



IMPLANTS

INTERNATIONAL

ARTHROPLASTY



EDINBURGH™ TOTAL HIP SYSTEM
SURGICAL GUIDELINES

1 - Resection of the Femur Neck

As the Edinburgh™ stem is not collared or flanged, options for neck resection permits the surgeon to determine the most appropriate level and orientation of the osteotomy line.

The level of resection usually runs somewhere mid-way between the upper margins of the lesser trochanter and the inferior aspect of the head, to the superior surface of the base of the femur neck, as shown in Fig 3.



Fig 3

2 - Preparation of the Femur

Access to the femoral cavity is achieved via the use of an appropriate initiator followed by an antversion osteotome or box chisel, positions so as to undercut the base of the neck and develop the slot into the trochanteric region, Fig 4.

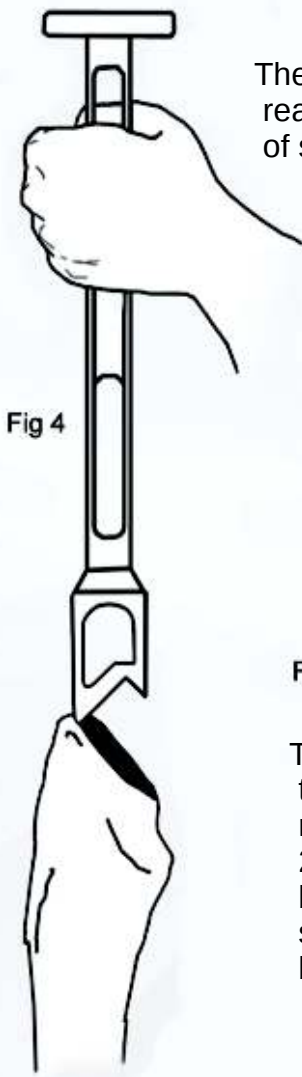


Fig 4

The cavity is developed using a ball ended, taper reamer, Fig 6.(a), followed by the appropriate size of straight canal reamer, available in a number of diameters Fig 5.(b), ensuring that the cavity runs down the mid-line of the femur.

The reamers should be positioned and advanced into the canal so that it aligns with the polineal space or the patella if the lateral approach is being employed, Fig 6.

Fig 5 (a) 

Fig 5 (b) 

The trabecular bone is then removed from within the calcar until a strong/dense bone layer is reached. Normally this will leave around 2mm-3mm of strong/dense trabecular bone layer which will then provide a secure micro-interlock between the bone bed and cement mantle.

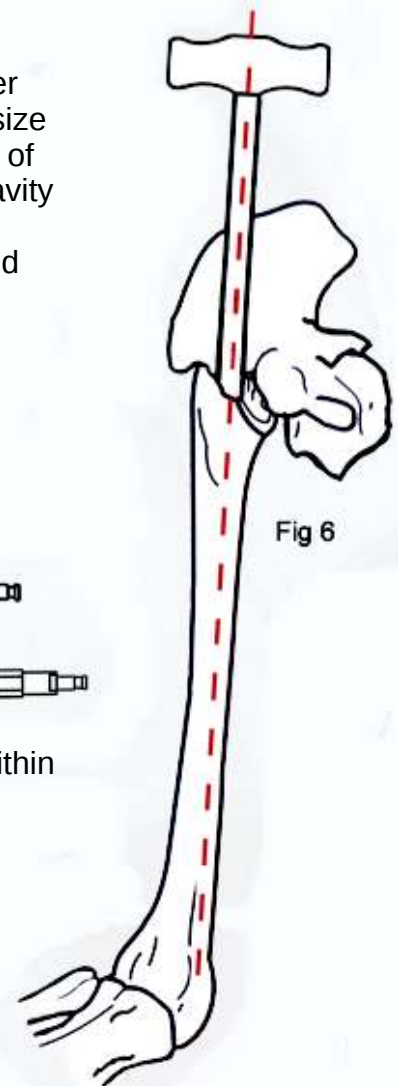
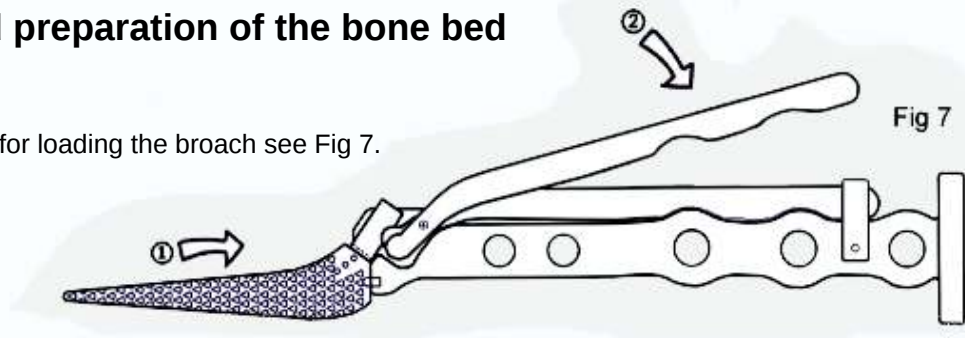


Fig 6

3 - Broaching and preparation of the bone bed

Recommended technique for loading the broach see Fig 7.



Step 1 - When loading the broach into the delivery tool ensure that the shoulder of the broach is in full contact with the 'driving' face. The control peg will offer alignment and will prevent rotation.

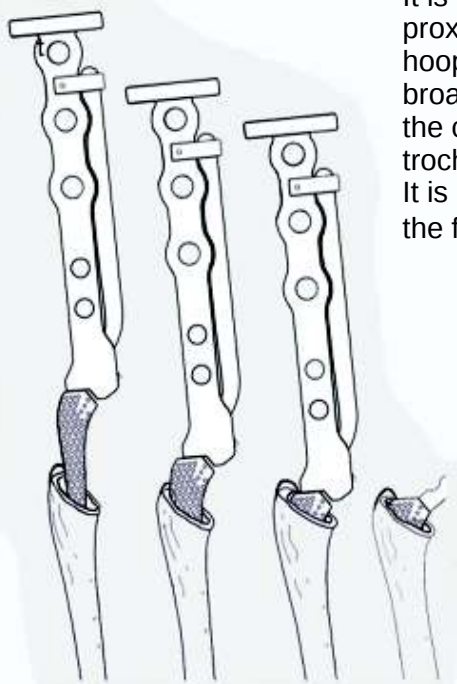
Step 2 - Now close the handle ensuring that the broach is stabilised, drop down the lock over the swing arm to secure the broach.

Always start the broaching process with the smallest broach available for the chosen stem offset and then develop the cavity in stages, (Broach # 1, 2, 3 etc), Finishing with the definitive broach corresponding with the chosen stem. See Fig 8a

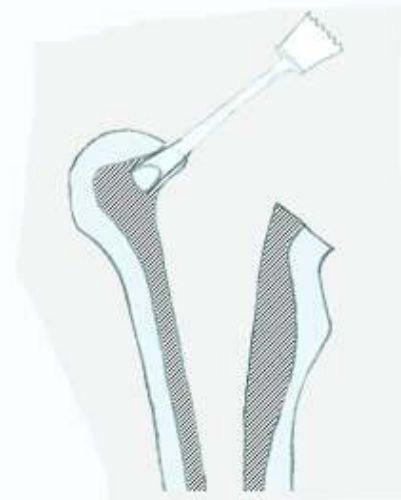
Note: **DO NOT** over broach the cavity and remove too much cancellous bone

If excessive resistance is encountered in advancing the broach to the chosen depth marker, this is usually due to the fact that there is either too much bone left around the distal tip of the broach and or too much trabecular bone in the proximal femur region. In these circumstances, revert to the tapered and straight reamers to further open up the mid canal and where ever else necessary. Re-use the gouge to remove the restriction prior to advancing the definitive broach to the appropriate depth marking.

At no time should the proximal femoral canal be over stressed so as to crack or compromise the strong trabecular bone.

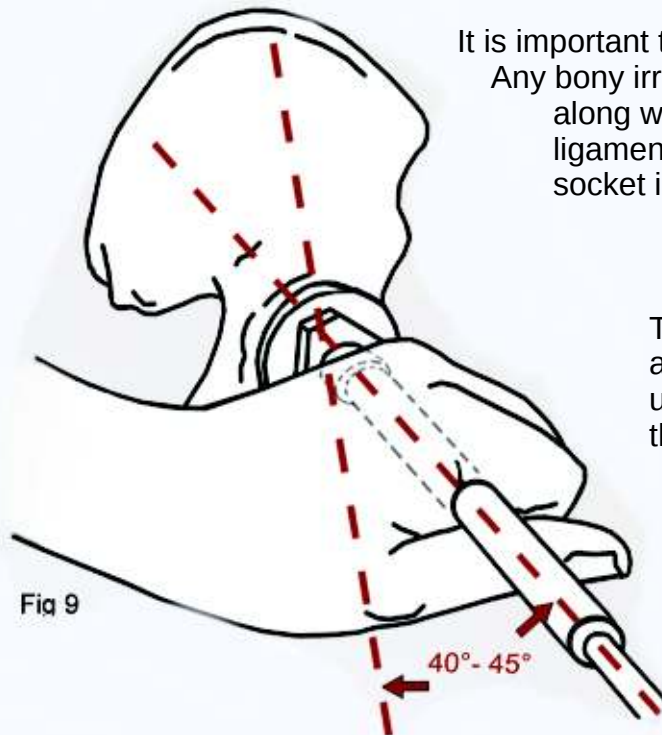


It is important to create a thick cement mantle around the proximal two centimeters of the femoral component to reduce hoop stresses it is therefore recommended that after the definitive broach has been removed post sizing of the femoral component the cancellous bone should be removed from the greater trochanter using a curette see Fig 8b. It is important that this is not done during the initial preparation of the femur as the broach will be loose when inserted.



4 - Preparation of the Acetabulum

It is important to locate and identify the true acetabular rim. Any bony irregularities or osteophytes should be removed along with any redundant capsular folds. The transverse ligament is left intact and the true floor of the acetabular socket identified.



The chosen acetabular reamers are used once again starting with the smaller reamer and working up to a definitive reamer diameter appropriate to the acetabular cup chosen pre-operatively.

The cavity is reamed up to the cancellous layer of the cavity except on the medial wall. Ideally the cavity is reamed until bleeding bone is exposed where possible.

Remove any remaining curtain osteophyte. The cortical layer above the teardrop is never removed.

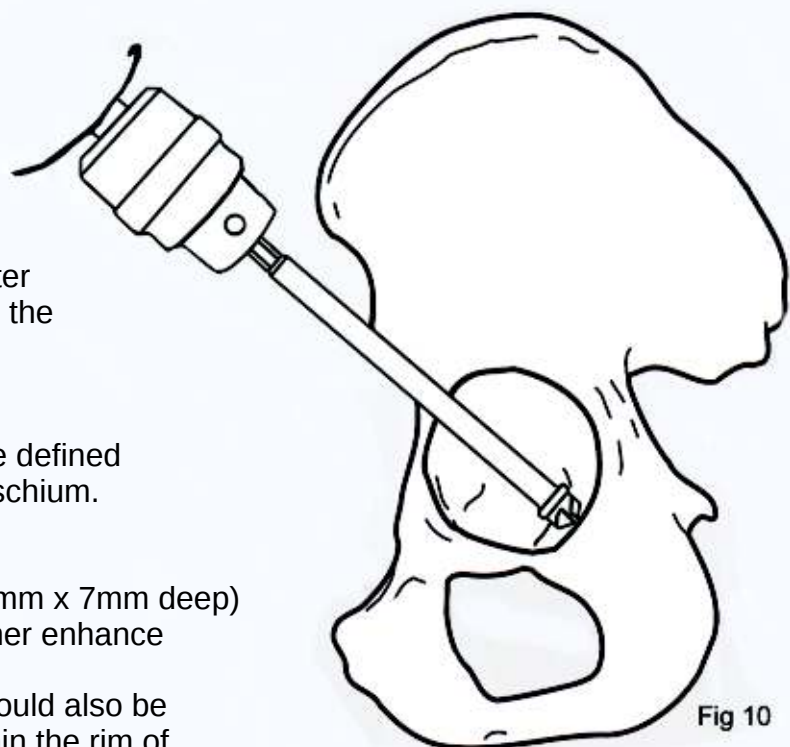
The reamer shaft should be oriented at 40-45° of abduction and 10-15° of antversion. See Fig 9.

Care must be taken so as to not to enlarge the antero-posterior diameter of the cavity thus unduly weakening the anterior and posterior walls.

A gouge may be employed to create defined fixation pits in the ilium, pubis and ischium.

Further multiple drill holes (Dia. 6.0mm x 7mm deep) are made in the three bones to further enhance cement fixation.

Additional Dia. 6.0mm drill holes should also be created where appropriate, just within the rim of the acetabulum, Fig 10.



Preparation of the acetabulum....continued

Trial cups are positioned within the reamed acetabular cavity to confirm or modify the cup chosen during the pre-operative planning. The trial cup must be totally surrounded by bone. Fig 11. Prior to cementation the reamed cavity should be examined.

Bone Fragments or chips collected during the preparation of the proximal femur can be used to completely plug the transverse ligament cavity and any other defects identified.

In an effort to reduce thermal injury to the bone caused by the polymerisation of the cement, it is recommended that the acetabulum and femur be washed out thoroughly with refrigerated saline using a pulse lavage system. The Cavity should be packed with swabs to dry it keeping them held in place with the cup pusher until just before inserting the cement. The cement should be pressurised on insertion.

It is also usual to spread a layer of bone chips on the cortical floor of the reamed cavity just above the teardrop

An aspirator may be used to assist the cement intrusion and prevent blood accumulating at the bone interface surface,

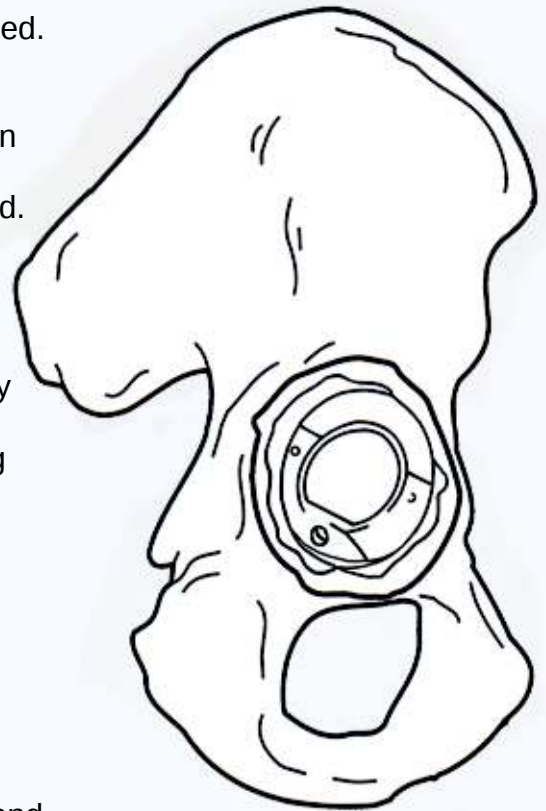
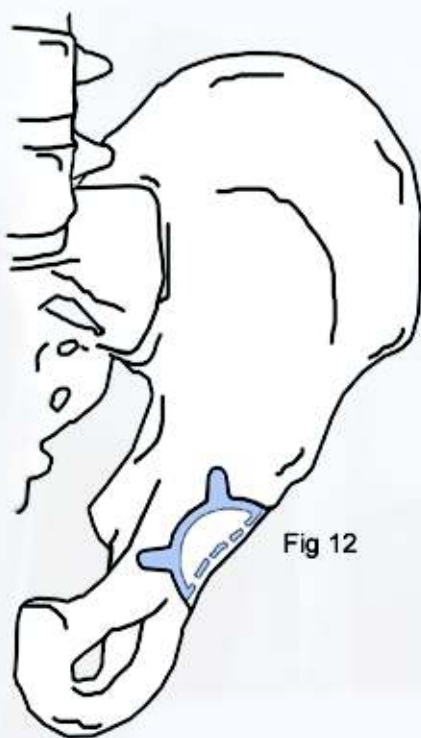


Fig 11



The prepared cement is placed into the cleaned cavity and suitably pressurised with particular attention being paid to drawing the cement into all the key holes and pit locations previously prepared.

The cement layer should be approximately 5mm below the rim of the acetabulum to ensure a good seal during the pressurisation. Fig 12.

5 - Acetabular implantation

The chosen acetabular cup is now ready to be implanted into the fully prepared socket. The cup is correctly loaded into the introducer, Fig 13. ensuring alignment of the location pins to the location holes.

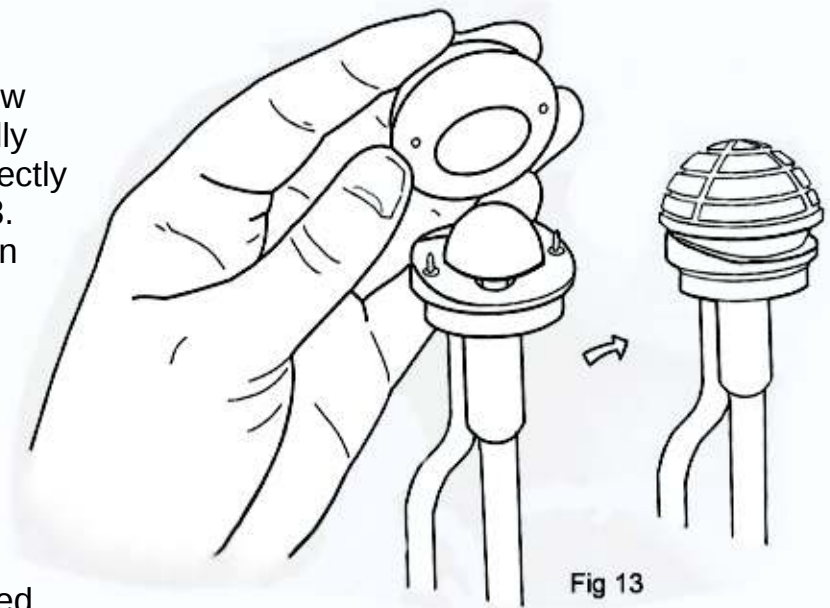


Fig 13

Considerable force will be required to overcome the resistance offered by the viscosity of the cement as the cup is pushed into the desired location. The cup is correctly aligned when the face of the cup is at an angle of 40 to 45 degrees of abduction and 10-15 degrees antiversion, Fig 14. If the direct lateral or lateral approach has been used then a more neutral alignment can be chosen.

The cup should also be rotated allowing the apex of the skirt to lie posterolateral either at 10 o'clock or at 2 o'clock, depending on which side hip, left or right, is being implanted.

The desired cement mantle should be no less than 3mm to 4mm. whilst awaiting polymerisation of cement, apply light pressure to the cup ensuring that the assembly is held stationary.

When the cement is fully polymerised, the fixation can be verified by rockin the cup, checking for 'hydraulic action' of the blood at the cement bone interface. If this is evident, a revision of the cup should be considered.

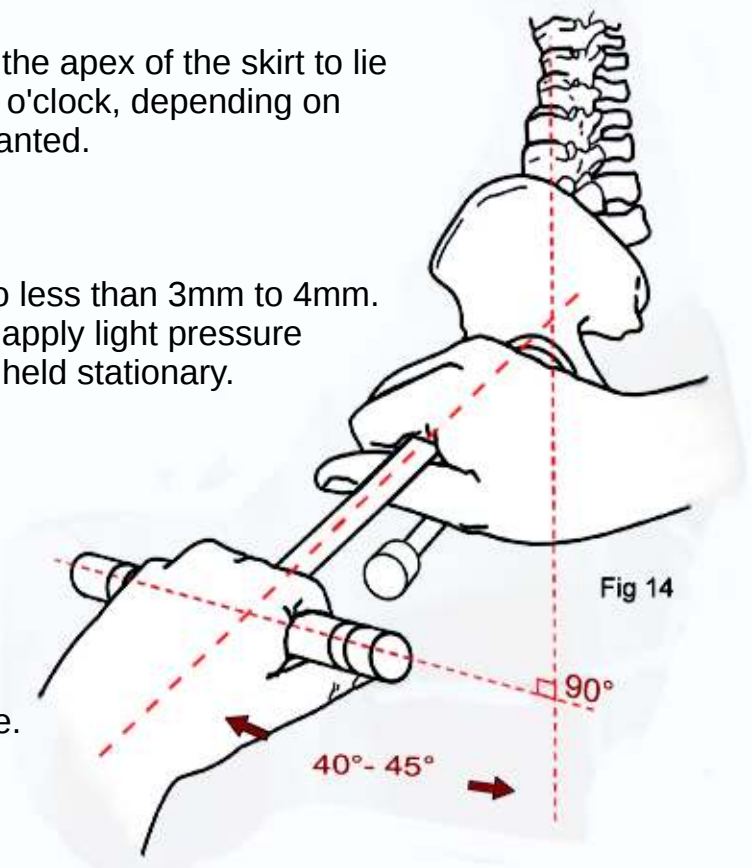


Fig 14

6 - First Trial Reduction

Positioning the correct **broach trial head** onto the neck of the broach, reduce the joint checking for neck length leading to correction of leg length.

There are 4 trial heads which are all clearly marked, Fig 15. the offsets ascend in 3.5mm increments from -3.5mm (short neck), 0mm (medium neck), +3.5mm (Long Neck), +7.0mm (extra long neck)



Fig 15

Only the **broach trial heads** should be used on the broach for the first trial reduction.

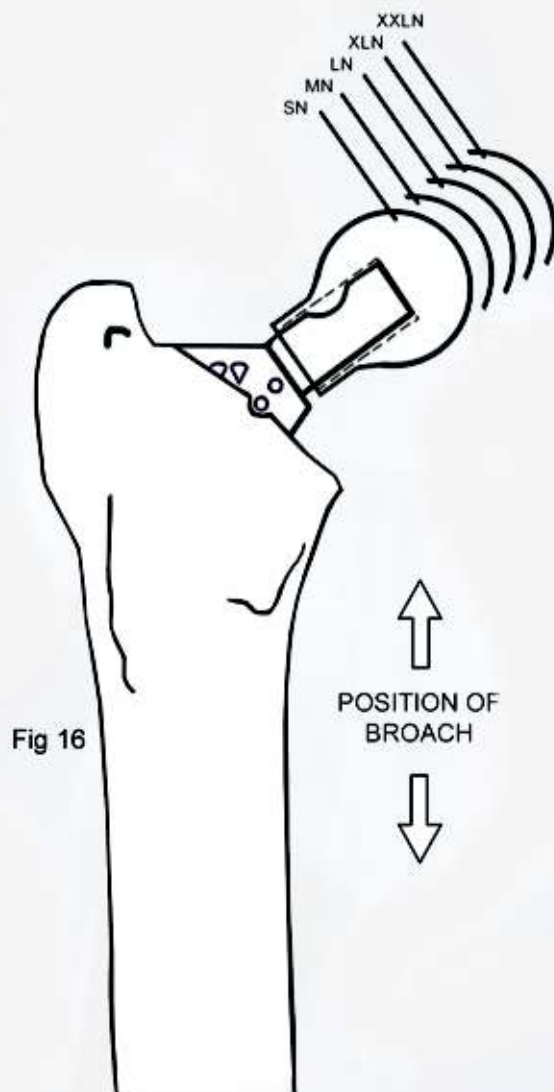


Fig 16

Leg length can be confirmed by looking for alignment of the femoral condyles as visual aid. Leg length can be corrected by moving the position of the broach or by using different neck lengths of the **broach trial head**, Fig 16.

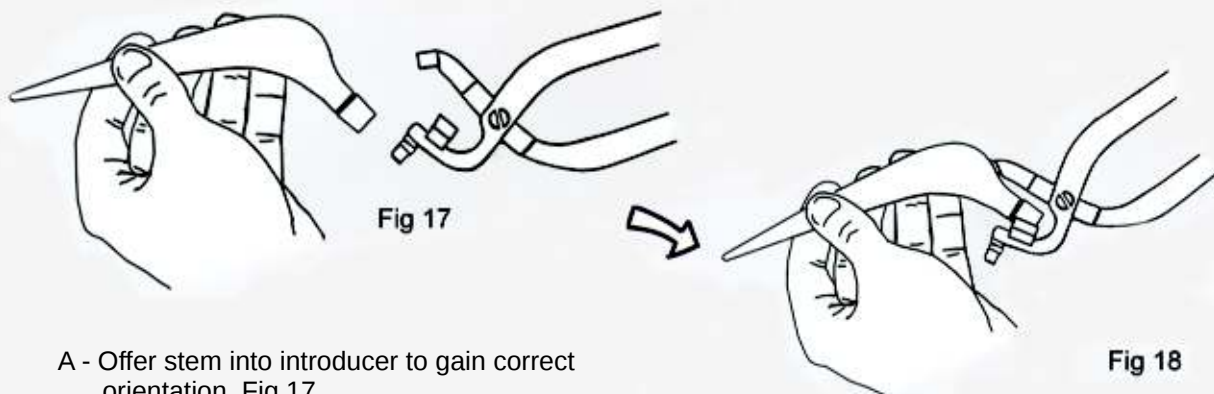
Once the correct leg length is established the femur can be marked with a diathermy or by marking a notch, it is important to make note of the broach position in relation to the 3 depth markers. The neck length used to gain correct leg length should also be noted.

7 - Cementing of Femur and Stem Implantation

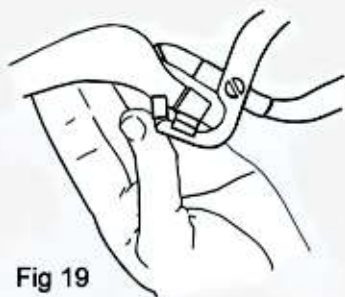
Cement is introduced into the canal in a retrograde fashion. the cement should be at theatre temperature of 21°C. the mixing regime and rate of polymerisation will depend on the bone cement being used. As the cement reached the proximal section of the canal the nozzle of the application device is cut off distal to the proximal seal. The femoral seal is then impacted forcibly into the proximal end of the femur and the remaining cement is pumped slowly into the femur. This action will maintain a steady pressure inside the femur and resist the bleeding pressure inside the femur.

Cement injection and pressurisation is continued unto the viscosity of the cement starts elevating. The rate of the polymerisation can be judged by a small sample held in the hand. When the desired polymerisation is achieved the femoral stem is then inserted. The object is to delay the insertion of the stem as long as possible bearing in mind that during stem insertion the interface pressures in the canal are directly related to the viscosity of the cement.

The selected hip stem can now be loaded to the introducer, ready for implantation. Follow the loading Guidelines to ensure correct loading.



A - Offer stem into introducer to gain correct orientation, Fig 17.

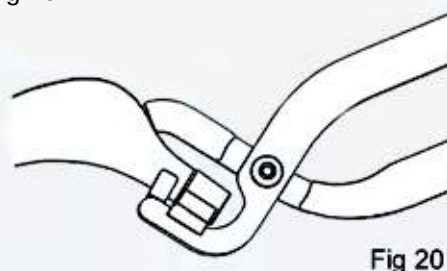


C - Using your thumb gently orientate the clevis fitting to locate the stem neck Fig 19. The clevis should never make contact with the trunnion.



B - Engage impactation arm into stem introduction slot, taking care to avoid the trunnion, Fig 18.

D - Compress the arms thus gripping the Ship Stem Fig 20.



8 - Cementing of femur and stem implantation....continued

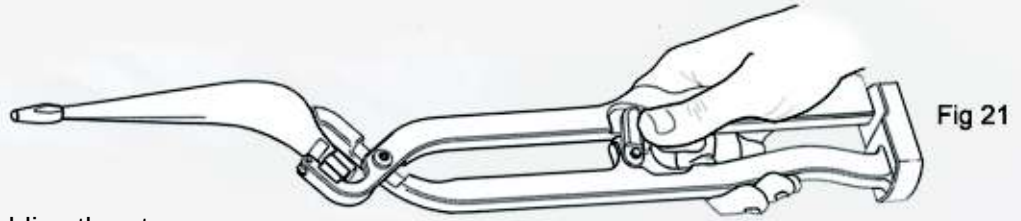


Fig 21

E - Engage the lock to stabilise the stem.

The distal centraliser can now be added to the stem. Fig 21.

If an intramedullary cement plug is required it should be deployed before packing the canal with cement. Check that the distal centraliser is in position on the stem once more before implanting the stem. Implant the stem closer to the posterior femoral cortex, aiming for the middle of the popliteal fossa if the posterior approach is used, or the patella if the direct lateral or lateral approach is used. The stem can be driven into position with the guidance of the surgeons thumb, Fig 22. Occluding the medial exit from the upper end of the femur between the stem and calcar, whilst pressuring the cement into the cancellous bone.

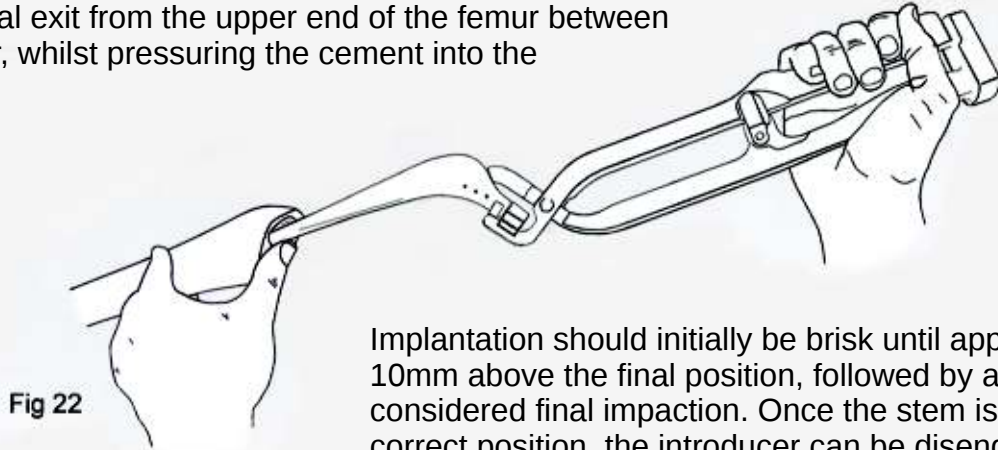


Fig 22

Implantation should initially be brisk until approximately 10mm above the final position, followed by a more considered final impaction. Once the stem is at the correct position, the introducer can be disengaged without damaging the trunnion, Fig 23.

To ensure the stem does not back out during final stages of polymerisation, remove any excess cement from the calcar surface of the femur. If required, clean any debris on or around the trunnion on the stem, ready to receive the standard 12/14 trial femoral head.

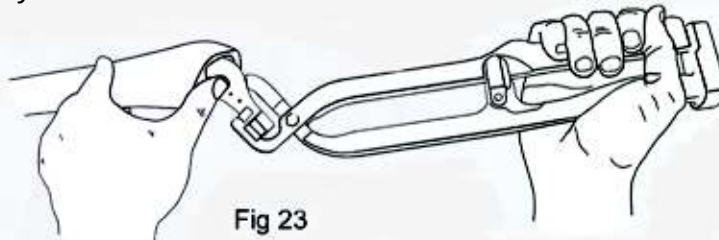


Fig 23



Fig 24

9 - Second Trial Reduction

Once again, Re-confirm patient's leg length and soft tissue balance using the standard 12/14 trial femoral head. When satisfied, exchange the standard 12/14 trial head for the final femoral head. Care should be taken to not damage either the stem trunnion or the femoral heads highly polished surface. Impact the femoral head by hand, ensuring a tight fit has been established, Fig 24.



10 - Post Operative Management

Post Operation - Same day

We Advise gentle exercise after surgery. Breathing Exercises, Foot, ankle and quadriceps exercises should be performed hourly.

Post Operation +1 day

Supervise breathing, foot, ankle and quadriceps exercises, introduce resistance to exercises for the un-operated leg and assisted active exercises for the healing leg. Encourage careful External rotation but avoid internal Rotation. Sitting erect or the use of too many pillows should be avoided.

Post Operation +2 days

Continue all recommended exercises and remove drains. A physiotherapist may aid the patient from their bed, ensuring the bed is sitting at a suitable height. Knee Flexion is encouraged with the patient sitting sideways on the bed. When standing for the first time, encourage the patient to take most of their bodyweight on the up-operated leg.

Normal steps should be taken, within the patient's tolerance encouraging an 'egg-shell' weight bearing philosophy, except for the elderly. Teach the patient to turn around without straining the hip. Also show the patient how to stand and sit correction from a chair. The patient should also be shown how to get in and out of bed, with assistance first.

Post Operation +3 days

All static exercises still under supervision. Teach the patient how to turn prone: patient is encouraged to lay prone for two twenty-minute periods daily.

Post Operation +4 days

Continue supervision of all exercises. Further steps can now be taken when walking. The patient can now be shown how to sit on the toilet, and be guided in the art of lifting the left onto the bottom step of the stairs whilst flexing the hip and knee, but without internally rotation the implanted hip.

Post Operation + 5 days

Supervision of exercises still required. Patient Should be Able to Attend the toilet independently. Walking up and down steps should now be further encouraged. A post-operative x-ray is taken, the patient should be independent upon discharge and allowed home with suitable walking aids. the patient should still take care to avoid excessive flexing and internal rotation of the replaced joint.

Follow-up

2 to 3 months post operation - First Post-operative visit.

1 year post-operation - X-ray taken and assessed. Providing a successful arthroplasty, the patient does not need post-operative visits from this point, unless a problem is noted.

After 8 years and onwards - X-rays taken every 2 years.



NOTES



INSTRUMENTATION : 3 TRAY SYSTEM
SURGICAL GUIDELINES : REF # ST 031/04

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