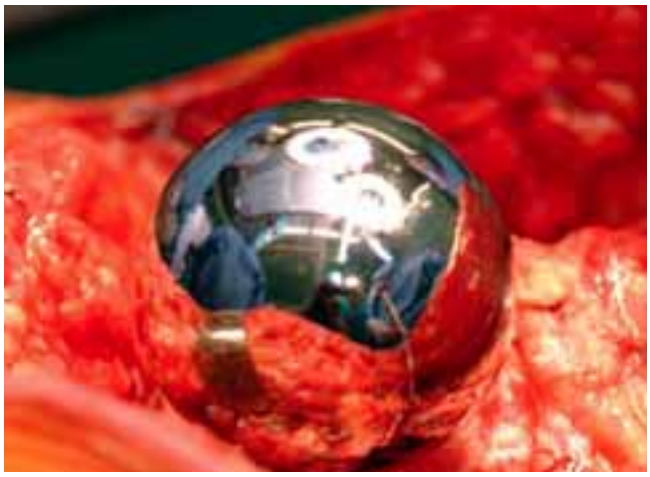


Figure 36.

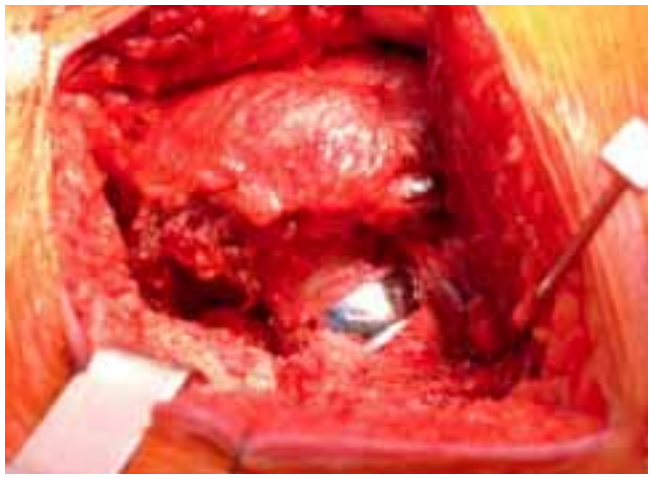


Figure 36a.

Reduction

After thorough washout of the wound the joint should be reduced carefully by combining longitudinal traction in the line of the femur with lateral traction via a bone hook in the piriformis fossa, and then finally external rotation.

Care should be taken when reducing the head that the polished bearing surface does not impinge on the rim of the cup but should rather be placed directly into the matching bearing surface of the acetabular cup *(Figure 36).*

Also ensure that no soft tissue lies between the surfaces, which would prevent proper reduction, and a finger can conveniently be used to guide it in.

Wound Closure

The capsule is then approximated superiorly with an absorbable suture, and then the non-absorbable sutures in the short external rotator muscles are attached to the trochanter *(Figure 36a).*

This is achieved by making drill holes in the trochanter tip laterally into the piriformis fossa, and then using a suture passer to pass the two pairs of sutures to be tied on the outside of the bone.

The gluteus maximus insertion may need to be repaired and then the quadratus femoris should be approximated.

The trochanteric bursal tissue is closed and then the deep fascia/ tensor muscle.

The skin is closed with a running subcuticular suture and adhesive strips.

Alternative Alignment Guide 1

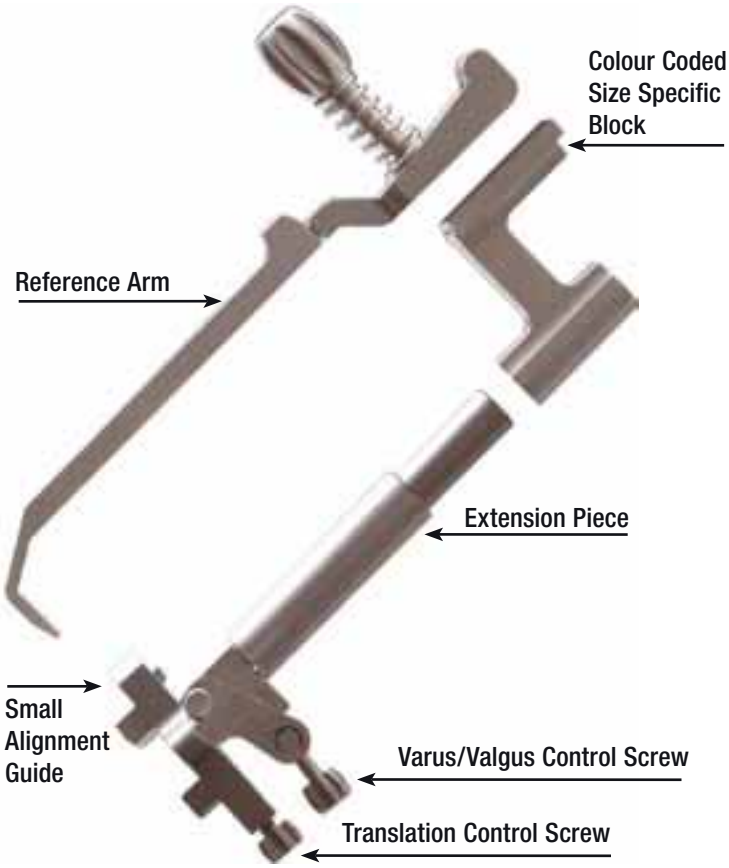


Figure 37.

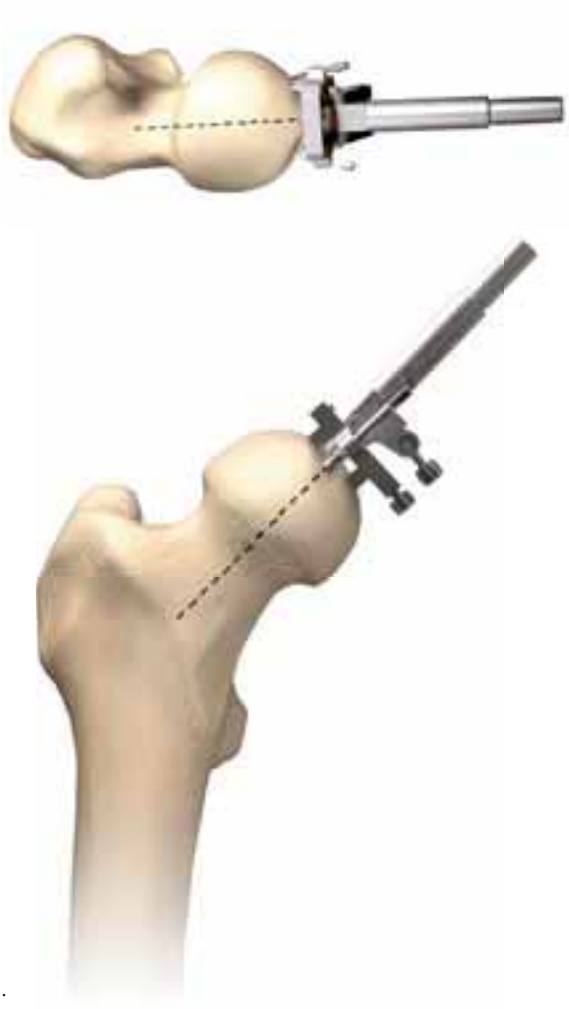


Figure 38.

1. Small Alignment Guide

Accurate placement of the Initial Reference Pin down the centre of the femoral neck can be accomplished by using the Small Alignment Guide (*Figure 37*). This alignment guide can be used to control the angulation and translation of the Initial Reference Pin through its entry point on the femoral head, where the two lines intersect and down the central axis of the femoral neck.

The Small Alignment Guide is placed with the initial reference guide pin in line with the estimated insertion point previously marked on the top of the femoral head (*Figure 19b, 38*).

The Guide is placed on the Femoral head with the Translation mechanism aligned on the previously marked central axis of the Femoral neck/head the superior/inferior position.

The legs are anchored in position with two quick release pins, which are inserted at a 45° angle to the femoral head.

A size specific, colour coded Femoral Gauge Block is attached to the reference arm. This is placed over the extension piece of the Small Alignment Guide.

The Reference Arm is spring-loaded so that it can be easily passed over the widest diameter of the femoral head and enables negotiation around any osteophytes that are present (*Figure 39*).

Note:
All the feet of the alignment guide do not have to be in contact with bone. The anchor pins can securely hold it in place. The Anteversion of the head should be checked prior to pinning.

Alternative Alignment Guide 1

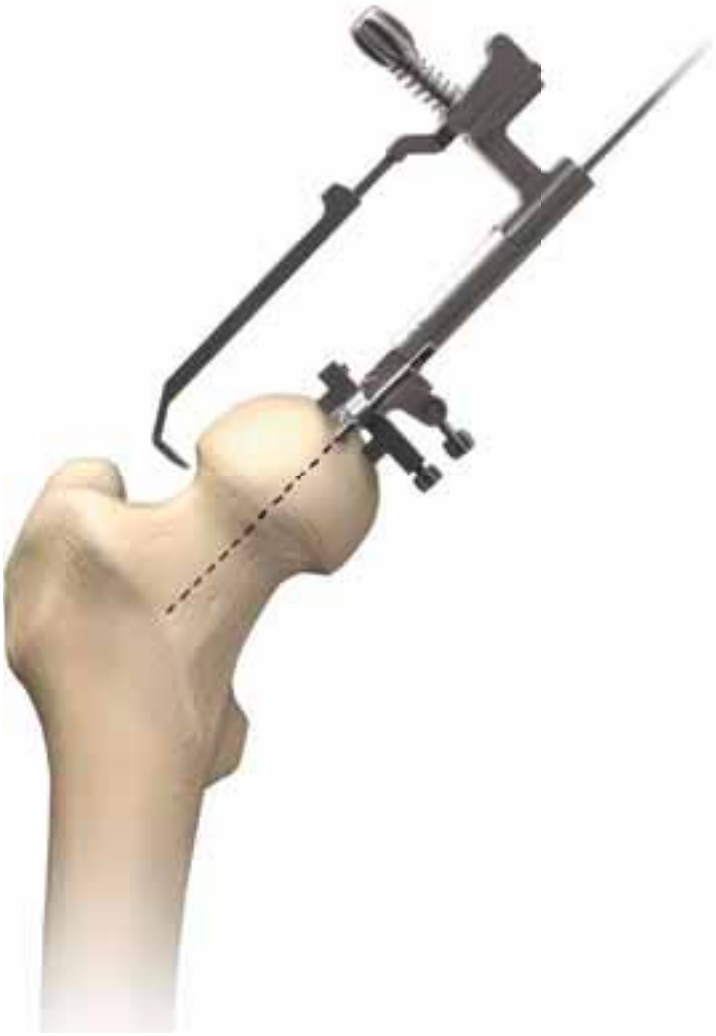


Figure 39.

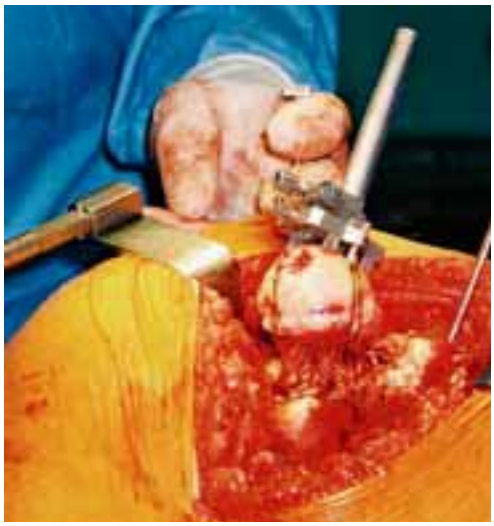


Figure 39a.

Initial Reference Pin Insertion

If the reference arm stylus point contacts the femoral neck or is not aligned parallel to the lines on the femoral neck, the position of the initial reference pin guide can either be independently translated and/or angulated to align to the lines marked on the neck (*Figure 39, 39a*).

- Firstly translation is achieved by using the lower screw mechanism; the assembly can be move superiorly or inferiorly as required in small incremental steps (*Figure 37*).

- Secondly angulation (Valgus/Varus) can be achieved by using the upper screw mechanism (*Figure 37*).

Once the angulation and orientation of the initial reference pin guide are considered to be in the correct position the initial reference pin should then be inserted through the Small Alignment guide, far enough into the femoral neck to give stability to the subsequent reaming instruments.

The initial reference pin (999818812) can also be inserted in either neutral or up to 10° of extra valgus, by aligning the reference arm parallel to the lines previously marked on the femoral neck in the superior and anterior quadrants.

After the pin insertion, the quick release anchor pins and the Small Alignment Guide are removed, leaving the central pin still in position.

Once in the appropriate position, the initial reference pin is used as a guide for all further femoral reaming instruments.

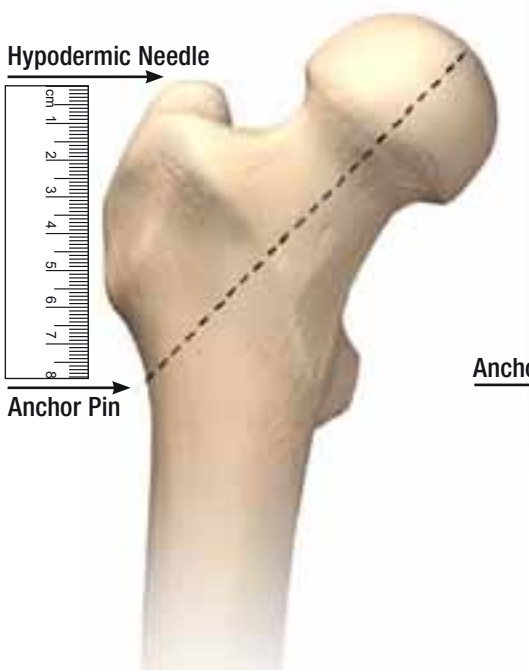


Figure 40.

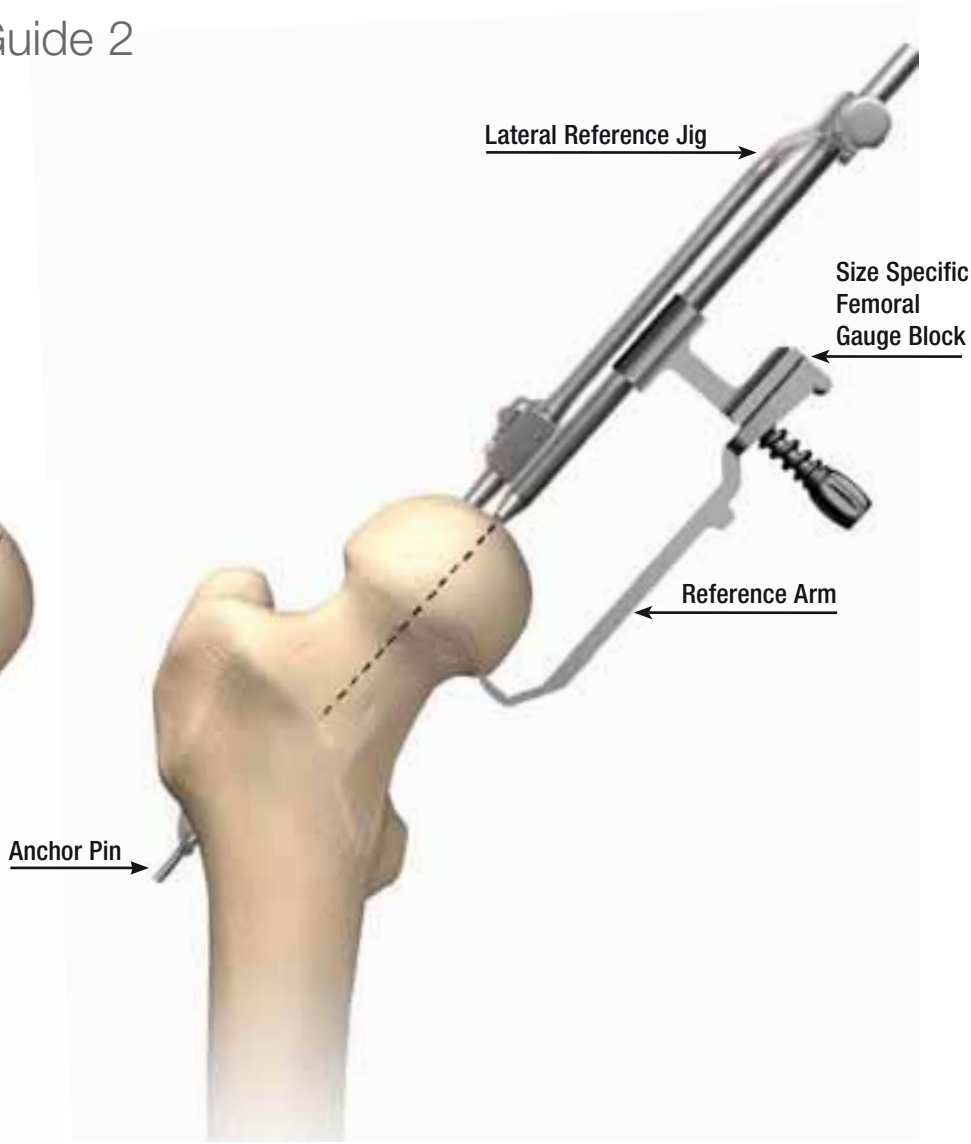


Figure 41.

2. Lateral Reference Jig

Preoperative Planning.

The correct position for the femoral implant is templated including varus/valgus angle. The guide pin position in the lateral femoral cortex is marked on the X-Ray. The distance from the tip of the greater trochanter to the lateral guide pin is measured and marked on the X-Ray.

A posterolateral approach and dislocation of the hip is performed. The hip is then repositioned.

A hypodermic needle is placed at the posterior superior tip of greater trochanter. An anchor pin (999818813) is drilled into the femur at the distance measured preoperatively. It should be placed in the midline of the femur (or slightly posterior, because anterior placement can lead to impingement of the arm with the femur). The pin is aimed towards the centre of the femoral head. The hypodermic needle is removed from the greater trochanter (*Figure 40*).

The lateral reference arm is put onto the lateral pin and the hip is dislocated again. The locking screw of the guide is loosened and central rod is adjusted to touch the femoral head at the approximate insertion point.

Anteversion/retroversion position is checked and the guide is centred with the threaded adjustment. The locking pin should be released prior to anteversion adjustment and tightened prior to use of the Reference Arm.

The reference arm with the size specific femoral gauge block attached is placed over the pin sleeve. The reference arm is rotated around the neck and should rotate freely without impingement. The contact point on the femoral head is checked. Any correction is made by changing the position of the central rod (entry point). The reference arm is rotated around the femoral neck and head again until a satisfactory position achieved (*Figure 41*).

When the position is optimal, the guide pin (999828813) is drilled in and left in position, and used as a guide for all further femoral reaming instruments.

Ordering Information Instrumentation

Core Instrumentation Kit

ASR0001	DePuy ASR™ Core Instrument Kit
999802259	DePuy ASR™ Head Pusher
999800007	DePuy ASR™ Head Pusher Handle
999800004	DePuy ASR™ Duraloc Cup Trial Adaptor
236069000	DePuy ASR™ Bantum Cup Trial Adaptor
217842005	Quick Drill Pin Driver
966515	Specialist*2 Pin Puller
999818812	DePuy ASR™ Initial Reference Pin Lg.
999801044	DePuy ASR™ Reference drill Guide
999800002	DePuy ASR™ Short Anchor Drill x 2
999800003	DePuy ASR™ Reference Arm
999800073	DePuy ASR™ Acetabular Impactor & Trial Handle
999800930	DePuy ASR™ femoral Trial Gauge Set (SM)
999800970	DePuy ASR™ Femoral Trial Gauge Set (LG)
221750044	Pinnacle Ante-version guide
999803950	DePuy ASR™ Version guide Adaptor

Separate Parts

999803000	DePuy ASR™ Small Alignment Guide
999800000	DePuy ASR™ lateral Reference Arm
999828813	DePuy ASR™ 3.2mm Reference Pin 280mm Long.
999818813	DePuy ASR™ Lateral Reference Anchor Pin
999800015	Multi Positional Tripod
999800016	DePuy ASR™ Cleaning Fixture
999818812	DePuy ASR™ Initial Referencing Pin
920010031	MI Acetabular Reamer Driver
259807625	MI Inferior Posterior Capsular Retractor (Rt)
259807626	MI Inferior Posterior Capsular Retractor (Lt)
259807110	MI Gluteus Medius Retractor
962256000	Charnley® Bow Retractor
962000000	Charnley® Bow 3” Retractor Blades
962082000	Charnley® Hohmans Retractor
259807650	MI Femoral Head Retractor
853965	Cannulated T-Handle
962272000	Charnley® Ring Curette

Small Tray

ASR0003	DePuy ASR™ Acetabular Implant Holder Kit (SM)
999800444	DePuy ASR™ Acetabular Implant Holder Size 44
999800446	DePuy ASR™ Acetabular Implant Holder Size 46
999800448	DePuy ASR™ Acetabular Implant Holder Size 48
999800450	DePuy ASR™ Acetabular Implant Holder Size 50
225244503	Duraloc® Bantam Trial Sizer 44 mm
225246000	Duraloc® Screw-In Cup Trial Sizer 46OD
225248000	Duraloc® Screw-In Cup Trial Sizer 48OD
225250000	Duraloc® Screw-In Cup Trial Sizer 50OD
ASR0030	DePuy ASR™ Short Femoral Profile Reamer Kit (SM)
999803139	DePuy ASR™ Short Femoral Profile Reamer Size 39
999803141	DePuy ASR™ Short Femoral Profile Reamer Size 41
999803143	DePuy ASR™ Short Femoral Profile Reamer Size 43
999803145	DePuy ASR™ Short Femoral Profile Reamer Size 45
ASR0033	DePuy ASR™ Femoral Stepped Pin Reamer Kit (SM)
999803339	DePuy ASR™ Femoral Stepped Pin Reamer Size 39
999803341	DePuy ASR™ Femoral Stepped Pin Reamer Size 41
999803343	DePuy ASR™ Femoral Stepped Pin Reamer Size 43
999803345	DePuy ASR™ Femoral Stepped Pin Reamer Size 45
ASR0036	DePuy ASR™ Stepped Profile Reamer Guide Kit
999803539	DePuy ASR™ Stepped Profile Reamer Guide Size 39
999803541	DePuy ASR™ Stepped Profile Reamer Guide Size 41
999803543	DePuy ASR™ Stepped Profile Reamer Guide Size 43
999803545	DePuy ASR™ Stepped Profile Reamer Guide Size 45
ASR0015	DePuy ASR™ Femoral Trial Kit (SM)
999802739	DePuy ASR™ Femoral Trial Kit Size 39
999802741	DePuy ASR™ Femoral Trial Kit Size 41
999802743	DePuy ASR™ Femoral Trial Kit Size 43
999802745	DePuy ASR™ Femoral Trial Kit Size 45
ASR0018	DePuy ASR™ XL Femoral Trial Kit (SM)
999802839	DePuy ASR™ XL Femoral trial Size 39
999802841	DePuy ASR™ XL Femoral trial Size 41
999802843	DePuy ASR™ XL Femoral trial Size 43
999802845	DePuy ASR™ XL Femoral trial Size 45

ASR0021	DePuy ASR™ Gauge Block Kit (SM)
999802939	DePuy ASR™ Gauge Block Size 39
999802941	DePuy ASR™ Gauge Block Size 41
999802943	DePuy ASR™ Gauge Block Size 43
999802945	DePuy ASR™ Gauge Block Size 45
ASR0025	DePuy ASR™ Femoral Chamfer Reamer Kit (SM)
999903239	DePuy ASR™ Fermoral Chamfer Reamer Size 39
999903241	DePuy ASR™ Fermoral Chamfer Reamer Size 41
999903243	DePuy ASR™ Fermoral Chamfer Reamer Size 43
999903245	DePuy ASR™ Fermoral Chamfer Reamer Size 45
9998-00-401	ASR Instrument Tray (SM)

Medium Tray

ASR0004	DePuy ASR™ Acetabular Implant Holder Kit (MED)
999800452	DePuy ASR™ Acetabular Implant Holder Size 52
999800454	DePuy ASR™ Acetabular Implant Holder Size 54
999800456	DePuy ASR™ Acetabular Implant Holder Size 56
999800458	DePuy ASR™ Acetabular Implant Holder Size 58
999800460	DePuy ASR™ Acetabular Implant Holder Size 60
999800462	DePuy ASR™ Acetabular Implant Holder Size 62
999800464	DePuy ASR™ Acetabular Implant Holder Size 64
225252000	Duraloc® Screw-In Cup Trial Sizer 52OD
225254000	Duraloc® Screw-In Cup Trial Sizer 54OD
225256000	Duraloc® Screw-In Cup Trial Sizer 56OD
225258000	Duraloc® Screw-In Cup Trial Sizer 58OD
225260000	Duraloc® Screw-In Cup Trial Sizer 60OD
225262000	Duraloc® Screw-In Cup Trial Sizer 62OD
225264000	Duraloc® Screw-In Cup Trial Sizer 64OD
ASR0031	DePuy ASR™ Short Femoral Profile Reamer Kit (Med)
999803146	DePuy ASR™ Short Femoral Profile Reamer Size 46
999803147	DePuy ASR™ Short Femoral Profile Reamer Size 47
999803149	DePuy ASR™ Short Femoral Profile Reamer Size 49
999803151	DePuy ASR™ Short Femoral Profile Reamer Size 51
999803153	DePuy ASR™ Short Femoral Profile Reamer Size 53
999803155	DePuy ASR™ Short Femoral Profile Reamer Size 55
999803157	DePuy ASR™ Short Femoral Profile Reamer Size 57

ASR0034	DePuy ASR™ Femoral Stepped Pin Reamer Kit (MED)
999803346	DePuy ASR™ Femoral Stepped Pin Reamer Size 46
999803347	DePuy ASR™ Femoral Stepped Pin Reamer Size 47
999803349	DePuy ASR™ Femoral Stepped Pin Reamer Size 49
999803351	DePuy ASR™ Femoral Stepped Pin Reamer Size 51
999803353	DePuy ASR™ Femoral Stepped Pin Reamer Size 53
999803355	DePuy ASR™ Femoral Stepped Pin Reamer Size 55
999803357	DePuy ASR™ Femoral Stepped Pin Reamer Size 57
ASR0037	DePuy ASR™ Stepped Profile Reamer Guide Kit(MED)
999803546	DePuy ASR™ Stepped Profile Reamer Guide Size 46
999803547	DePuy ASR™ Stepped Profile Reamer Guide Size 47
999803549	DePuy ASR™ Stepped Profile Reamer Guide Size 49
999803551	DePuy ASR™ Stepped Profile Reamer Guide Size 51
999803553	DePuy ASR™ Stepped Profile Reamer Guide Size 53
999803555	DePuy ASR™ Stepped Profile Reamer Guide Size 55
999803557	DePuy ASR™ Stepped Profile Reamer Guide Size 57
ASR0016	DePuy ASR™ Femoral Kit Trial (MED)
999802746	DePuy ASR™ Femoral Trial Size 46
999802747	DePuy ASR™ Femoral Trial Size 47
999802749	DePuy ASR™ Femoral Trial Size 49
999802751	DePuy ASR™ Femoral Trial Size 51
999802753	DePuy ASR™ Femoral Trial Size 53
999802755	DePuy ASR™ Femoral Trial Size 55
999802757	DePuy ASR™ Femoral Trial Size 57
ASR0019	DePuy ASR™ XL Trial Kit (MED)
999802846	DePuy ASR™ XL Trial Kit Size 46
999802847	DePuy ASR™ XL Trial Kit Size 47
999802849	DePuy ASR™ XL Trial Kit Size 49
999802851	DePuy ASR™ XL Trial Kit Size 51
999802853	DePuy ASR™ XL Trial Kit Size 53
999802855	DePuy ASR™ XL Trial Kit Size 55
999802857	DePuy ASR™ XL Trial Kit Size 57
ASR0022	DePuy ASR™ Gauge Block Kit (MED)
999802946	DePuy ASR™ Gauge Block Size 46
999802947	DePuy ASR™ Gauge Block Size 47
999802949	DePuy ASR™ Gauge Block Size 49
999802951	DePuy ASR™ Gauge Block Size 51
999802953	DePuy ASR™ Gauge Block Size 53
999802955	DePuy ASR™ Gauge Block Size 55
999802957	DePuy ASR™ Gauge Block Size 57
ASR0026	DePuy ASR™ Femoral Chamfer Reamer Kit (MED)
999903246	DePuy ASR™ Femoral Chamfer Reamer Size 46
999903247	DePuy ASR™ Femoral Chamfer Reamer Size 47
999903249	DePuy ASR™ Femoral Chamfer Reamer Size 49
999903251	DePuy ASR™ Femoral Chamfer Reamer Size 51
999903253	DePuy ASR™ Femoral Chamfer Reamer Size 53
999903255	DePuy ASR™ Femoral Chamfer Reamer Size 55
999903257	DePuy ASR™ Femoral Chamfer Reamer Size 57
9998-00-402	DePuy ASR™ Instrument Tray (MED) A
9998-00-403	DePuy ASR™ Instrument Tray (MED) A

Large Tray

ASR0005	DePuy ASR™ Acetabular Implant Holder Kit (LG)
999800466	DePuy ASR™ Acetabular Implant Holder Size 66
999800468	DePuy ASR™ Acetabular Implant Holder Size 68
999800470	DePuy ASR™ Acetabular Implant Holder Size 70
225266000	Duraloc® Screw-In Cup Trial Sizer 66OD
225268000	Duraloc® Screw-In Cup Trial Sizer 68OD
225270000	Duraloc® Screw-In Cup Trial Sizer 70OD
ASR0032	DePuy ASR™ Short Femoral Profile Reamer (LG)
999803159	DePuy ASR™ Short Femoral Profile Reamer Size 59
999803161	DePuy ASR™ Short Femoral Profile Reamer Size 61
999803163	DePuy ASR™ Short Femoral Profile Reamer Size 63
ASR0035	DePuy ASR™ Femoral Stepped Profile Reamer Kit (LG)
999803359	DePuy ASR™ Stepped Profile Reamer Size 59
999803361	DePuy ASR™ Stepped Profile Reamer Size 61
999803363	DePuy ASR™ Stepped Profile Reamer Size 63
ASR0038	DePuy ASR™ Stepped Profile Reamer Guide Kit (Lg)
999803559	DePuy ASR™ Stepped Profile Reamer Guide Size 59
999803561	DePuy ASR™ Stepped Profile Reamer Guide Size 61
999803563	DePuy ASR™ Stepped Profile Reamer Guide Size 63
ASR0017	DePuy ASR™ Femoral Trial Kit (LG)
999802759	DePuy ASR™ Femoral Trial Kit Size 59
999802761	DePuy ASR™ Femoral Trial Kit Size 61
999802763	DePuy ASR™ Femoral Trial Kit Size 63
ASR0020	DePuy ASR™ XL Femoral Trial Kit (LG)
999802859	DePuy ASR™ XL Femoral Trial Size 59
999802861	DePuy ASR™ XL Femoral Trial Size 61
999802863	DePuy ASR™ XL Femoral Trial Size 63
ASR0023	DePuy ASR™ Gauge Block Kit (LG)
99982959	DePuy ASR™ Gauge Block Size 59
99982961	DePuy ASR™ Gauge Block Size 61
99982963	DePuy ASR™ Gauge Block Size 63
ASR0027	DePuy ASR™ Femoral Chamfer Reamer Kit (LG)
999903259	DePuy ASR™ Femoral Chamfer Reamer Size 59
999903261	DePuy ASR™ Femoral Chamfer Reamer Size 61
999903263	DePuy ASR™ Femoral Chamfer Reamer Size 63
9998-00-403	DePuy ASR™ Instrument Tray (LG)

X-ray Templates

244200000	DePuy Goniometer
200080500	X-Ray Scale
9998-00-075	Total DePuy ASR™ X-ray Templates
9998-00-076	DePuy ASR™ Femoral Head X-ray Templates
9998-00-077	DePuy ASR™ Acetabular Cup X-ray Templates
9998-00-078	DePuy ASR™ XL Head X-ray Templates

DePuy ASR™ XL Head Taper Sleeve Adaptor Kits Trial

ASR0002	DePuy ASR™ 12/14 Taper Sleeve Adaptor Kit
999800112	DePuy ASR™ Taper Sleeve Adaptor Kit 12/14 +2 Trial
999800115	DePuy ASR™ Taper Sleeve Adaptor Kit 12/14 +5 Trial
999800118	DePuy ASR™ Taper Sleeve Adaptor Kit 12/14 +8 Trial
ASR028	DePuy ASR™ 11/13 Taper Sleeve Adaptor Kit
999800220	DePuy ASR™ Taper Sleeve Adaptor 11/13 +0 Trial
999800223	DePuy ASR™ Taper Sleeve Adaptor 11/13 +3 Trial
999800226	DePuy ASR™ Taper Sleeve Adaptor 11/13 +6 Trial
999800229	DePuy ASR™ Taper Sleeve Adaptor 11/13 +9 Trial
ASR0029	DePuy ASR™ 9/10 Taper Sleeve Adaptor Kit
999800320	DePuy ASR™ Sleeve Adaptor 9/10 +0 Trial
999800323	DePuy ASR™ Sleeve Adaptor 9/10 -3 Trial
999800333	DePuy ASR™ Sleeve Adaptor 9/10 +3 Trial

Ordering Information Implants

DePuy ASR™ Femoral Implants

999803239	DePuy ASR™ Femoral Implant Size 39
999803441	DePuy ASR™ Femoral Implant Size 41
999803643	DePuy ASR™ Femoral Implant Size 43
999803845	DePuy ASR™ Femoral Implant Size 45
999803946	DePuy ASR™ Femoral Implant Size 46
999804047	DePuy ASR™ Femoral Implant Size 47
999804249	DePuy ASR™ Femoral Implant Size 49
999804451	DePuy ASR™ Femoral Implant Size 51
999804653	DePuy ASR™ Femoral Implant Size 53
999804855	DePuy ASR™ Femoral Implant Size 55
999805057	DePuy ASR™ Femoral Implant Size 57
999805359	DePuy ASR™ Femoral Implant Size 59
999805561	DePuy ASR™ Femoral Implant Size 61
999805763	DePuy ASR™ Femoral Implant Size 63

DePuy ASR™ Acetabular Implants

999803944	DePuy ASR™ Acetabular Implant Size 44
999804146	DePuy ASR™ Acetabular Implant Size 46
999804348	DePuy ASR™ Acetabular Implant Size 48
999804550	DePuy ASR™ Acetabular Implant Size 50
999804652	DePuy ASR™ Acetabular Implant Size 52
999804754	DePuy ASR™ Acetabular Implant Size 54
999804956	DePuy ASR™ Acetabular Implant Size 56
999805158	DePuy ASR™ Acetabular Implant Size 58
999805360	DePuy ASR™ Acetabular Implant Size 60
999805562	DePuy ASR™ Acetabular Implant Size 62
999805764	DePuy ASR™ Acetabular Implant Size 64
999805966	DePuy ASR™ Acetabular Implant Size 66
999806168	DePuy ASR™ Acetabular Implant Size 68
999806370	DePuy ASR™ Acetabular Implant Size 70

DePuy ASR™ XL Femoral Implants

999890139	DePuy ASR™ XL Femoral Implant Size 39
999890141	DePuy ASR™ XL Femoral Implant Size 41
999890143	DePuy ASR™ XL Femoral Implant Size 43
999890145	DePuy ASR™ XL Femoral Implant Size 45
999890146	DePuy ASR™ XL Femoral Implant Size 46
999890147	DePuy ASR™ XL Femoral Implant Size 47
999890149	DePuy ASR™ XL Femoral Implant Size 49
999890151	DePuy ASR™ XL Femoral Implant Size 51
999890153	DePuy ASR™ XL Femoral Implant Size 53
999890155	DePuy ASR™ XL Femoral Implant Size 55
999890157	DePuy ASR™ XL Femoral Implant Size 57
999890159	DePuy ASR™ XL Femoral Implant Size 59
999890161	DePuy ASR™ XL Femoral Implant Size 61
999890163	DePuy ASR™ XL Femoral Implant Size 63

DePuy ASR™ XL Taper Sleeve Adaptors

999800102	DePuy ASR™ Taper Sleeve Adaptor 12/14 +2
999800105	DePuy ASR™ Taper Sleeve Adaptor 12/14 +5
999800108	DePuy ASR™ Taper Sleeve Adaptor 12/14 +8
999800200	DePuy ASR™ Taper Sleeve Adaptor 11/13 +0
999800203	DePuy ASR™ Taper Sleeve Adaptor 11/13 +3
999800206	DePuy ASR™ Taper Sleeve Adaptor 11/13 +6
999800209	DePuy ASR™ Taper Sleeve Adaptor 11/13 +9
999800300	DePuy ASR™ Taper Sleeve Adaptor 9/10 +0
999800313	DePuy ASR™ Taper Sleeve Adaptor 9/10 -3
999800303	DePuy ASR™ Taper Sleeve Adaptor 9/10 +3

Smart Set Bone Cement

3095040	Smart Set™ GHV (Gentamitn) 40g
3095020	Smart Set™ GHV (Gentamitn) 20g
3092040	Smart Set™ HV 40g
3092020	Smart Set™ HV 20g

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3. Reconstructive Device Series, Global Markets for Hip Resurfacing Implants 2002, GHIRO2 September 2002, Millennium Research Group.

4. Guidance on the use of metal on metal hip resurfacing arthroplasty. National Institute for Clinical Excellence. Technology Appraisal Guidance - No. 44, June 2000.

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