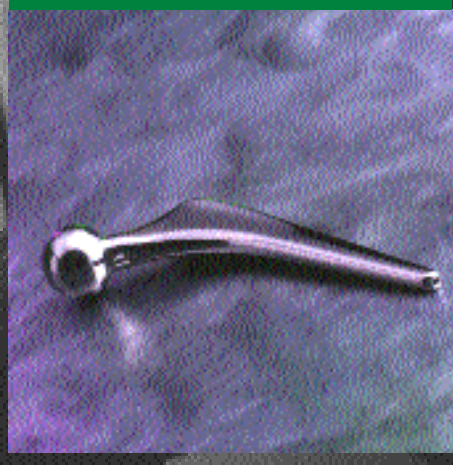
Joint & Fracture Care
Sulzer Orthopedics

MS-30™
Surgical Technique


MS-30 Hip Stem

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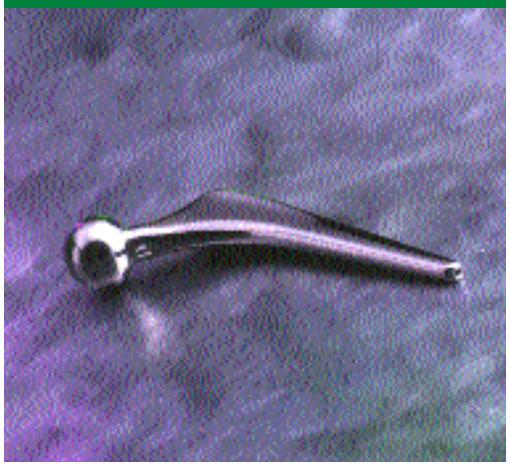
Over 25 years of experience with hip prostheses have shown that very good long-term results can be achieved with cemented femoral stems. Clinical and radiographic analyses have shown the importance of a homogeneous, uninterrupted and adequately thick cement mantle. The MS-30 stem offers a hybrid solution - an uncemented cup combined with a cemented stem.[1,2,3]

MS-30 Hip Stem



Key Benefits of Cemented MS-30 Stems

The conical wedge form with rounded edges in the proximal section corresponds with the necessary anatomical and biomechanical requirements:

- Retention and utilization of the morphology of the intertrochanteric region with resultant rotatory stability (self-centering a favorable zone for cementing).
- The main body of the cement mantle is subject to compressive forces. Tensile forces are restricted to the lateral shoulder where the cement merely has the function of a filling material.[4]
- The implant does not have any sharp edges which eliminates stress concentrations and the resulting cement cracks.
- The MS-30 system consists of a range of stem sizes which allows for the appropriate filling of the medullary canal. Furthermore, an optimal thickness of the cement mantle can also be achieved.
- The form and length of the implant, together with the distal centralizer, help to ensure self centering.

1) E. Morscher: "Endoprosthetic Surgery in 1988", Annales Chirurgiae et Gynaecologiae 78:242-253, 1989
2) E. Morscher et al: "Cementless Press-Fit Cup", Clinical Orthopaedics and Related Research, 1989
3) L. Sportorno et al: "Sei anni di esperienza di protesi non cemetate", Min. Ort. 1986; 37(4) 181-92
4) Crowninshield et al: "The Effect of Femoral Stem Cross-Sectional Geometry on Cement Stresses in Total Hip Reconstruction", Clinical Orthopaedics and Related Research (1980)

MS-30 Surgical Technique

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Preoperative Planning

The objectives of preoperative planning are to determine the stem size, the optimal position of the stem in the medullary canal and the correct position of the acetabular and femoral components in order to maintain equal leg lengths.[4] For this purpose, the templates of the cup and the stem, colored felt-tip pens, transparent paper, a goniometer and an x-ray picture of the whole pelvis to a scale of 1.18:1 are required.

Determination of Leg Length

Three horizontal lines are drawn on the standard x-ray picture: the tangent of both ischia forms the base line. A second line is drawn over the acetabula and the third between the lesser trochanters. Using the Müller ischiometer, the center of rotation on the side not being operated is determined and the distance to the tear drop is measured. Finally, the pelvic axis is drawn, running through the symphysis and vertically to the biischial line.

Figure 1a
Same leg lengths: all three lines run parallel.

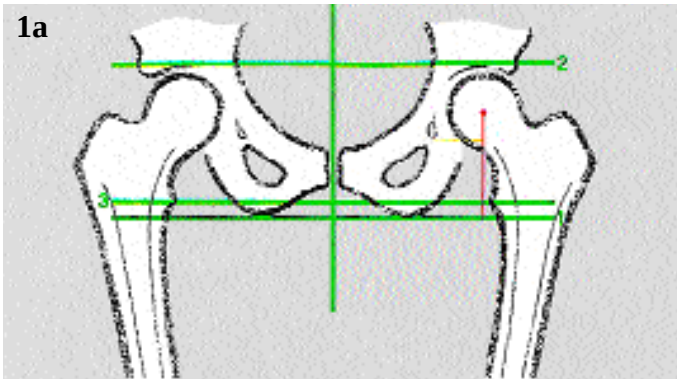
Figure 1b
Asymmetry caused by the femur: the first and second lines run parallel, the bitrochanteric line is divergent.

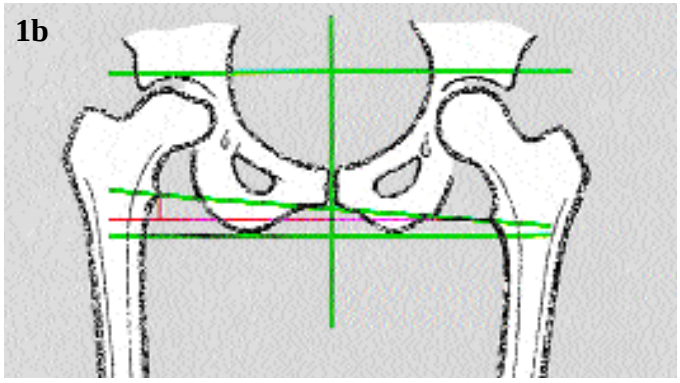
Figure 1c
Asymmetry caused by the acetabulum: the second and third lines run parallel, the first line deviates.

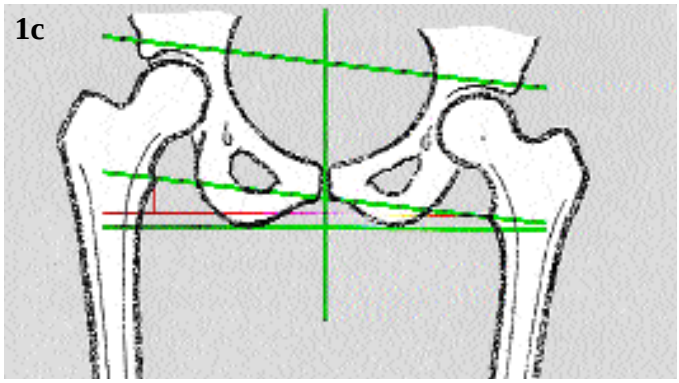
Figure 1d
Combined asymmetry: all three lines are divergent.

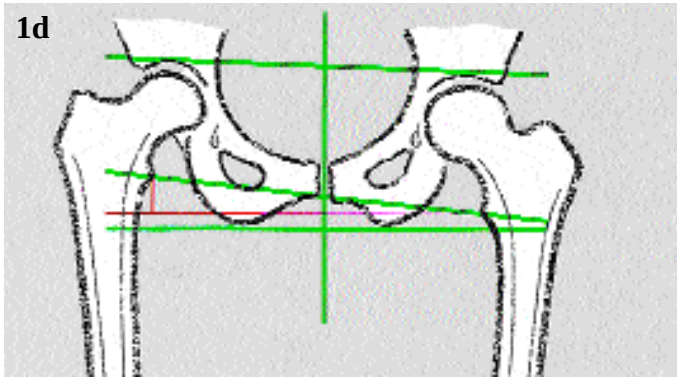
The difference in the distance measured between the connecting line of the lesser trochanters and the base line corresponds to the correction needed to obtain equal leg lengths.

Figure 1









4) L. Spotorno, S. Romagnoli: “Il piano preoperatorio nelle protesi non cementate”, Min. Ort. 1988; 39 (4) 317–320

The Template

The template is an important planning aid. The templates are drawn on a scale of 1.18:1, to allow for 18% magnification on the x-ray (Figure 2).

Determination of the Thickness of the Cement Mantle and the Ideal Stem Size

When using the MS-30 stem, a cement layer of 4-7mm in the proximal area and a cement layer of 1-3mm in the distal area around the prosthesis tip must be obtained (Figure 3). The proximal cement mantle is dependent on the morphology of the femur (trumped-shaped, cylindrical, dysplastic) and the corresponding CCD angle. In the case of trumpet-shaped femora, the cement layer will be thicker than in the case of cylindrical or dysplastic femora (Figure 4).

Figure 2

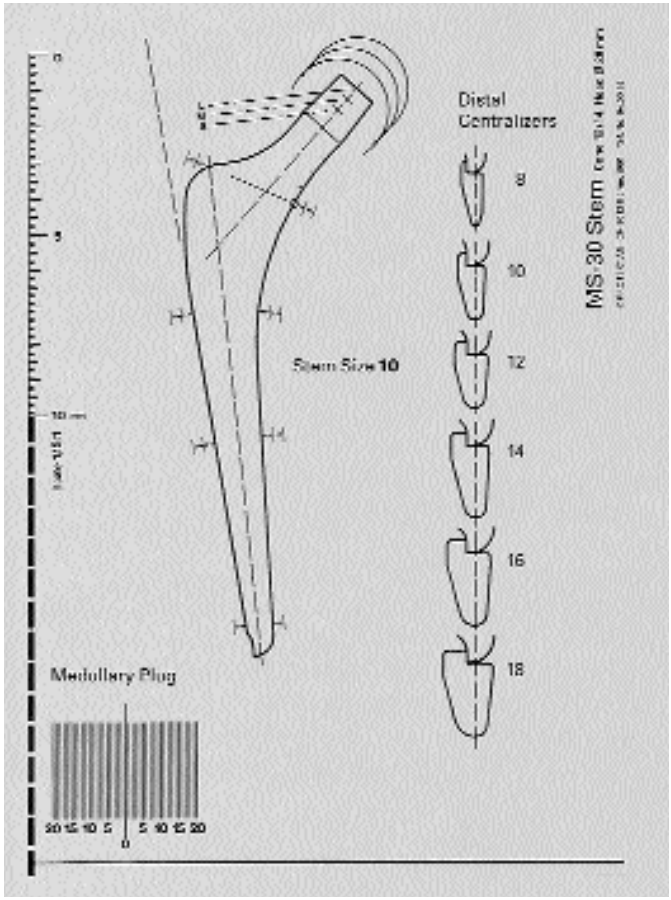


Figure 3

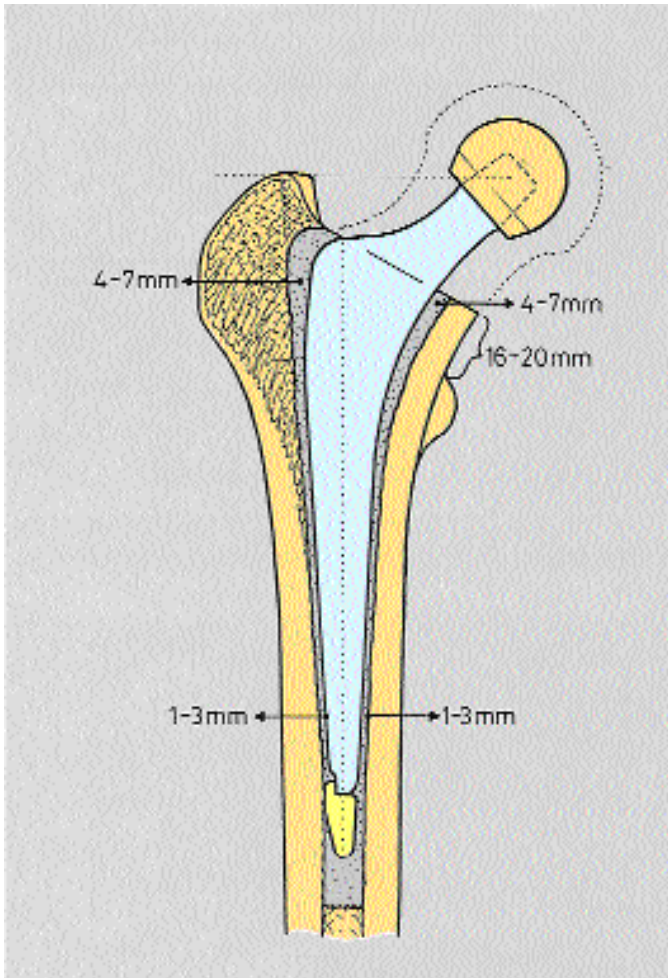
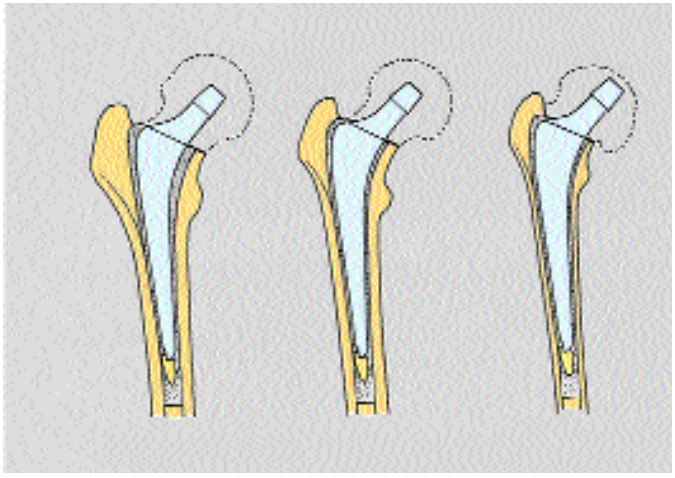


Figure 4



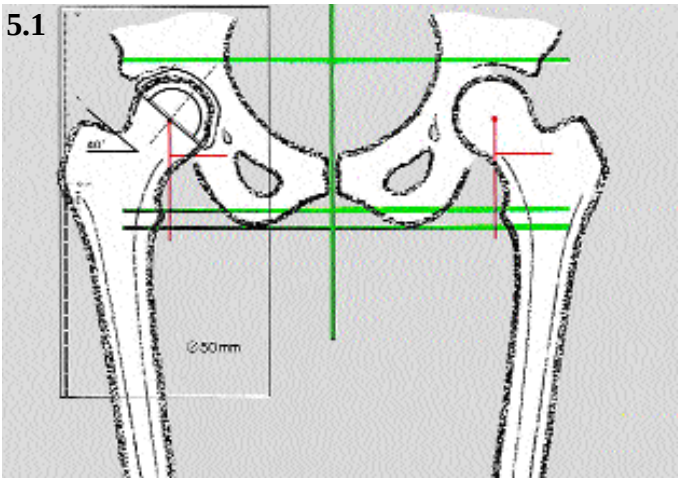
Planning Steps in the Simplest Case of Unilateral Degenerative Arthritis of the Hip

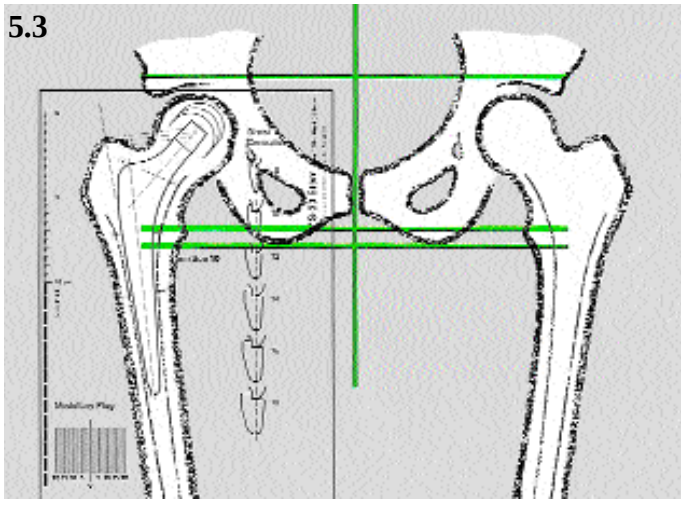
1. Determination of any possible leg length inequality, prosthesis size and position of the cup
The three horizontal lines, the pelvic axis (in this example there is no inequality) and the center of rotation measured on the healthy hip on the opposite side – (distance of the center from the tear drop) are drawn in. Then the cup template is placed on top, whereby the limits of the acetabulum, if possible the subchondral bone, the height of the tear drop and an inclination of 40–45° are taken into account. Possible grafting will be required.

2. Tracing pelvis and cup
Tracing paper is placed on the x-ray picture and the template, with the longitudinal axis parallel to the vertical pelvic axis. The half of the pelvis and the cup are drawn in, then the drawing paper and the template are removed.

3. Determination of size and position of the stem
The template is laid on the femur, whereby, if possible, a space of 4–7mm should remain proximally (calcar) and 1–3 mm distally (tip of prosthesis) between the stem and the inner cortex layer for an optimum cement thickness. One of the three T lines running through the center of rotation should touch the tip of the greater trochanter. On average, the osteotomy level of the neck of the femur is 16–20 mm above the lesser trochanter.

Figure 5





4. Pelvis level

Without removing the femoral template, the tracing paper used in step 2 is placed in position, so that the inside of the cup corresponds to the mean neck length. The bitrochanteric and ischiatic lines must be parallel. If the lines are divergent in the case of residual inequality, one may proceed as follows: Head with long neck, higher osteotomy, let the prosthesis protrude further out of the stump of the femur, longer stem. After successful correction, the pelvis drawn should be shifted cranially by comparison with the x-ray picture for a distance corresponding to the inequality determined in step 1.

5. Determination of distal centralizer and medullary plug size

The template of the distal centralizer is superimposed at the level of the tip of the prosthetic stem. The correct size is the one that ensures lateral cortical contact, keeping the stem in the center of the medullary canal. Then the millimeter gauge is placed below the centralizer and the diameter of the medullary plug is determined.

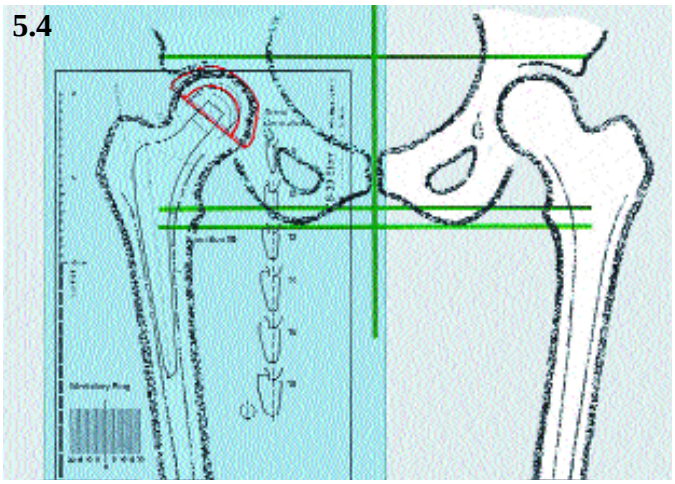
6. Final result

The femur, the stem, the distal centralizer and the medullary plug are drawn on the tracing paper. The position of the lateral limit of the stem in the greater trochanter is drawn on the paper. This line determines the lateral limit of the cancellous bone to be removed in order to avoid positioning in varus deformity. The following dimensions are included in the drawing and measured:

- Lesser trochanter – osteotomy level
- Lesser trochanter – medial edge of the prosthesis neck
- Medullary plug – inside cortical layer of the osteotomy of the neck of the femur

The connecting line between the center of rotation and the tip of the trochanter is drawn in.

5.4



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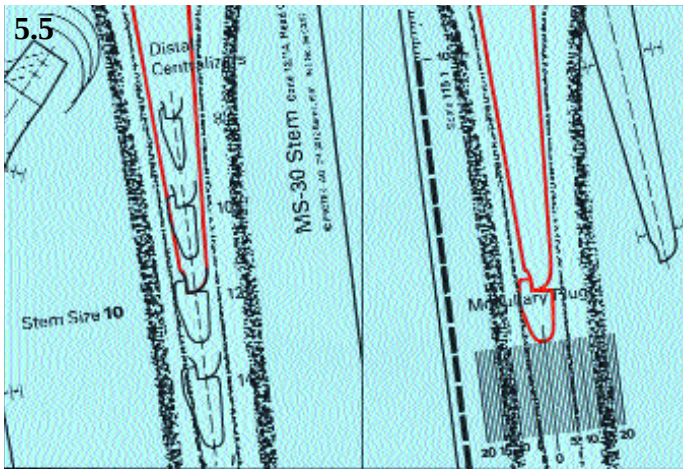

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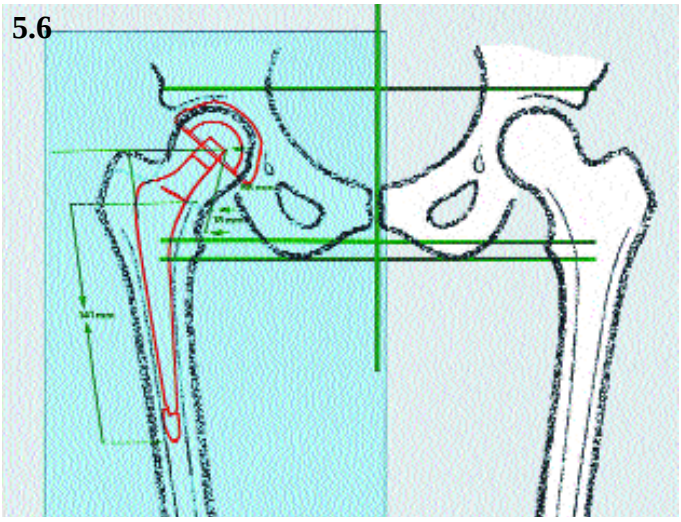


Preparation of the Medullary Cavity

1. The osteotomy level determined in the preoperative planning normally begins about 16–20 mm proximally from the lesser trochanter with an inclination of 30°. In the event of marked dysplasia and extreme anteversion of the femoral neck, the osteotomy is carried out more superior.

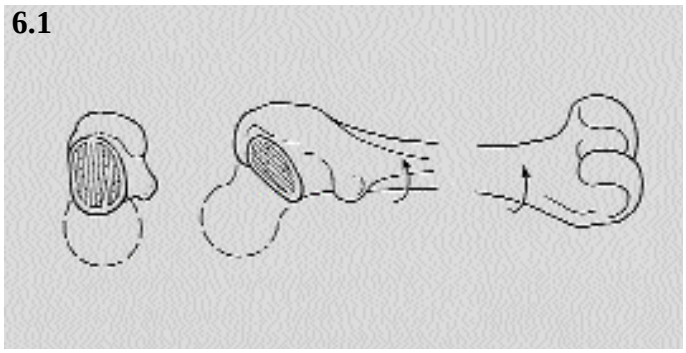
2 .Resection of a trapezoidal segment of the cancellous bone is necessary in order to create lateral space. As a result, the insertion of the rasp in a varus position is avoided. Work begins with a saw and this preparation is finished with an angled gouge.

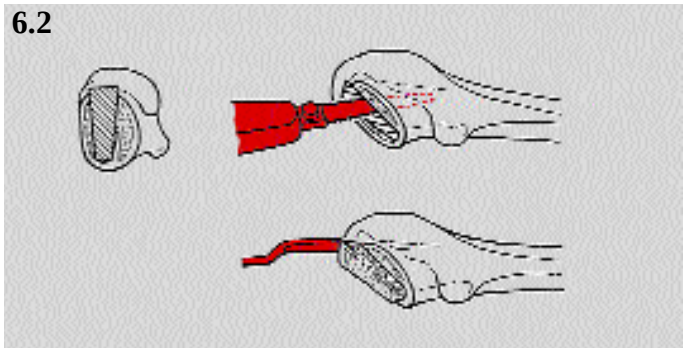
3. A reamer is inserted by hand along the lateral cortex. Using rotatory movements, the cancellous bone is removed, especially in the area of the calcar. Here just a thin, structurally stable layer is left to increase the anchorage area. If the structure is atrophic, the isthmus (femoral calcar) and the adjoining cancellous bone are removed.

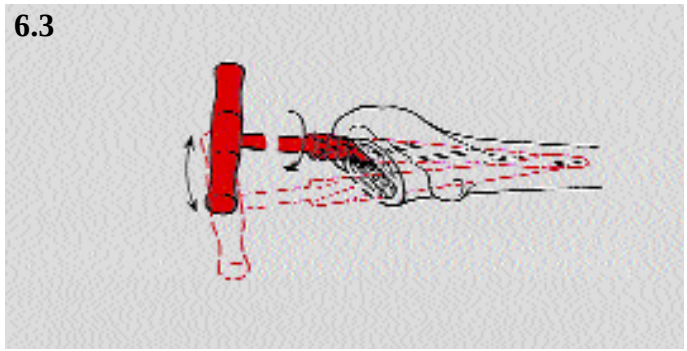
4. Insertion of the rasps, if possible, 2 sizes smaller than the final planned rasp. When impacting the rasps, care must be taken to avoid torsion movements. The final rasp is impacted to the level of the osteotomy. After the trial reduction with a test prosthesis, the rasp last used is inserted once again. The proximal and distal cement thickness fixed during planning is reproducible by impacting the rasp more or less deeply. Four markings are to be found on the rasp, with each mark indicating the attainment of a certain thickness of cement.

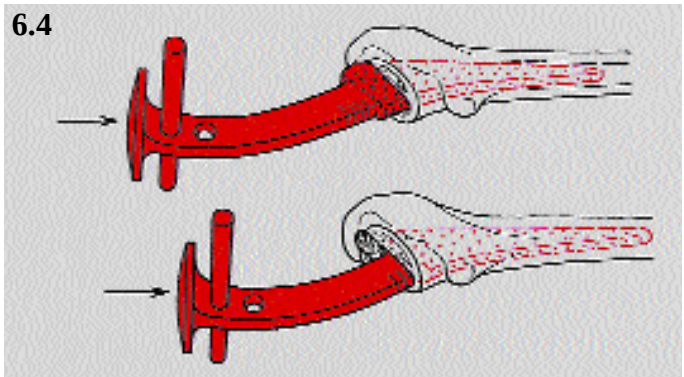
Cement mantle	Proximal (calcar)	Distal (tip of prosthesis)
1st mark	2–3 mm	1 mm
2nd mark	4–5 mm	2 mm
3rd mark	6–7 mm	3 mm
4th mark	8–9 mm	4 mm

Figure 6









Lateral Position - Posterolateral Incision

1. Strict lateral position of the patient. Posterolateral incision according to Austin-Moore.

2. Incision of the fascia lata and partial division of the femoral insertion of the glutaeus maximus muscle. Insertion of a Hohmann's lever under the glutaeus medius muscle on a level with the neck of the femur. Exposure and division of the external rotators and of the posterior articular capsule.

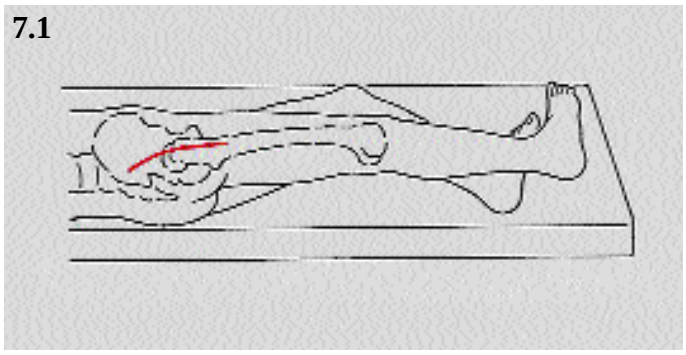
3. Dislocation of the hip by combined movements of internal rotation, flexion and adduction. Resection of the residual capsule and osteotomy of the neck of the femur after measuring the level in accordance with the preoperative planning. The resection level begins about 16–20 mm proximally above the lesser trochanter (30° inclination).

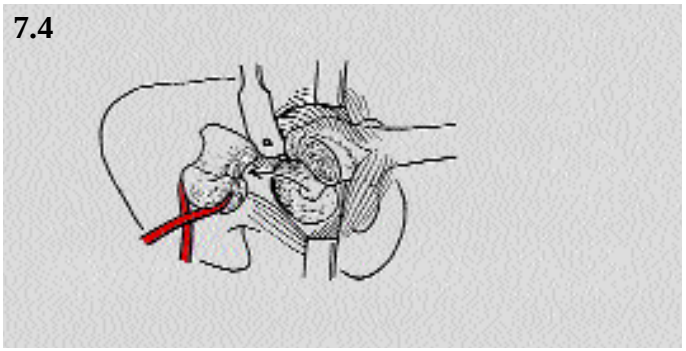
4. Removal of the head and neck of the femur. Insertion of the Hohmann’s lever and exposure of the acetabulum.

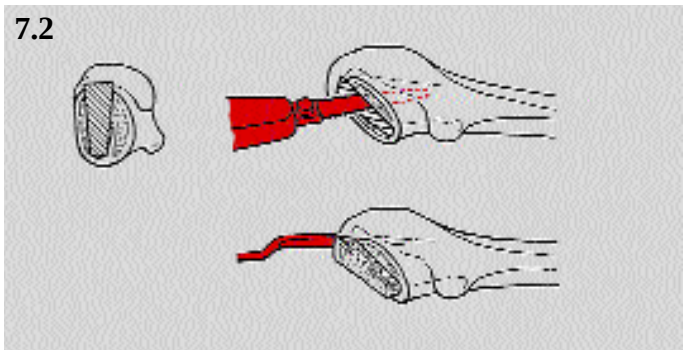
5. Implantation of the selected cup.

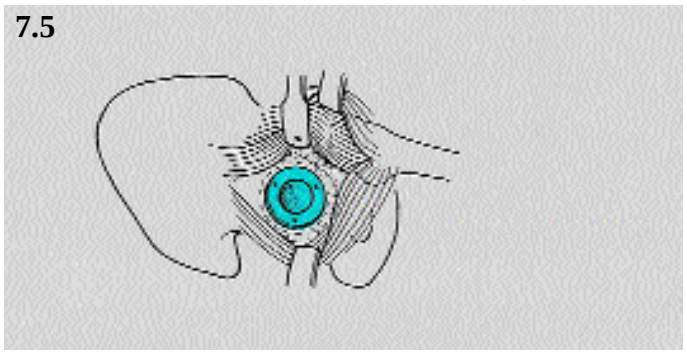
6. Using a saw, a trapezoidal segment of the cancellous bone is cut from the greater trochanter to the lateral limit in accordance with the preoperative planning. This allows the correct insertion of the rasp, avoiding a varus position.

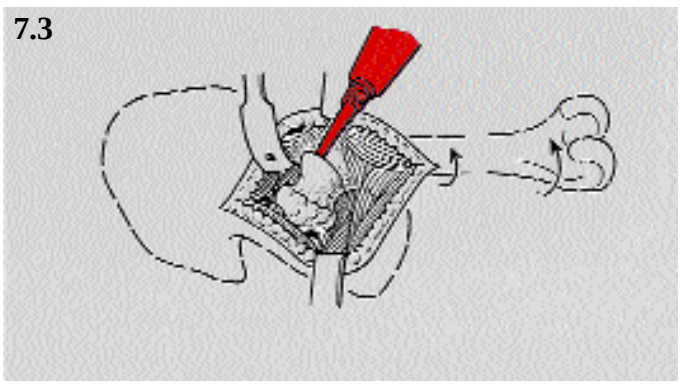
Figure 7

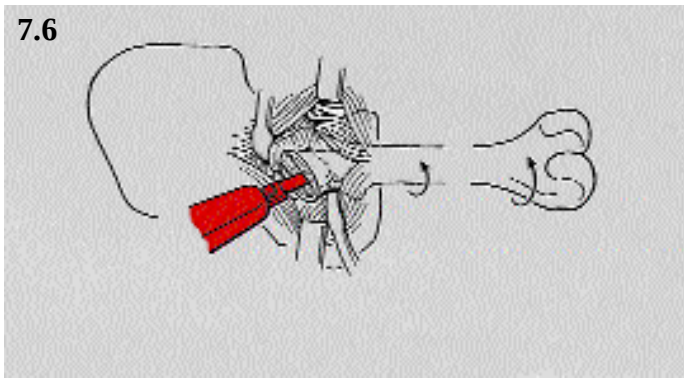












7. Removal of the trapezoidal segment of cancellous bone.

8. Opening of the medullary canal using a reamer with a T-handle and removal of the haemopoietic cancellous bone.

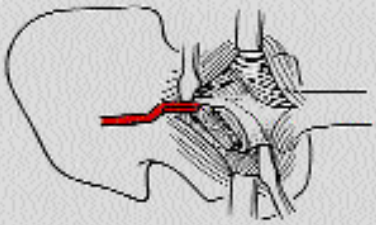
9. Impacting of the first rasp, taking account of the required anteversion of 10–15°. If at all possible, one should begin with a rasp 2 sizes smaller than the preoperatively determined final rasp.

10. Impaction of the final rasp to the osteotomy level.

11. Removal of the rasp and introduction of the test prosthesis. Determination of the correct impaction depth (distance between the lesser trochanter and the medial edge of the neck of the prosthesis as preoperatively planned) and the correct positioning.

12. Mounting of the test head, trial reduction and evaluation of leg length, muscular tension, stability and extent of movement.

7.7



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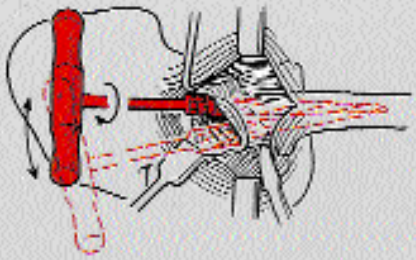

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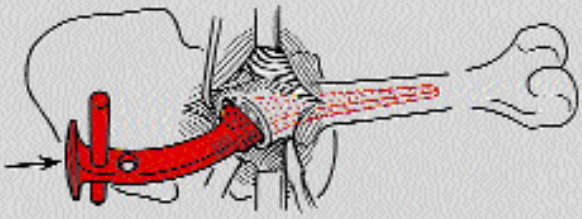

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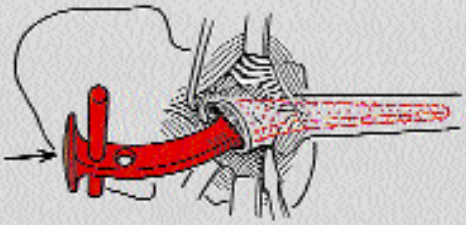

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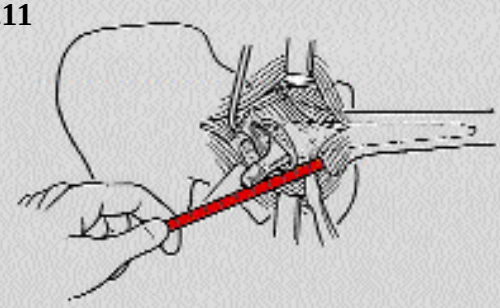

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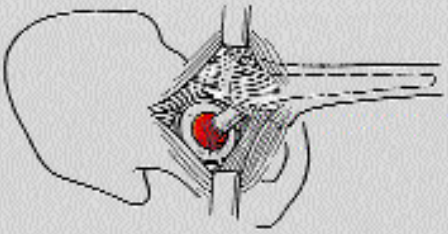


13. Removal of the test prosthesis and insertion of the last rasp last. The latter is driven in as far as the mark showing the pre-operatively determined cement thickness.

14. In the event of inadequate bone quality, the calcar femoralis and the adjoining cancellous bone are removed with a curette.

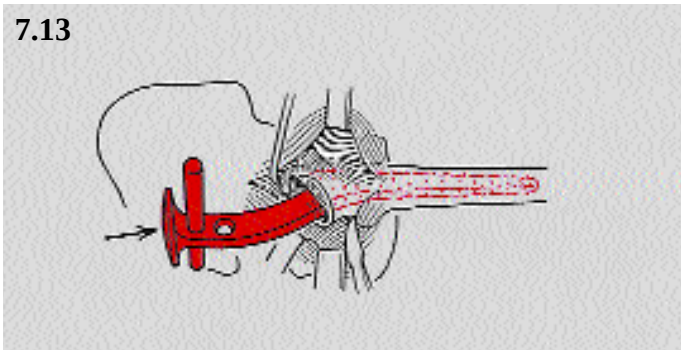
15. Insertion of the measuring rod to determine the size of the distal centralizer and the medullary plug (the probable size has already been determined in the course of the preoperative planning).

16. Insertion of the medullary plug (autologous according to Müller or synthetic) with the introducing rod to the depth determined preoperatively (distance between the medullary plug and osteotomy level – inner cortex layer). The medullary plug is ideally positioned if it touches the distal tip of the centralizer, thus favouring the wedge effect.

17. Rinsing and removal of bone fragments with a special rotating brush.

18. Insertion of a stiff drainage cannula and connection of the drainage to a suction pump in order to create a negative pressure distally.

7.13



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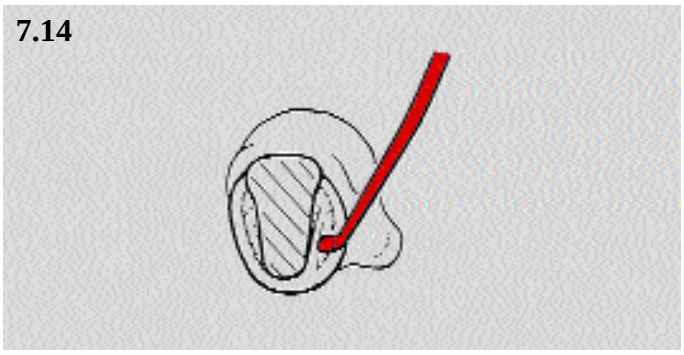

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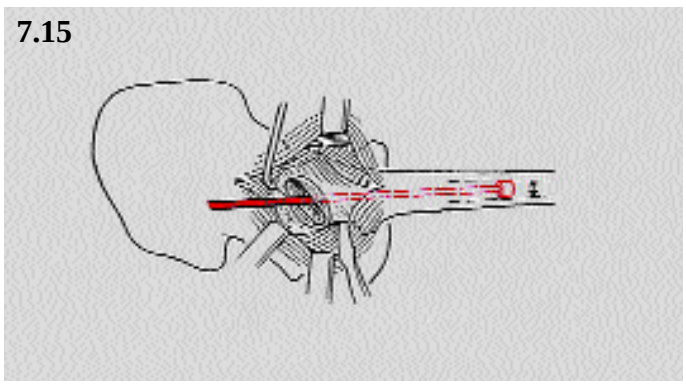

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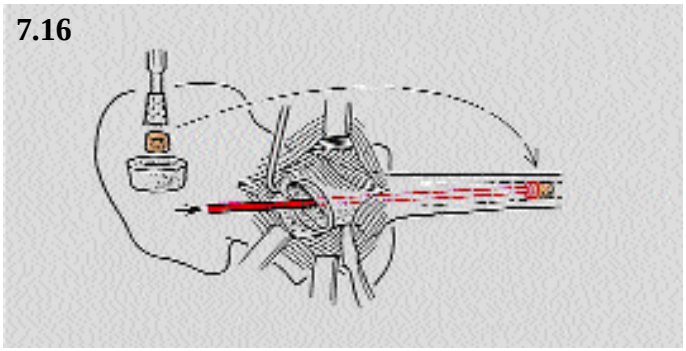

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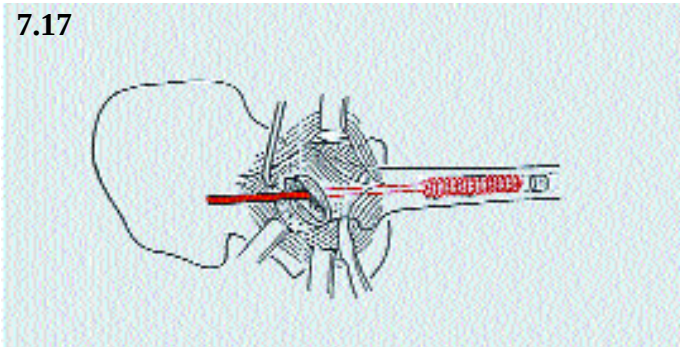

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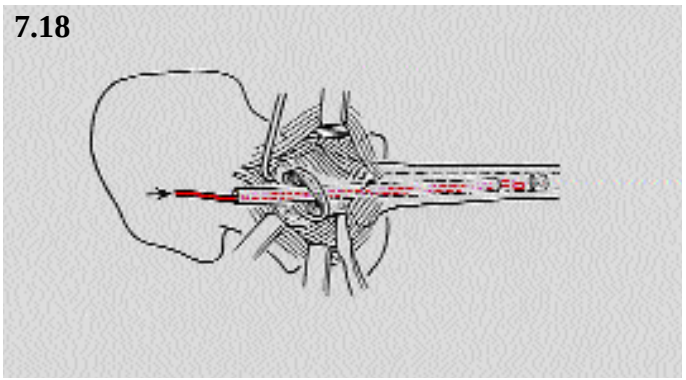


19. Application of a haemostatic tamponade.

20. Removal of the tamponade and insertion of the cement using an antegrade cement injector with a silicon compression disk.

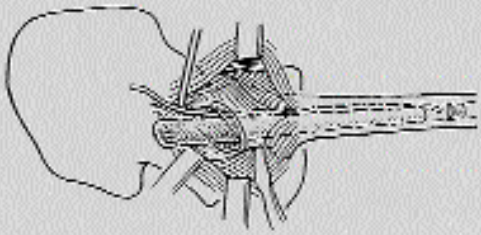
21. After mounting the centralizer on the tip of the prosthesis, the stem is inserted in the correct position with the silicon compression disk positioned on the osteotomy surface.

22. After half the prosthesis has been inserted, the consistency of the cement is assessed. Removal of the drain and final insertion of the stem with carefully aimed blows of the hammer on the impactor. The blows are made in a distal/lateral direction in order to avoid any varus positioning.

23. Final impaction of the stem up to the resection line in order to avoid a leg length dysmetry, any inward acting forces and a negative torsional moment.

24. The silicon compression disk is left in place until almost complete polymerization of the cement, then the excess cement is removed.

7.19



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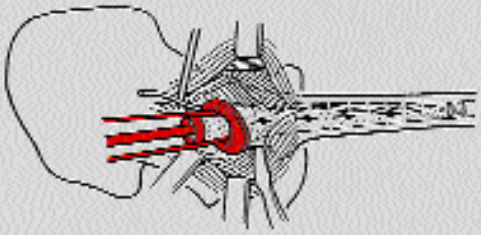

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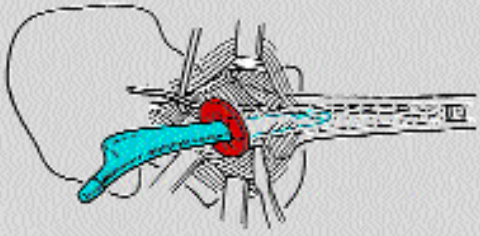

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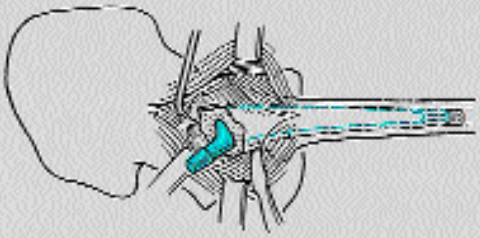
7.23



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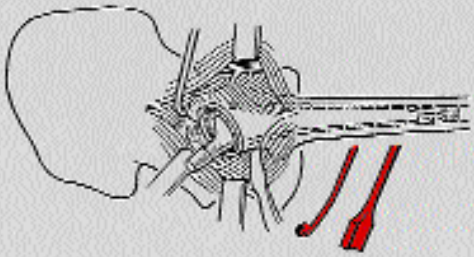


25. Careful cleaning of the taper.

26. Mounting of the final head with a rotatory movement.

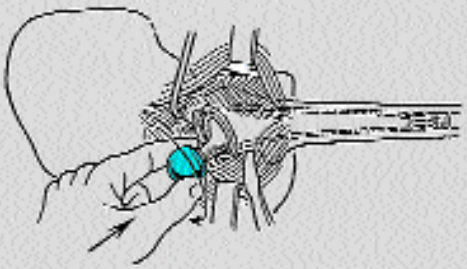
27. Locking of the head on the taper with a light hammer blow on the nylon-headed impactor.

28. Reduction and confirmation of movement and stability.

29. Application of drainage and suturing of the wound.

7.25

7.26



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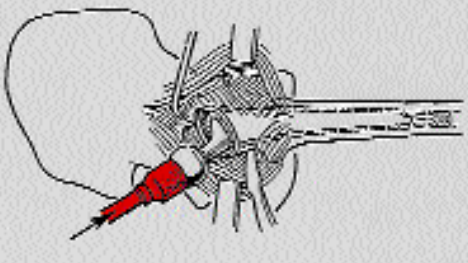

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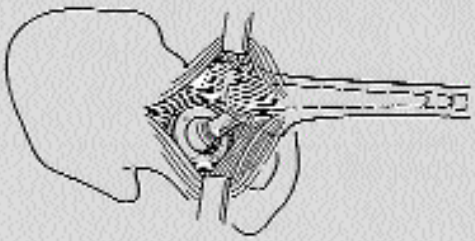

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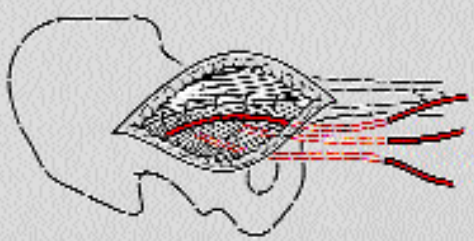


Postoperative Treatment

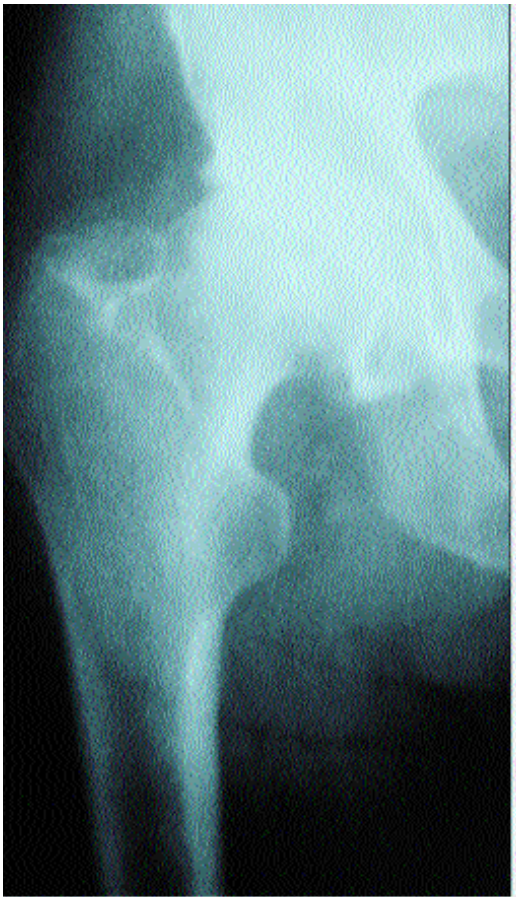
Two days of confinement to bed in a dorsal position with a wedge pillow between the legs: passively and actively assisted exercises from the first day after the operation. From the third day after the operation, after removal of the drainage, first attempts at walking with two crutches and partial weight bearing.

Discharge from hospital on the 10th/12th day with exact instructions on behavior and a plan for physiotherapy. First postoperative check-up 7 weeks after the operation. During the following seven weeks, the patient may stress the opposite side while using a crutch. The patient may then walk without crutches.

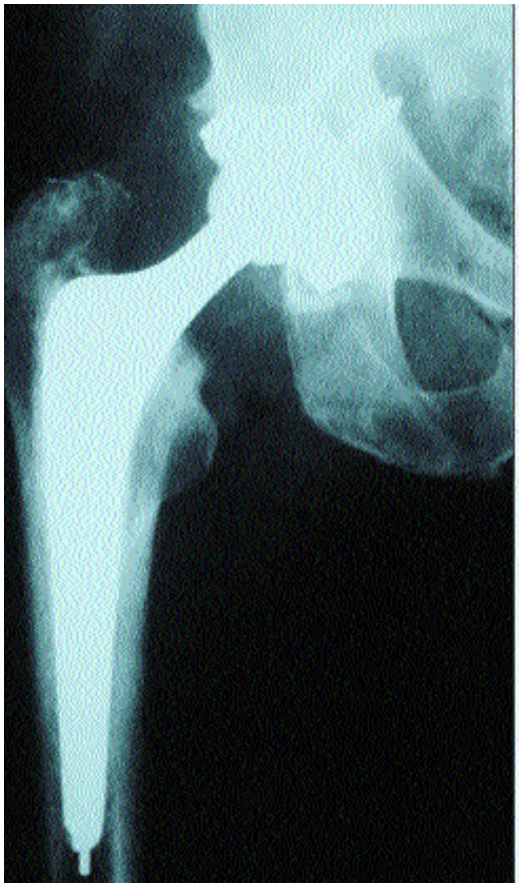
Case Study

73 year-old male patient, coxarthrosis on the right side
MS-30 stem, size 12 and uncemented cup, size 50

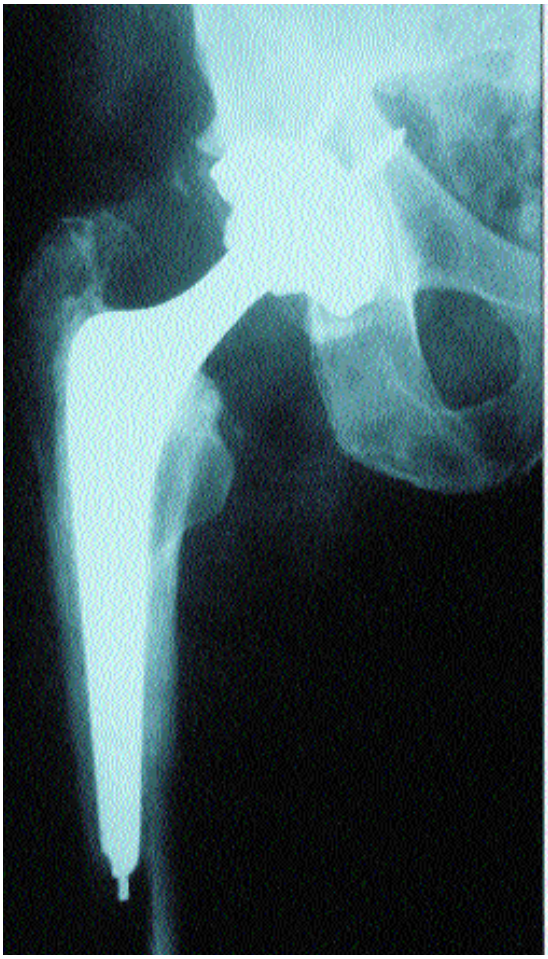
Preoperative x-ray



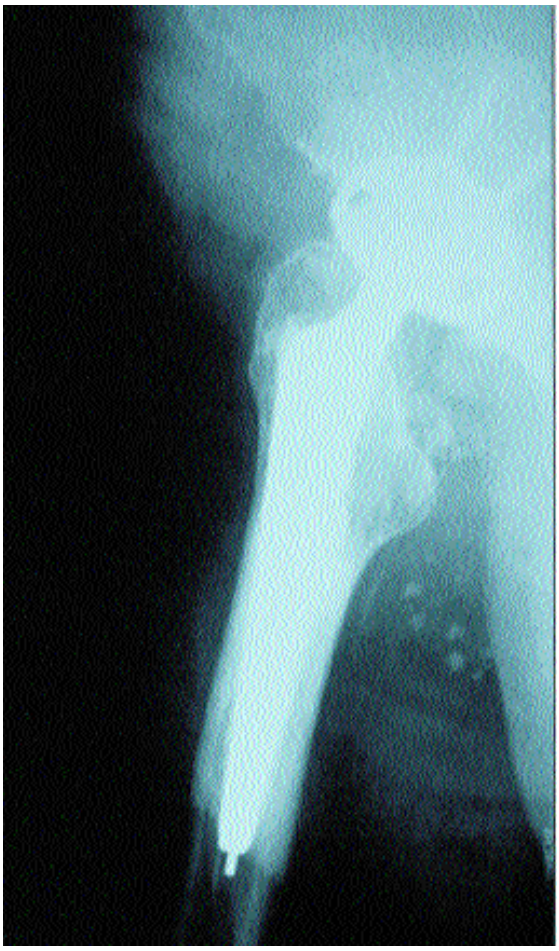
Postoperative x-ray



A/P x-ray, 12 months post-operation



Lateral x-ray, 12 months post-operation



CAUTION: Federal Law (U.S.A.) restricts this device to sale by or on the order of a physician.

Important Information for the Operating Surgeon

MS-30 FEMORAL STEM /

PROTASUL S30 FEMORAL HEADS

Description of Prosthesis

The MS-30 Femoral Stem is a highly polished straight stem designed for cemented use. It is manufactured from stainless steel (Protasul S30, ISO 5832-9) in a variety of sizes. The stem design features a lateral flange to facilitate cement compression. A polymethylmethacrylate (PMMA) distal centralizer may be utilized for even cement distribution. The modular 12/14 taper allows for use of a matching Protasul S30 stainless steel or zirconia ceramic head with 12/14 taper.

The Protasul S30 Femoral Heads are metallic heads manufactured from the same stainless steel alloy as the MS-30 Femoral Stem (ISO 5832-9). The heads come in a variety of diameters and neck lengths to replicate normal anatomy.

The MS-30 Femoral Stem must be used with either the Sulzer Orthopedics Protasul S30 stainless steel modular femoral head or Zirconia ceramic modular femoral head component with a 12/14 taper.

Information for Use

The advancement of total joint replacement has provided the surgeon a means of restoring mobility and reducing pain for many patients. While total hip replacements are largely successful in attaining these goals, no total joint replacement can be expected to withstand the activity levels and loads of normal healthy bone.

In using the se components, the surgeon should be aware that the following factors can be of extreme importance to the eventual success of the procedure:

A. Correct and initial size selection of the implant is extremely important. The potential for success in total joint replacement is increased by selecting the proper size, shape and design of the implant. This total joint prosthesis requires careful seating and adequate bone and cement support, and should be restricted to limited functional stress.

B. In selecting patients for total joint replacement, the following factors can be of extreme importance to the eventual success of the procedure:

1. The patient's weight: An overweight or obese patient can produce loads on the prosthesis that can lead to failure of the cement and/or device.
2. The patient's occupation or activity: If the patient is involved in an occupation or activity, that involves substancial walking or lifting, running and/or muscle strain, the resultant forces can cause failure of the cement and/or device.
3. A condition of senility, mental illness, or substance abuse, e.g., alcoholism: These conditions, among others, may cause the patient to ignore certain necessary limitations and precautions in the use of the device, leading to implant failure or other complications.
4. Certain degenerative diseases: In some cases, the progression of degenerative disease may be so advanced at the time of implantation that it may substantially decrease the expected life of the device. In such cases, total hip replacement can only be considered as a temporary relief from pain or as an intermediate procedure.
5. Foreign body sensitivity: Where material sensitivity is suspected, appropriate tests should be made prior to material selection or implantation.
6. Infection: Local infection, recent or chronic, may be a contraindication for the use of a total joint replacement. Extreme care should be used in patient selection in the event of recent or chronic infection.

C. The stem should be protected from mechanical damage and not be allowed to contact any metallic or other hard surface.

Assembly of Components

The MS-30 Femoral Stem utilizes modular assembly techniques to allow maximum flexibility at the time of surgery. The femoral stem component, head assembly, and acetabular component come as separate catalog items.

At the time of surgery, after the femoral stem has been implanted, either the Protasul S30 Stainless Steel or Zirconia Ceramic modular femoral head component is placed on the 12/14 Morse-type taper. Impaction of the two units is completed utilizing the femoral head impactor.

WARNING: DO NOT IMPACT THE STEM INTO THE FEMORAL CANAL AFTER HEAD COMPONENT IS ASSEMBLED. FURTHER IMPACTION COULD DAMAGE THE HEAD OR THE CONE.

CAUTION: DO NOT ATTEMPT TO REUSE A PROSTHESIS WHICH HAS PREVIOUSLY BEEN IMPLANTED OR IMPACTED INTO THE IMPLANT SITE. DO NOT ALTER THE IMPLANT PRIOR TO USE.

Indications and Contraindications

Indications and contraindications for the use may be relative or absolute and must be carefully weighed against the patient's entire evaluation and the prognosis for possible alternative procedures such as nonoperative treatment, arthrodesis, and others.

Patient selection will be largely dependent on patient's age, general health, conditions of available bone stock, prior surgery and anticipated further surgeries. Prosthetic replacement is generally only indicated for patients who have reached skeletal maturity.

A. Indications

1. Patient conditions of noninflammatory degenerative joint disease (NIDJD), e.g., avascular necrosis, osteoarthritis, and inflammatory joint disease (IJD), e.g., rheumatoid arthritis.
2. Those patients with failed previous surgery where pain, deformity, or dysfunction persists.
3. Revision of previously failed hip arthroplasty.

Total hip replacements may be considered for younger patients if any unequivocal indication outweighs the risks associated with the age of the patient (see "Warnings and Precautions"), and modified demands regarding activity and hip joint loading are assured. This includes severely crippled patients with multiple joint involvement, for whom an immediate need of hip mobility leads to an expectation of significant improvement in the quality of their lives.

B. Contraindications

1. Patient's physical conditions that would eliminate or tend to eliminate adequate implant support or prevent the use of an appropriately sized implant, e.g., previous surgery, insufficient quality or quantity of bone resulting from conditions such as cancer or congenital dislocation, metabolic bone disease of the upper femur or pelvis, femoral osteotomy revision, girdlestone revision, osteoporosis, osteomyelitis, neuromuscular compromise or vascular deficiency in the affected limb in sufficient degree to render the procedure unjustifiable (e.g., absence of musculoligamentous supporting structures, joint neuropathy) or other conditions that may lead to inadequate skeletal fixation.
2. Active infection of the hip, old or remote infection. This may be an absolute or relative contraindication. Every effort should be undertaken to rule out preoperative infection in a patient with suspicious symptoms, such as a history of, or when there are signs of, local inflammation, abscesses,fever, increased blood sedimentation rate, evidence of rapid joint destruction or bone resorption.
3. Other conditions that will place excessive demands on the joint:
   - Charcot's joints
   - muscle deficiencies
   - multiple joint disabilities
   - refusal to modify postoperative physical activities
   - obesity.
4. Conditions that tend to impose severe loading on the affected extremity include, but are not limited to, the following:
   - obesity
   - heavy labor
   - active sports
   - history of falls
   - general neurological abnormalities or neurological conditions including mental conditions (e.g., mental illness, senility, drug use, alcoholism) that tend to pre-empt the patient's ability or willingness to follow the surgeon's postoperative instructions.
5. Physical conditions that tend to adversely affect the stable fixation of the implants include, but are not limited to, the following:
   - marked osteoporosis
   - systemic and metabolic disorders leading to progressive deterioration of bone, (e.g., cortisone therapies, immunosuppressive therapies)
   - history of general or local infectious disease
   - tumors and/or cysts of the supporting bone structure
   - suspected allergic reactions to metals, polyethylene, bone cement
   - other joint disability (i.e., knees or ankles)
   - severe deformity leading to impaired anchorage or improper positioning of implants.

Warnings and Precautions

A. Preoperative

1. The preoperative planning and surgical technique for implantation of the MS-30 Femoral Stem represent principles that are basic to sound surgical management in total hip replacement. Thorough familiarity with the surgical technique is essential. The use of certain surgical instruments is suggested in the performance of this surgery. Review of the use and handling of these instruments is important. Bent or damaged instruments may lead to improper implant position and result in implant failure. A surgical technique brochure fully describing the procedure is available from Sulzer Orthopedics.
2. When total hip replacement is being considered, particularly for the young and the active patient, the surgeon should discuss all aspects of the surgery and the implant with the patient before surgery. The discussion should include the limitations of joint reconstruction, limitations particular to the patient, the possible consequences resulting from these limitations and, therefore, the necessity of following the doctor's preoperative instructions.
3. Allergies and other reactions to implant materials, although rare, should be considered and ruled out preoperatively.

4. X-ray templates should be used to estimate implant sizes, placement and joint alignment. An adequate inventory of implant sizes should be available at the time of surgery, including sizes larger and smaller than those expected to be used. Extra implant components are recommended. All packages and implants should be thoroughly inspected prior to surgery for possible damage (see "Sterilization" section).
5. The correct handling of the implant is extremely important. The components should be used without nicks, scratches, or other alterations; these can produce defects and stresses that may become the focal point for eventual failure of the implant.
6. A surgical implant must not be reused under any circumstances. Once implanted and subsequently removed, an implant should be discarded. Even though the implant appears undamaged, it may have small defects and internal stress patterns that may lead to failure. Only new implants may be used. Do not alter implant prior to use.
7. The use of polymethylmethacrylate (PMMA) bone cement can be helpful in securing, supporting and stabilizing certain devices in bone, but it neither replaces the support function of sound bone nor eliminates the need for additional support during healing. In using cement for implant fixation, care should be used to ensure complete cement support on all parts of the device embedded in the bone cement to help prevent possible stress concentrations that may lead to failure.
8. The stem utilizes a Morse-type taper for the attachment of the total head, or hemiarthroplasty components. The taper system utilized by Sulzer Orthopedics may be different from that of other manufacturers. Heads, cups, femoral stems, and sleeves should not be interchanged with those of other manufacturers.
9. This stem has a 12/14 neck taper, which is only compatible with modular femoral head components with a 12/14 taper.
10. The safety and effectiveness of the use of this device in bilateral applications have not been established.

B. Intraoperative

1. The correct selection of the implant is extremely important. Selection of the implant refers to the appropriate type and size for each patient with consideration of the anatomical and biomechanical factors involved. Such factors include patient age, activity level, weight, bone and muscle conditions.
2. Prior to closure, the surgical site should be thoroughly cleansed of bone chips, ectopic bone, bone cement, etc. Foreign particles at the metal/plastic articular interface may cause excessive wear and/or friction. Ectopic bone and/or bone spurs may lead to dislocation or painful and restricted motion. Range of motion should be thoroughly checked for early contact or instability.
3. The largest cross-section component that allows for adequate bone support to be maintained is recommended. Failure to use the optimum size may result in loosening, bending, cracking, or fracture of the component, bone, or cement (if cement used).
4. Stem and cup positioning and neck length are of critical importance. Subluxation, dislocation, and/or fracture of components may result due to muscle looseness and/or malpositioning of components.

C. Postoperative

Postoperative care is important. The patient should be instructed on the limitations of this device and should be cautioned regarding the load-bearing, range of motion, and activity levels permissible. Early load-bearing should be carefully controlled.

1. Early postoperative care should be carefully structured to maintain range of motion, and to prevent dislocation or thromboembolism.
2. Postoperative therapies, patient handling, (e.g., changing dressings, placing on bedpans, etc.) and patient activities should be structured to prevent excessive loading of the operative hip. Surgical procedure chosen, patient's age and/or bone quality may necessitate extending the period of limited weight bearing.
3. Periodic X-rays are recommended for close comparison with immediate postoperative X-rays to detect long-term evidence or progressive changes in implant position or loosening, or evidence of bending, cracking of component or cement, and/or disassembly of components.
4. The patient should be encouraged to promptly report any unusual changes in the operative extremity to his physician.

D. Adverse Events

The potential adverse effects are similar to those occurring with any total hip replacement. These effects are often attributable to factors listed under "Warnings and Precautions" and commonly include:

1. Changing position of the prosthesis (bending, fracture and/or disassembly of components or cement) with or without loosening or clinical symptoms.
2. Perforation, fissure of the acetabulum, femur or trochanter, and/or trochanter avulsion.
3. Subluxation, dislocation, decreased range of motion, and shortening or lengthening of the extremity.
4. Fractures of the femur. Postoperative fractures are usually stress fractures. Fractures are usually evidence of defects in the cortex due to prior screw holes and misdirected reaming and/or inadequate maldistributed bone cement. Intraoperative fractures are usually associated with revision surgery deformity and/or severe osteoporosis.
5. Ectopic ossification.
6. Early or late infection.
7. Cardiovascular disorders, including damage to blood vessels (iliac obturator, and femoral arteries), wound hematoma, venous thrombosis, pulmonary embolism, and myocardial infarction.
8. Temporary or permanent neuropathies involving the femoral, sciatic, peroneal or obturator nerves.
9. Pulmonary disorders including pneumonia and atelectasis.
10. Aggravated conditions in other joints or back due to intraoperative trauma, leg length discrepancy, femoral medialization, or muscular deficiencies.
11. Excessive wear of the acetabular component from damage to mating wear surfaces or debris particles.
12. Tissue reactions and allergies to corrosion or wear products and cement particles.
13. Urological complications, especially urinary retention and infection.
14. Aseptic loosening.
15. Other complications associated with general surgery, drugs, or ancillary devices used, blood, etc.

Sterilization

Unless otherwise indicated, all components have been sterilized by a minimum of 25 kGy (2.5 Mrads) of gamma irradiation and are supplied packaged in protective trays. Inspect packages for punctures and other damage prior to surgery.

SULZER ORTHOPEDICS DOES NOT RECOMMEND RESTERILIZATION OF IMPLANTABLE DEVICES.

Additional information regarding the MS-30 Femoral Stem and Protasul S30 Femoral Heads may be obtained from Sulzer Orthopedics.

THE MS-30 FEMORAL STEM IS INTENDED ONLY FOR USE WITH BONE CEMENT.

MS-30 Ordering Information

MS-30 Components

Catalog Number	Description
30.00.49-060	6.0mm MS-30 POLISHED SS CMTD HIP STEM
30.00.49-080	8.0mm MS-30 POLISHED SS CMTD HIP STEM
30.00.49-100	10.0mm MS-30 POLISHED SS CMTD HIP STEM
30.00.49-120	12.0mm MS-30 POLISHED SS CMTD HIP STEM
30.00.49-140	14.0mm MS-30 POLISHED SS CMTD HIP STEM
30.00.49-160	16.0mm MS-30 POLISHED SS CMTD HIP STEM
30.01.08	8mm, L: 21.5mm 1PC MS-30 DISTAL CENTRALIZERS
30.01.10	10mm, L: 21.5mm 1PC MS-30 DISTAL CENTRALIZERS
30.01.12	12mm, L: 21.5mm 1PC MS-30 DISTAL CENTRALIZERS
30.01.14	14mm, L: 21.5mm 1PC MS-30 DISTAL CENTRALIZERS
30.01.16	16mm, L: 21.5mm 1PC MS-30 DISTAL CENTRALIZERS
30.01.18	18mm, L: 21.5mm 1PC MS-30 DISTAL CENTRALIZERS
30.22.05	PROTASUL S-30 HEAD 22MM/-3.5 mm (S) Neck
30.28.05	PROTASUL S-30 HEAD 28MM/-4 mm (S) Neck
30.32.05	PROTASUL S-30 HEAD 32MM/-4 mm (S) Neck
30.22.06	PROTASUL S-30 HEAD 22MM/ 0 (M) Neck
30.28.06	PROTASUL S-30 HEAD 28MM/ 0 (M) Neck
30.32.06	PROTASUL S-30 HEAD 32MM/ 0 (M) Neck
30.22.07	PROTASUL S-30 HEAD 22MM/+3.5 mm (L) Neck
30.28.07	PROTASUL S-30 HEAD 28MM/+4 mm (L) Neck
30.32.07	PROTASUL S-30 HEAD 32MM/+4 mm (L) Neck
7676-28-004	ZIRCONIA CERAMIC HEAD 28MM/-4 mm Neck
7676-32-004	ZIRCONIA CERAMIC HEAD 32MM/-4 mm Neck
7676-28-000	ZIRCONIA CERAMIC HEAD 28MM/Neutral Neck
7676-32-000	ZIRCONIA CERAMIC HEAD 32MM/Neutral Neck
7676-28-400	ZIRCONIA CERAMIC HEAD 28MM/+4 mm Neck
7676-32-400	ZIRCONIA CERAMIC HEAD 32MM/+4 mm Neck

MS-30 Instrumentation

Catalog Number	Description
74.30.04	MS-30 TRAY INSERT FOR MODULAR RASPS
74.30.05	MS-30 TRAY FOR MODULAR RASPS
70.00.01	LONG BAR
70.00.94	HANDLE FOR MODULAR RASPS
72.00.35	MS-30 AWL
72.00.40	MS-30 SETTING DEVICE
72.13.94-060	MS-30 RASP 6.0mm, MODULAR
72.13.94-080	MS-30 RASP 8.0mm, MODULAR
72.13.94-100	MS-30 RASP 10.0mm, MODULAR
72.13.94-120	MS-30 RASP 12.0mm, MODULAR
72.13.94-140	MS-30 RASP 14.0mm, MODULAR
72.13.94-160	MS-30 RASP 16.0mm, MODULAR
72.13.94-180	MS-30 RASP 18.0mm, MODULAR
73.11.22-05	TEST HEAD 12/14 - S - 22mm
73.11.22-06	TEST HEAD 12/14 - M - 22mm
73.11.22-07	TEST HEAD 12/14 - L - 22mm
73.11.28-05	TEST HEAD 12/14 - S - 28mm
73.11.28-06	TEST HEAD 12/14 - M - 28mm
73.11.28-07	TEST HEAD 12/14 - L - 28mm
73.11.32-05	TEST HEAD 12/14 - S - 32mm
73.11.32-06	TEST HEAD 12/14 - M - 32mm
73.11.32-07	TEST HEAD 12/14 - L - 32mm
75.00.25	QUICK COUPLER HANDLE
75.00.36	IMPACTOR/EXTRACTOR
75.00.50	SMALL CEMENT PUSHER
75.00.52	SILICON COMPRESSION DISK (QTY=10)
75.01.38	REPOSITIONING LEVER
75.04.56	MEASURING ROD
75.04.57-080	MEASURING PLUG, 8mm
75.04.57-100	MEASURING PLUG, 10mm
75.04.57-120	MEASURING PLUG, 12mm
75.04.57-140	MEASURING PLUG, 14mm
75.04.57-160	MEASURING PLUG, 16mm
75.04.57-180	MEASURING PLUG, 18mm
75.09.15	DOUBLE CURVED GOUGE, 9mm
75.09.82	CURETTE W/TEETH SMALL, 9mm
75.85.75	EXTRACTION INSTRUMENT
78.00.38	SYNTHETIC TOP
78.00.38-22	TOP FOR REPOSITIONING LEVER - 22mm
78.00.38-28	TOP FOR REPOSITIONING LEVER - 28mm
78.00.38-32	TOP FOR REPOSITIONING LEVER - 32mm
95.00.03	METALLIC RULER
75.00.51	ALLEN KEY
06.00738.017	TEMPLATES, MS-30

Guiding Instrument (optional)

Catalog Number	Description
72.00.94-01	MS-30 HANDLE FOR GUIDING DEVICE
72.00.94-02	MS-30 THREADED ROD FOR GUIDING DEVICE
72.00.94-03	MS-30 BOLT FOR GUIDING DEVICE
72.00.94-04	MS-30 POSITIONING GUIDE FOR GUIDING DEVICE

Sulzer Orthopedics

Innovators in Medical Device Technology

Knees

Apollo® Knee System
Classic condylar knee replacement system.

MOST™ System
Modular knee and hip options for severe bone loss and trauma.

Natural-Knee® System
Anatomic design for superior clinical results.

Hips

Alloclassic™ Hip
Classic proven design with superior clinical results.

Apollo® Hip System
Designed for optimal results with low-demand patients.

APR® Anatomical Hip System
Anatomically designed hip replacement system.

Durasul™ Tribological System
Highly crosslinked polyethylene without measurable wear.

FracSure™ Hip System
A classic design for hip fractures.

Inter-Op™ Acetabular System
Leading-edge technology in a porous acetabular system.

Metasul® Metal-on-Metal acetabular components
Backed by a limited Lifetime Warranty and over 10 years clinical results.

MS-30™ Hip Stem
A highly polished cemented stem.

Natural-Hip™ System
A complete, state-of-the-art hip system.

Precedent™ Revision Hip System
A better solution for revision hips.

SL Revision™ Hip System
A stable revision design with extensive sizes.

Upper Extremities

Anatomical™ Shoulder System
Infinite adjustments of inclination & retroversion for precisely restored anatomy.

GSB® Elbow System
A nonconstrained design with 17 years of clinical results.

Select® Shoulder System
TSA and fracture management with offset head options.

SULZERMEDICA

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