SuperCap® Tissue Preserving Total Hip Arthroplasty
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**Chapter 3** Indications and Warnings

MicroPort Orthopedics recognizes that proper surgical procedures and techniques are the responsibility of the medical professional. The following guidelines are furnished for information purposes only. Each surgeon must evaluate the appropriateness of the procedures based on his or her personal medical training, experience and patient condition. Prior to use of the system, the surgeon should refer to the product package insert for additional warnings, precautions, indications, contraindications and adverse effects. Instructions For Use package inserts are also available by contacting the manufacturer. Contact information can be found on the back of this Surgical Technique and the Instructions For Use package inserts are available on the website listed.
Tissue-Preserving Total Hip Arthroplasty using a superior capsulotomy is a technique that allows for implantation of the total hip components under direct vision through a single incision. The technique allows for replacing the hip without ever surgically dislocating the joint, thereby maximizing the opportunity for preserving the surrounding soft-tissues. The technique is designed to allow for the recovery associated with abductor preserving exposures while simultaneously conferring stability to the hip joint that is associated with exposures that preserve the posterior hip joint capsule and short external rotators.

The technique is best learned by observing the surgery first-hand and then performing the surgery on cadaveric specimens. Surgeons who perform the miniposterior exposure can transition to the superior capsulotomy technique gradually over a number of total hip procedures.

**Patient Selection**
This technique is indicated for any standard total hip arthroplasty. Although not necessary, surgeons may tend to prefer situations where there are no pre-existing hardware, where there is a typical amount of space between the acetabular rim and the greater trochanter, and for new adopters, where there is an absence of significant malformation of the hip. Heavy patients have shown to be efficiently treated with this technique. In fact, the difference in difficulty between thin and obese patients is actually less than it is with the miniposterior, anterior, or direct lateral exposures although initially experience should focus on simpler total hip arthroplasties before the technique is applied to obese patients or patients with prior surgery or more significant deformities.

The technique has been shown to be applicable for 99 out of 100 patients typically presenting for total hip arthroplasty.

**Preoperative Planning**
Preoperative planning should be performed as usual, with the exception that the placement of the femoral component should be measured in relation to the tip of the greater trochanter rather than in relation to the lesser trochanter.
Chapter 2

Surgical Technique

Accurate preoperative templating requires good quality standardized radiographs of the pelvis and operative hip.

CAUTION: Preoperative templating is intended for estimation purposes only. Final component size and position should be determined intraoperatively.

Patient Positioning
The patient is positioned in the lateral position with the body positioned slightly toward the anterior side of the table so the hip can be maximally adducted.

Incision Placement
With the foot on a Mayo stand and the hip flexed 45 degrees and internally rotated 15 degrees (if possible), the incision is placed starting 1cm distal to the tip of the greater trochanter and extending 8cm proximally, exactly in line with the femoral shaft axis. The incision can be moved a little inferiorly for hips with varus femoral necks and a little superiorly for hips with valgus femoral necks.
Exposure Technique

The incision is made to the level of the fascia. The fascia is incised, starting just distal to the tip of the greater trochanter, and extending in line with the incision. Two wing-tipped elevators are then used to spread the gluteus maximus fibers to expose the bursa tissue overlying the gluteus medius muscle. The very thin layer of bursa tissue is then carefully incised just along the posterior border of the gluteus medius.

A blunt pull retractor is then placed on the posterior border of the gluteus medius to expose the piriformis tendon and gluteus minimus muscle.

A Cobb elevator is placed underneath the anterior aspect of the piriformis tendon at its insertion in the piriformis fossa. A blunt pull retractor is then placed on the piriformis tendon and pulled inferiorly to move the posterior border of the gluteus medius out of the way to maximally expose the piriformis tendon as distally as possible. A long-handed knife is then used to transect the piriformis tendon as close to its insertion as possible. Take care not to extend the cut into the superior gemellis or obturator internis tendon. Some surgeons choose to simply retract the piriformis tendon posteriorly while preserving its attachment. Maintain the exposure on the posterior side by retracting the piriformis tendon posteriorly and then placing a small impacting spiked Hohmann through the posterior capsule into the femoral head.

Identify the posterior border of the gluteus minimus and mobilize the muscle from the hip joint capsule from posterior to anterior using a Cobb elevator for a very small distance, just enough to make a vertical incision in the superior capsule.
Sharp dissection with a knife may be necessary to begin mobilization of the minimus. The interval between the minimus tendon and the anterior hip capsule should be developed with a Cobb elevator. A blunt impacting Hohmann retractor can be placed into that interval. In addition, an impacting spiked Hohmann retractor can be placed anteriorly, just under the minimus and into the ilium, just above the acetabular rim. Make an incision in the superior hip joint capsule from 6 o’clock in the trochanteric fossa to a little posterior of 12 o’clock at the superior acetabular rim. Use a long electrocautery to incise in the trochanteric fossa to prevent bleeding of the anastomosis around the base of the femoral neck. Make another incision in the anterior superior capsule for about 10mm along the acetabular rim. Place a tagging suture at the corner of the capsule.

Remove the spiked Hohmann retractor from the posterior part of the femoral head and place two blunt Hohmann retractors inside the hip joint capsule anteriorly and posteriorly around the femoral neck. Finally, impact a straight spiked Hohmann retractor into the femoral head in line with the femoral shaft axis and at the margin of the acetabular rim to complete the exposure.
Preparing the Femur

Using an end-cutting cylindrical starting reamer, enter the femoral canal through the trochanteric fossa. Use the conical metaphyseal reamer to ensure central placement of the starting hole and to ensure that the broaches are not placed in varus. Use cylindrical reamers if the femoral component requires them.

Use an osteotome to open the superior neck and lateral portion of the femoral head to allow insertion of femoral broaches. Gauge depth of the broaches by measuring the distance from the lateral shoulder of the broach to the tip of the greater trochanter. This distance is typically 15 to 30mm but varies depending on the anatomy and preoperative leg length discrepancy.

Once the final broach is fully seated, remove the broach and replace it with a broach that is one size smaller to use as an internal neck cutting guide so that the neck osteotomy is slightly below the top of the final stem.
**Femoral Neck Osteotomy**

Use an oscillating saw with a narrow blade to transect the femoral neck, using the top of the broach as a template. Some surgeons use a combination of both oscillating and reciprocating saws to complete this step.

The blunt Hohmann retractors serve to protect the surrounding tissues. The saw blade can be felt to penetrate the bone much the same way that a cast saw is used when removing a cast. To ensure that the neck has been transected, place a Cobb elevator in the path of the saw blade and lever to ensure that the femoral neck cut has been completed.
Femoral Head Removal
Place a Cobb elevator at the head/socket junction and rotate the head into a little valgus. Place a long Schanz screw into a solid part of the head. Lever the pin to rotate the femoral head into valgus which will facilitate subluxation. Place an additional pin to rotate the head further into valgus as desired to remove the femoral head.

Femoral head removal can be further facilitated by affixing a T-handle chuck to the Schanz screw and a slap-hammer to the T-handle chuck. Use the slap hammer to extract the head.

The socket exposure is established by placing a large sharp impacting Hohmann retractor into the mid-anterior socket region inside the capsule, but outside the labrum. Similarly, place a small sharp impacting Hohmann retractor into the mid-posterior socket region, again, inside of the capsule but outside the labrum. This retractor can be placed directly into the ischium if desired.

A third impacting spiked Hohmann retractor can be placed into the anterior ilium, under the minimus, just superior to the acetabular rim, as before. These three retractors should provide sufficient exposure. Placement of additional retractors inferiorly can interfere with the use of the acetabular reamers.
Acetabular Preparation and Component Insertion
Use the 45 degree angle acetabular reamer handle to ream the socket appropriately. After reaming, switch to the anterior side of the table and run a Cobb elevator along the superior edge of the acetabular rim to ensure that there is no remaining soft tissue at the edge of the acetabulum. Use the double-angled cup impactor to insert the cup. In muscular patients, the greater trochanter frequently puts upward (abduction) pressure on the cup impactor. Neutralizing that pressure by applying a downward (adduction) pressure on the cup impactor handle allows for easier release of the cup impactor threads. Place a trial liner into the cup.

Trial Reduction
Replace the smaller broach that was used for the neck osteotomy with the final broach. Place the trial head into the socket. While on the anterior side of the table, carefully place a bone hook into the top of the broach trial. Control the leg using the bone hook for traction using one arm and control the position of the leg by cradling your other arm under the knee and lower leg. Deliver the femur into position to allow your assistant to place the trial neck into the broach. Then reduce the trial neck into the trial head. The hip should be fully stable and undislocatable in any position.
Trial Disassembly and Final Component Insertion
Have your assistant hold the trial head within the socket using a long Schmitz and, applying traction using the bone hook, disassemble the trial neck from the trial head. Remove the trial neck and broach. Insert the real femoral prosthesis. Repeat the trial reduction after the femoral prosthesis has been inserted to check for any changes that might have occurred if the real implant seats at a level that is slightly different from that of the final broach. Remove the trial liner and impact the real liner using the double-angled cup impactor. Place the real head within the liner. Reduce the neck of the prosthesis into the head. Alternatively, the femoral head can be affixed to the femoral neck prior to final reduction.

Closure
Using the tagging suture in the anterior capsule, close the capsule using a running suture from proximal, at the acetabular rim, to distal, toward the trochanteric fossa followed by fascial and superficial layer closure.

Rehabilitation
The patient should be able to progress without restriction of motion. Progress weight bearing according to your confidence in the implant-bone fixation.
Indications and Warnings

General Risks
Please consult product package insert for additional risk information, this can be found under Prescribing Information on ortho.microport.com, and then selecting any brand of MicroPort hip implants. Please consult the product package insert for information on cleaning and handling of MicroPort instruments, this can be found under Prescribing Information on ortho.microport.com, and then selecting “Cleaning and Handling of MicroPort Instruments.”

Indications
Intended Use
MicroPort total hip systems are intended for use in total hip arthroplasty for reduction or relief of pain and/or improved hip function in skeletally mature patients.

Indications for Use
1. non-inflammatory degenerative joint disease such as osteoarthritis, avascular necrosis, ankylosis, protrusio acetabuli, and painful hip dysplasia;
2. inflammatory degenerative joint disease such as rheumatoid arthritis;
3. correction of functional deformity; and,
4. revision procedures where other treatments or devices have failed

Please consult the package insert Instructions for Use for information regarding a specific MicroPort implant.

Contraindications
Patients should be warned of these contraindications. Contraindications include:
1. overt infection;
2. distant foci of infections (which may cause hematogenous spread to the implant site);
3. rapid disease progression as manifested by joint destruction or bone absorption apparent on roentgenogram;
4. skeletally immature patients (patient is less than 21 years of age at the time of surgery);
5. cases where there is inadequate neuromuscular status (e.g., prior paralysis, fusion and/or inadequate abductor strength), poor bone stock, poor skin coverage around the joint which would make the procedure unjustifiable;
6. neuropathic joints;
7. hepatitis or HIV infection;
8. neurological or musculoskeletal disease that may adversely affect gait or weightbearing.

Additional contraindications for a metal-on-metal bearing include:
1. Patients with known moderate to severe renal insufficiency;
2. Females of childbearing age are contraindicated due to the unknown effects of elevated levels of metal ions on the fetus.

Please consult the package insert Instructions for Use for information regarding a specific MicroPort implant.
Preoperative Precautions
The surgeon must evaluate each situation individually based on the patient's clinical presentation in making any decisions regarding implant selection. The surgeon must be thoroughly familiar with the implant, instruments and surgical procedure prior to performing surgery. The surgeon should contact MicroPort for product-specific surgical techniques.

Patient selection should consider the following factors which could lead to increased risk of failure and can be critical to the eventual success of the procedure: the patient's weight, activity level, and occupation. The patient should not have unrealistic functional expectations for occupations or activities that include substantial walking, running, lifting, or muscle strain. Additional conditions presenting increased risk of failure include:

1. uncooperative patient or patient with neurologic disorders, incapable of following instructions;
2. marked bone loss, severe osteoporosis, or revision procedures for which an adequate fit of the prosthesis cannot be achieved;
3. metabolic disorders that may impair bone formation;
4. osteomalacia;
5. poor prognosis for good wound healing (e.g., decubitus ulcer, end-stage diabetes, severe protein deficiency and/or malnutrition);
6. pre-existing conditions commonly considered with any surgery including bleeding disorders, long-term steroidal therapy, immunosuppressive therapy, or high dosage radiation therapy.

The patient should be warned of surgical risks, and made aware of possible adverse effects. The patient should be warned that the prosthesis does not replace normal healthy bone, that the prosthesis can break or become damaged as a result of certain activity or trauma, has a finite expected service life, and may need to be replaced at some time in the future. The patient should also be advised of other risks that the surgeon believes should be disclosed. The patient should be advised that any noise or unusual sensation should be reported to the surgeon as it may indicate implant malfunction.

Please consult the package insert Instructions for Use for information regarding a specific MicroPort implant.

Intraoperative Precautions
Specialized instruments are available and must be used to assure the accurate implantation of prosthetic components. Do not mix instruments from different manufacturers. While rare, breakage of instruments may occur especially with extensive use or excessive force. For this reason, instruments should be examined for wear or damage prior to surgery.

X-ray templates are used to estimate the size of the product to be used. The anatomy of the patient ultimately determines the size of the product for an individual patient.

Please consult the package insert Instructions for Use for information regarding a specific MicroPort implant.

Postoperative Precautions
The patient must be advised of the limitations of the reconstruction and the need for protection of the prosthesis from full weight bearing until adequate fixation and healing have occurred. The patient should be cautioned to limit activities and protect the replaced joint from unreasonable stresses and possible loosening, fracture and/or wear, and follow the instructions of the physician with respect to follow-up care and treatment. Loosening of the components can result in increased production of wear particles, as well as damage to the bone, making successful revision surgery more difficult. Periodic, long-term follow-up is recommended to monitor the position and state of the prosthetic components, as well as the condition of the adjoining bone.
Periodic post-operative x-rays are recommended for close comparison with early post-op conditions to detect long term evidence of changes in position, loosening, bending, or cracking of components.

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Adverse Effects for total hip arthroplasty can include:

1. Osteolysis (progressive bone resorption). Osteolysis can be asymptomatic and therefore routine periodic radiographic examination is vital to prevent any serious future complication.
2. Particulates leading to increased wear rates necessitating early revision.
3. Allergic reactions to materials; metal sensitivity that may lead to histological reactions, pseudotumor and aseptic lymphocytic vasculitis-associated lesions (ALVAL).
4. Delayed wound healing; Deep wound infection (early or late) which may necessitate removal of the prosthesis. On rare occasions, arthrodesis of the involved joint or amputation of the limb may be required.
5. A sudden drop in blood pressure intra-operatively due to the use of bone cement;
6. Damage to blood vessels or hematoma;
7. Temporary or permanent nerve damage, peripheral neuropathies and subclinical nerve damage as possible result of surgical trauma resulting in pain or numbness of the affected limb;
8. Cardiovascular disorders including venous thrombosis, pulmonary embolism, or myocardial infarction;
9. Fatigue fracture of the prosthetic component can occur as a result of trauma, strenuous activity, improper alignment, incomplete implant seating, duration of service, loss of fixation, non-union, or excessive weight;
10. Dislocation, migration and/or subluxation of prosthetic components from improper positioning, trauma, loss of fixation and/or muscle and fibrous tissue laxity;
11. Periarticular calcification or ossification, with or without impediment to joint mobility;
12. Trochanteric non-union due to inadequate reattachment and or early weight bearing;
13. Trochanteric avulsion as a result of excess muscular tension, early weight bearing, or inadvertent intraoperative weakening;
14. Traumatic arthrosis of the knee from intraoperative positioning of the extremity;
15. Inadequate range of motion due to improper selection or positioning of components, by femoral impingement, and periarticular calcification;
16. Femoral or acetabular perforation or fracture; femoral fracture while seating the device; femoral fracture by trauma or excessive loading, particularly in the presence of poor bone stock;
17. Undesirable shortening or lengthening of the limb;
18. Aggravated problems of the affected limb or contralateral extremity by leg length discrepancy, excess femoral medialization, or muscle deficiency;

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The CE-Marking of Conformity is applied per catalog number and appears on the outer package label, if applicable.

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