



Dr. H. D. Huddleston's

The Hip and Knee Institute

Restoring the joy of motion.

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[HOME](#)

[HIPS](#)

[KNEES](#)

[ABOUT DR H.](#)

[TESTIMONIALS](#)

[NEWSLETTER](#)

[CONTACT](#)



Arthritis of the Knee Joint

Welcome to the Online Edition of Dr. Huddleston's informative manual *Arthritis of the Knee Joint*, which covers in full many subjects related to knee pathology in general and Total Knee Replacement in particular.

You can follow in order by selecting the first link, which will lead you to the second, and so on. Or, you can just jump right in to the specific area you are interested in.

Arthritis of the Knee Joint: Table of Contents

- [Biographical Notes on Dr. Huddleston](#)
- [Sir John Charnley](#)
- [Initial Consultation with Dr. Huddleston](#)
- [Anatomy of the Normal Knee Joint](#)
- [Diseases of the Knee Joint](#)
- [Symptoms of Knee Disorder](#)
- [Treating Knee Arthritis Without Surgery](#)
- [Non-Steroidal Anti-Inflammatory Drugs \(NSAIDs\)](#)
- [Examples of Prescription and Over-the-Counter \(NSAIDs\)](#)
- [Keeping Fit With an Arthritic Knee](#)
- [When Should You Consider a Knee Replacement](#)
- [Total Knee Replacement Surgery](#)
- [Implant Designs and Materials](#)
- [Other Surgical Options for Knee Arthritis](#)
- [Blood Transfusion for Total Knee Replacement](#)
- [Scheduling Surgery](#)
- [Current Medications](#)
- [Final Preoperative Visit](#)
- [What to Bring to the Hospital](#)
- [Admission to the Hospital](#)
- [What to Expect After Leaving the Operating Room](#)
- [What to Expect After You Get Home](#)
- [Home Exercises for the First 8 Weeks After Surgery](#)
- [Long Term Care of Your Knee Replacement](#)
- [Allowable Activities After Knee Replacement](#)
- [Revision Knee Surgery](#)
- [Complications of Total Knee Replacement Surgery](#)

- **Special Studies**

1. Aspiration and Arthrogram
2. Bone Scans
3. Magnetic Resonance Imaging (MRI)

If you feel that this online manual has omitted anything you would like to know,
please send your suggestion to Dr. Huddleston.
We will try to include it in future updates.

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HOME HIPS KNEES ABOUT DR H. TESTIMONIALS NEWSLETTER CONTACT

KNEE TABLE OF CONTENTS

- [Dr. Huddleston Bio](#)
- [Sir John Charnley](#)
- [Initial Consultation](#)
- [Anatomy of the Knee Joint](#)
- [Diseases of the Knee](#)
- [Symptoms of Knee Disease](#)
- [Non-Operative Treatment](#)
- [NSAIDs](#)
- [Exercise and Fitness](#)
- [When to Consider TKR](#)
- [Total Knee Replacement Surgery](#)
- [Implant Designs and Materials](#)
- [Other Surgical Alternatives](#)
- [Blood Transfusion](#)
- [Scheduling Surgery](#)
- [Your Current Medications](#)
- [Office Visit Before Surgery](#)
- [What to Bring to the Hospital](#)
- [Hospital Admission](#)
- [Expectations After Surgery](#)
- [Expectations at Home](#)
- [Home Exercises After Surgery](#)
- [Long-Term Care](#)
- [Allowable Activities After TKR](#)
- [Revision Knee Surgery](#)
- [Complications of TKR](#)
- [Special Studies](#)

Herbert D. Huddleston, M.D., F.R.C.S.



Dr. Huddleston is Board Certified in Orthopedic Surgery. He restricts his surgical practice to Surgery of the hip and knee.

Dr. Huddleston grew up in South Africa and graduated from the Medical School of the University of Capetown. He completed his training in General Surgery in England, and was elected a Fellow of the Royal College of Surgeons.

His orthopedic residency training was taken at the Albert Einstein College of Medicine in New York City, after which he moved to Los Angeles to do a one year Fellowship in Hip and Knee Replacement Surgery with Professor Charles O. Bechtol.

After spending time in England with **John Charnley**, the father of modern hip replacement, Dr. Huddleston joined Charles Bechtol in private practice as his assistant. Bechtol, while Professor of Orthopedic Surgery at the University of California in Los Angeles, was one of the first three surgeons to introduce the Charnley technique of hip replacement into the United States.

Dr. Bechtol and Dr. Huddleston became partners in a private practice limited exclusively to Hip and Knee Replacement Surgery. Upon Bechtol's retirement, Dr. Huddleston took over the practice.

Dr. Huddleston's extensive experience includes more than six thousand hip replacements and five thousand knee replacements. He has revised more than seven hundred failed hip replacements referred to him from around the United States.

He has published research on the causes of failure of cemented joint replacements and on leg length techniques and issues in hip replacement. He teaches and lectures on the subject of joint replacement surgery. Dr. Huddleston has designed a hip replacement system (the Omega system) which is used throughout the world.

Dr. Huddleston is a Fellow of the American Academy of Orthopaedic Surgeons, a Fellow of the Royal College of Surgeons, and a Fellow of the International College of Surgeons. He is a member of the American Association of Arthritic Hip and Knee Surgeons. Dr. Huddleston is on staff at the Valley Presbyterian Hospital and the Providence Tarzana Hospital.

Dr. Huddleston and his wife, Fran, and three sons, Michael, Christopher and Nicholas, enjoy sailing, skiing, tennis and travel.

WHY DR. HUDDLESTON MAY BE THE RIGHT SURGEON FOR YOU.

1. He has had special training in joint replacement surgery.
2. His practice is restricted to hip and knee surgery.
3. He has performed more than six thousand hip replacements.
4. He has performed more than five thousand knee replacements.
5. He does all his own surgery, from beginning to end.
6. He uses the same joint replacement team in the operating room daily.
7. He selects the best implant for you, regardless of cost.
8. He selects implants that are right for you and your lifestyle.
9. His two hospitals do not dictate what implants he can install.
10. He has a special technique for perfectly measuring the leg length in every hip replacement.
11. He routinely uses the revolutionary mini-incision hip replacement and mini-incision knee replacement techniques.
12. As a result his patients recover from surgery extremely rapidly with minimal post-op restrictions, and with a rapid return to normal walking.
13. His anesthesiologists are experienced with elderly and high risk patients.
14. The nursing staff at his hospital have had extensive experience with joint replacements.
15. He still accepts what insurance pays for his services (for now).

On to the Next Section of the Manual:
Sir John Charnley

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HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

KNEE TABLE OF CONTENTS

- [Dr. Huddleston Bio](#)
- [Sir John Charnley](#)
- [Initial Consultation](#)
- [Anatomy of the Knee Joint](#)
- [Diseases of the Knee](#)
- [Symptoms of Knee Disease](#)
- [Non-Operative Treatment](#)
- [NSAIDs](#)
- [Exercise and Fitness](#)
- [When to Consider TKR](#)
- [Total Knee Replacement Surgery](#)
- [Implant Designs and Materials](#)
- [Other Surgical Alternatives](#)
- [Blood Transfusion](#)
- [Scheduling Surgery](#)
- [Your Current Medications](#)
- [Office Visit Before Surgery](#)
- [What to Bring to the Hospital](#)
- [Hospital Admission](#)
- [Expectations After Surgery](#)
- [Expectations at Home](#)
- [Home Exercises After Surgery](#)
- [Long-Term Care](#)
- [Allowable Activities After TKR](#)
- [Revision Knee Surgery](#)
- [Complications of TKR](#)
- [Special Studies](#)



Sir John Charnley

One of the greatest surgical advances of the twentieth century has been the development of the hip replacement operation. The pioneer and innovator in the field was Sir John Charnley, an English orthopedic surgeon.

He invented the low friction hip replacement in the early 1960s at the Center for Hip Surgery at Wrightington, England. Surgeons from all over the world made their way to Wrightington to learn his techniques.

Sir John Charnley was a master surgeon, innovator and bio-engineer. Knee and shoulder replacement surgery developed directly out of his work on the artificial hip. His work has been an outstanding contribution to the relief of human suffering.

On to the Next Section of the Manual:
[Initial Consultation with Dr. Huddleston](#)

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HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

KNEE TABLE OF CONTENTS

- [Dr. Huddleston Bio](#)
- [Sir John Charnley](#)
- [Initial Consultation](#)
- [Anatomy of the Knee Joint](#)
- [Diseases of the Knee](#)
- [Symptoms of Knee Disease](#)
- [Non-Operative Treatment](#)
- [NSAIDs](#)
- [Exercise and Fitness](#)
- [When to Consider TKR](#)
- [Total Knee Replacement Surgery](#)
- [Implant Designs and Materials](#)
- [Other Surgical Alternatives](#)
- [Blood Transfusion](#)
- [Scheduling Surgery](#)
- [Your Current Medications](#)
- [Office Visit Before Surgery](#)
- [What to Bring to the Hospital](#)
- [Hospital Admission](#)
- [Expectations After Surgery](#)
- [Expectations at Home](#)
- [Home Exercises After Surgery](#)
- [Long-Term Care](#)
- [Allowable Activities After TKR](#)
- [Revision Knee Surgery](#)
- [Complications of TKR](#)
- [Special Studies](#)

Arthritis of the Knee Joint

INITIAL CONSULTATION WITH DR. HUDDLESTON

Your initial consultation with Dr. Huddleston may take 45 minutes to an hour, depending on the complexity of your problem.

At your first visit we will take a comprehensive medical history, with special emphasis on your knee problem. You will have a complete orthopedic examination to rule out other conditions which may be causing your symptoms. We will need to take x-rays of the involved joint(s) if you have not had any taken recently (and brought them with you).

PLEASE BRING THE FOLLOWING WITH YOU ON THE FIRST VISIT:

1. Any family members or friends you may want to have present to help in the discussion and decision making process.
2. A written list of questions you may have.
3. Any X-Rays, MRI studies, bone scans or other studies of your knee taken by previous physicians (that you can readily obtain).
4. A list of your current medications (with dosages).
5. A list of physicians you have seen in the past 2 years (with addresses and phone numbers, if possible). We normally send a full report to the doctor who referred you to us. Please let us know if you want a report sent to any other physician.

On to the Next Section of the Manual
Anatomy of the Normal Knee Joint

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HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

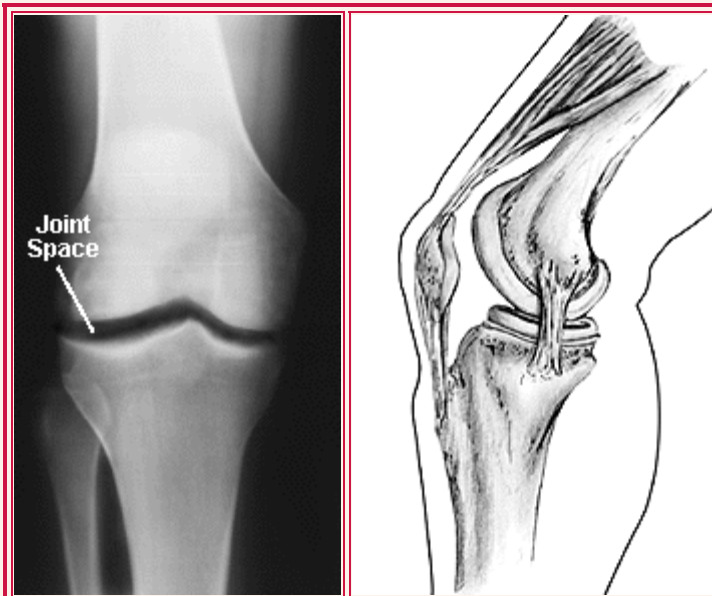
KNEE TABLE OF CONTENTS

- Dr. Huddleston Bio
- Sir John Charnley
- Initial Consultation
- Anatomy of the Knee Joint
- Diseases of the Knee
- Symptoms of Knee Disease
- Non-Operative Treatment
- NSAIDs
- Exercise and Fitness
- When to Consider TKR
- Total Knee Replacement Surgery
- Implant Designs and Materials
- Other Surgical Alternatives
- Blood Transfusion
- Scheduling Surgery
- Your Current Medications
- Office Visit Before Surgery
- What to Bring to the Hospital
- Hospital Admission
- Expectations After Surgery
- Expectations at Home
- Home Exercises After Surgery
- Long-Term Care
- Allowable Activities After TKR
- Revision Knee Surgery
- Complications of TKR
- Special Studies

Arthritis of the Knee Joint

ANATOMY OF THE NORMAL KNEE JOINT

The knee is a "hinge type" joint which is formed by two bones held together by flexible ligaments. The bones are the femur (thigh bone) and the tibia (shin bone). The knee cap (patella) also forms part of the knee joint. It glides over the end of the femur as the knee bends. The moving parts of a normal knee are covered with a layer of articular cartilage which is a white smooth substance about 1/4 of an inch thick on the patella and 1/8 of an inch thick on the femur and tibia. An x-ray of the knee normally shows space (the "joint space") between the femur and the tibia as well as between the femur and the patella. This is not empty space but represents the cartilage (which does not show up on x-rays). The smooth, cartilage-covered surfaces of the knee move on each other with very little friction in the normal joint. In the normal knee the "joint space" is approximately 1/4 of an inch wide and fairly even in outline.



An X-Ray and Illustration Showing a Normal Knee Joint

On to the Next Section of the Manual
Diseases of the Knee Joint



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[HOME](#)

[HIPS](#)

[KNEES](#)

[ABOUT DR H.](#)

[TESTIMONIALS](#)

[NEWSLETTER](#)

[CONTACT](#)

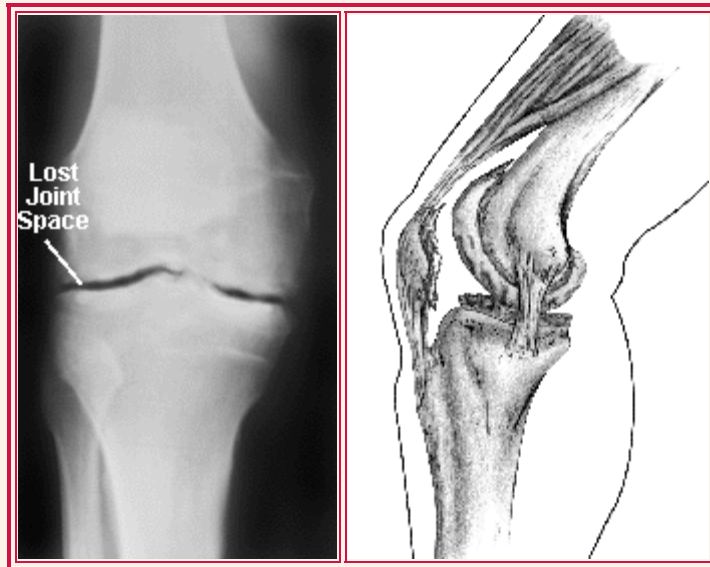
KNEE TABLE OF CONTENTS

- [Dr. Huddleston Bio](#)
- [Sir John Charnley](#)
- [Initial Consultation](#)
- [Anatomy of the Knee Joint](#)
- [Diseases of the Knee](#)
- [Symptoms of Knee Disease](#)
- [Non-Operative Treatment](#)
- [NSAIDs](#)
- [Exercise and Fitness](#)
- [When to Consider TKR](#)
- [Total Knee Replacement Surgery](#)
- [Implant Designs and Materials](#)
- [Other Surgical Alternatives](#)
- [Blood Transfusion](#)
- [Scheduling Surgery](#)
- [Your Current Medications](#)
- [Office Visit Before Surgery](#)
- [What to Bring to the Hospital](#)
- [Hospital Admission](#)
- [Expectations After Surgery](#)
- [Expectations at Home](#)
- [Home Exercises After Surgery](#)
- [Long-Term Care](#)
- [Allowable Activities After TKR](#)
- [Revision Knee Surgery](#)
- [Complications of TKR](#)
- [Special Studies](#)

Arthritis of the Knee Joint

DISEASES OF THE KNEE JOINT

There are a number of conditions which can cause arthritis of the knee. The term "arthritis" literally means inflammation of a joint, but is generally used to describe any condition in which there is damage to the cartilage. Inflammation, if present, is in the synovium. The proportion of cartilage damage and synovial inflammation varies with the type and stage of arthritis. Usually the pain early on is due to inflammation. In the later stages, when the cartilage is worn away, most of the pain comes from the mechanical friction of raw bones rubbing on each other.



An X-ray and Illustration Showing an Arthritic Knee Joint

There are two broad categories of arthritis:
OSTEOARTHRITIS AND RHEUMATOID ARTHRITIS

Osteoarthritis mainly damages the joint cartilage, but there is often some inflammation as well. It usually affects only one or two major joints (usually in the legs). It does not affect the internal organs. The

cause of knee osteoarthritis is not known. It is thought to be simply a process of “wear and tear” in most cases. Some conditions may predispose the knee to osteoarthritis, for example, a previous fracture that involved the joint, or by lesser injuries that may have torn ligaments or menisci. Abnormalities in development of the knee bones, such as bow legs, may cause the knee to wear out sooner than normal. In osteoarthritis of the knee the cartilage cushion is either thinner than normal (leaving bare spots on the bone), or completely absent. Bare bones grind against each other and cause mechanical pain. Fragments of cartilage floating in the joint may cause inflammation in the joint lining, and this is a second source of pain. X-rays show the “joint space” to be narrowed and irregular in outline. There is no blood test for osteoarthritis.

Rheumatoid Arthritis (R.A.) starts in the synovium and is mainly “inflammatory”. The cause is not known. It eventually destroys the joint cartilage. Bone next to the cartilage is also damaged, making it very soft. R.A. affects multiple joints simultaneously. It also affects internal organs. Another form of knee arthritis that is mainly “inflammatory” is Lupus. There are other more rare forms of arthritis that are also mainly “inflammatory”. They are basically similar to R.A.. X-ray changes in R.A. are essentially similar to osteoarthritis plus a loss of bone density.

Blood tests for rheumatoid arthritis are not very accurate. “Rheumatoid Factor” is present in the blood in about 80% of patients who have had rheumatoid arthritis for more than 18 months. Early on in the disease the percentage is much lower. Unfortunately, about 7% of people over the age of 70 test positive for rheumatoid factor, even though they do not have rheumatoid arthritis. The test, by itself, is therefore not very reliable.

Anti-inflammatory medications (see page 15) are effective in treating the “inflammatory” aspect of either rheumatoid or osteoarthritis.

Osteonecrosis is another (rare) condition which may cause knee pain. It is a condition in which parts of the femur bone die and later collapse.

MENISCAL INJURIES

Many patients have knee pain coming from injury to a meniscal cartilage rather than injury to the articular cartilage. Most people are not aware that there are these two types of cartilage in the knee. This is somewhat confusing. The articular cartilage is the cartilage that covers the ends of the bone (similar to the tread on a tire). A meniscal cartilage is a disc of cartilage that is actually separate from the femur and the tibia and the patella. There are two such c-shaped meniscal cartilages in the knee. They are sandwiched between the femur and the tibia. These meniscal cartilages are often injured, particularly during athletics.

If a meniscal cartilage is torn, it often does not heal and the pieces of the cartilage may become trapped in abnormal positions in the knee causing giving way, fluid on the knee, and pain with certain twisting

activities. The arthroscope, which is an instrument the size of a pencil, can be inserted into the knee through a minute incision allowing the physician to visualize the contents of the knee on a television screen. With small instruments placed into the knee through other minute puncture wounds, the surgeon can often remove the torn bits of meniscal cartilage and relieve the problems described above ("Arthroscopic Surgery"). However, when the articular cartilage has been worn out (as in arthritis), arthroscopy is rarely able to correct the problem and a knee replacement is often needed.

On to the Next Section of the Manual
Symptoms of Knee Disorder

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HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

KNEE TABLE OF CONTENTS

- Dr. Huddleston Bio
- Sir John Charnley
- Initial Consultation
- Anatomy of the Knee Joint
- Diseases of the Knee
- Symptoms of Knee Disease
- Non-Operative Treatment
- NSAIDs
- Exercise and Fitness
- When to Consider TKR
- Total Knee Replacement Surgery
- Implant Designs and Materials
- Other Surgical Alternatives
- Blood Transfusion
- Scheduling Surgery
- Your Current Medications
- Office Visit Before Surgery
- What to Bring to the Hospital
- Hospital Admission
- Expectations After Surgery
- Expectations at Home
- Home Exercises After Surgery
- Long-Term Care
- Allowable Activities After TKR
- Revision Knee Surgery
- Complications of TKR
- Special Studies

Arthritis of the Knee Joint

SYMPTOMS OF KNEE DISORDER

Arthritis pain coming from the knee joint may be felt in the front, the back, or the sides of the knee. Not all "knee pain" necessarily comes from the knee joint itself. Hip pain frequently radiates down the thigh to the knee. Sometimes knee pain is so prominent in patients with hip disease that the patient (and sometimes even the physician) can be fooled into thinking that the problem is in the knee when in fact the problem is in the hip. Other knee symptoms include catching, giving way (buckling), locking, swelling, a painful limp, creaking and a decreased distance the patient can walk because of pain. The movement that is possible in the knee joint will gradually become less: the knee may not straighten out all the way or may not bend fully, or both. The leg may become increasingly "bow-legged" or "knock-kneed" with time. At night the knee pain may awaken the patient when he or she turns over while sleeping.

On to the Next Section of the Manual
Treating Knee Arthritis Without Surgery

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HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

KNEE TABLE OF CONTENTS

- Dr. Huddleston Bio
- Sir John Charnley
- Initial Consultation
- Anatomy of the Knee Joint
- Diseases of the Knee
- Symptoms of Knee Disease
- Non-Operative Treatment
- NSAIDs
- Exercise and Fitness
- When to Consider TKR
- Total Knee Replacement Surgery
- Implant Designs and Materials
- Other Surgical Alternatives
- Blood Transfusion
- Scheduling Surgery
- Your Current Medications
- Office Visit Before Surgery
- What to Bring to the Hospital
- Hospital Admission
- Expectations After Surgery
- Expectations at Home
- Home Exercises After Surgery
- Long-Term Care
- Allowable Activities After TKR
- Revision Knee Surgery
- Complications of TKR
- Special Studies

Arthritis of the Knee Joint

TREATING KNEE ARTHRITIS WITHOUT SURGERY

1. Should you limit your activities? - If you have knee arthritis, the more you walk the more the knee will hurt. In time, running, tennis, golf and eventually even walking may become impossible. You can minimize the pain by simply cutting back on activities which seem to aggravate the knee. Whenever possible, use an elevator (or an escalator) instead of stairs, and avoid long walks that leave you in pain. However, "saving the joint" by becoming totally sedentary will not slow down the arthritis. Therefore it is recommended that you remain as active as your pain will comfortably allow. A reported study in the *Annals of Internal Medicine*, in 1992 suggests that people with hip arthritis who force themselves to remain active may do better in the long run than those who "baby" themselves. Also, being totally sedentary leads to a loss of muscle and bone strength. If you feel that you really need it, ask Dr. Huddleston's staff to arrange for a handicapped parking sign for your car, but you are better off parking further away and forcing yourself to walk!
2. A cane has been known since pre-biblical times to be an effective pain-reliever for knee arthritis. Unfortunately most people today are too vain to use one! Two important facts about canes: 1). Hold the cane in the opposite hand (yes, the opposite hand) from the side with the knee problem and: 2). The cane should be the correct height. Any medical supply company that sells you a cane will adjust it to the correct length. The physical therapy department at the Southern California Orthopedic Institute can also adjust the length for you if needed.
3. Weight loss will probably decrease your pain if you are greatly overweight. But weight reduction alone is unlikely to completely relieve the pain. Obesity also makes the knee operation more difficult, and complications occur more frequently in overweight people. Dr. Huddleston realizes that it can be very difficult to lose weight when you are not very active because of your knee pain. Do the best you can!
4. Gold injections and methotrexate may be useful in rheumatoid arthritis. The treatment is complex and usually only given under the supervision of a rheumatologist.
5. Cortisone injection. The symptoms of mild and moderate degrees of arthritis frequently improve with the injection of cortisone into the joint. This is not recommended more than once every two to three months or so if it works. The amount needed is very small and side effects are rare or minor. The more advanced the arthritic damage the less likely is Cortisone to be beneficial.
6. Knee braces generally have not been found to be very helpful for knee arthritis, but recently special braces and wedged shoes have been shown to be helpful in some

cases. An ace bandage may help to control swelling of the joint and gives some psychological benefit as well.

7. Non-Steroidal Anti-Inflammatory Agents

On to the Next Section of the Manual
Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)

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HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

KNEE TABLE OF CONTENTS

- Dr. Huddleston Bio
- Sir John Charnley
- Initial Consultation
- Anatomy of the Knee Joint
- Diseases of the Knee
- Symptoms of Knee Disease
- Non-Operative Treatment
- NSAIDs
- Exercise and Fitness
- When to Consider TKR
- Total Knee Replacement Surgery
- Implant Designs and Materials
- Other Surgical Alternatives
- Blood Transfusion
- Scheduling Surgery
- Your Current Medications
- Office Visit Before Surgery
- What to Bring to the Hospital
- Hospital Admission
- Expectations After Surgery
- Expectations at Home
- Home Exercises After Surgery
- Long-Term Care
- Allowable Activities After TKR
- Revision Knee Surgery
- Complications of TKR
- Special Studies

ARTHRITIS OF THE KNEE JOINT

Non-Steroidal Anti-Inflammatory Drugs

7. Non-Steroidal Anti-Inflammatory Drugs NSAIDs (Pronounced EN-seds), are a group of drugs which decrease the inflammation (pain and swelling) in arthritic joints. The pain relief from NSAIDs can be quite amazing. Although they are commonly referred to as “arthritis pills”, none of them will in any way influence the outcome of the arthritis. There are many NSAIDs available, and newer ones are constantly being brought onto the market. The “newest” one is not necessarily the most effective. Most people respond better to one NSAID than to another, and you may have to try several before the “right” one can be found for you. They all have potentially serious side effects and should only be taken under medical supervision. Most can only be obtained by prescription and are expensive. Aspirin (which is also an NSAID!) is cheap, and is often just as effective as any of the other NSAIDs. It should therefore be tried first. If even coated aspirin (Ecotrin) affects your stomach, then try extra-strength Tylenol. Most NSAIDs are “COX I Inhibitors.”

Always take NSAIDs with food or antacids, or with a full glass of water. These medications have potentially serious side effects, and should only be taken under close medical supervision.

COX II Inhibitors are a fairly new class of NSAIDs which include Celebrex and Mobic. (Vioxx and Bextra have been taken off the market).

In general, these drugs have been found to be slightly more effective than most (but not all) of the older, COX I NSAIDs, but this is not true for all patients. They have much fewer gastric side effects than COX I inhibitors, but side-effects are not eliminated. Celebrex cannot be taken by people allergic to sulfa and can elevate blood pressure if you already have hypertension by counteracting the effectiveness of some blood pressure medications known as “ACE Inhibitors”.

Side Effects of NSAIDs

Please read this section carefully if Dr. Huddleston has prescribed NSAIDs for you.

About 30% of patients on NSAIDs can expect some side effects. Most side effects are mild and may go away without treatment. Others are more serious and should be

treated right away.

Most NSAIDs can affect the liver, bone marrow or kidneys (see Table below). Although Dr. Huddleston may give you the initial prescription for NSAIDs, and help you find the most effective one for you, we prefer your family doctor or internist to continue prescribing the medication, since blood tests are needed at least every three months to determine if you are having harmful side effects. The damage is reversible if the medication is stopped in time.

Stomach Problems: Stop the medication immediately if you get stomach pain, cramping or burning. Check with your doctor if you get nausea, constipation or diarrhea which lasts for more than three days.

Fluid Retention: This may happen if the NSAIDs affect your kidney function. You may notice swelling of the ankles, feet, or lower legs, or an unusual weight gain. If this continues for more than two weeks, check with your doctor.

Bruising Tendency: NSAIDs interfere with the clotting of blood and may cause you to bruise easily. If you have any bleeding problems or take blood thinners, check with your doctor before taking NSAIDs.

Dizziness, Lightheadedness, or Drowsiness: These are rare. If they do occur they usually go away when your body adjusts to the medicine.

Stomach Ulcers: Some people taking NSAIDs develop stomach ulcers, and occasionally these may bleed. The bleeding can come with very little warning, and can even be severe enough to cause death. This is why stomach symptoms should be taken very seriously in patients on NSAIDs.

If you have severe heartburn, or if your stools turn pitch black (altered blood), or if you vomit blood or material that looks like coffee grounds, stop the medicine and call your doctor immediately.

Note that iron pills (taken for anemia or during the period you are giving blood for auto transfusion) will also turn your stools pitch black.

Most people can take NSAIDs without having stomach problems. However, you may have a higher risk if you have had previous ulcers, or are over the age of 60, use cortisone (such as Prednisone), smoke or drink alcohol. If you are in any of these high risk categories, it is recommended that you take Cytotec (which helps to protect the stomach) in addition to the NSAID. Cytotec is not routinely prescribed as it is expensive and has side effects of its own. There are other medications which can help protect the stomach.

Drugs that may interact with NSAIDs

Some drugs may interact adversely with NSAIDs. In some cases the combination should be avoided completely; in others, the dosage of either drug may need compensatory adjustment.

Never take Aspirin-containing medication at the same time as taking NSAIDs.

If you are taking any of the following drugs, consult your internist before commencing treatment with NSAIDs. There may be others not included in this list: aspirin, lithium, phenytoin, methotrexate, digoxin, probenecid, barbiturates, anticoagulants, high blood pressure medications, antacids, oral diabetes medications or diuretics.

Allergy to the NSAIDs: This may be manifested as rapid breathing, gasping, wheezing, fainting, hives, itching, skin rash, rapid heart beat, or sudden puffiness of the eyelids. Allergy is exceedingly rare. It occurs sometimes in people who are truly allergic to aspirin. If you have these symptoms and you do not have someone to drive you to the hospital, call an ambulance and get to the hospital as soon as you can, since the allergic reaction could be severe and need urgent medical treatment.

Remember to discontinue the use of any aspirin or aspirin-containing drugs 7 days prior to your surgery. All nonsteroidal anti-inflammatory medications should be discontinued 7 days prior to your surgery.

The reason for discontinuing these medications is that they can increase bleeding at the time of surgery. Tylenol, Darvocet, and Tylenol with Codeine can be taken by mouth up to the night before the operation. If you have an uncemented implant, you should not use Indomethacin after surgery unless approved by Dr. Huddleston, since it may interfere with bone-ingrowth into the implant surface.

EXAMPLES OF PRESCRIPTION AND OVER-THE-COUNTER NSAIDs

Generic Name	Some Brand Names
COX I INHIBITORS	
aspirin compounds (acetylsalicylates)	Anacin, Bayer, BC Powder, Bufferin Excedrin, Ecotrin, Zorpin
non-aspirin salicylates	Arthropan, Disalcid, Magan, Trilisate
diclofenac	Voltaren *
fenoprofen	Nalfon *
flurbiprofen	Ansaid *
ibuprofen	Advil, Medipren, Motrin Nuprin, Rufen *
indomethacin	Indocin *

ketoprofen	Orudis *
meclofenamate	Meclomen *
mefenamic acid	Ponstel
naproxen	Naprosyn *
naproxen sodium	Anaprox *
phenylbutazone	Butazolidin *
prioxicam	Feldene *
sulindac	Clinoril *
tolmetin	Tolectin *
COX II INHIBITORS	
Celecoxib	Celebrex * +
Meloxicam	Mobic *

* Can affect liver or kidneys. Need to have blood tests every 3-6 months (Complete Blood Count, Liver Function Tests, serum creatinine).
+ Can elevate blood pressure.

RULES FOR PATIENTS TAKING NSAIDs

- A. Tell your doctor if you are taking any other prescription or over-the-counter medications. Also if you have any other medical problems, especially stomach ulcers, bleeding tendency, colitis, diverticulitis (or other stomach or bowel disease), kidney disease, asthma or liver disease.
- B. Always take NSAIDs with a meal and plenty of liquids.
- C. Don't exceed the dose prescribed by your doctor if it doesn't seem to be working to your satisfaction. There is a maximum effective dose for each NSAID and it could be very harmful to exceed that dose.
- D. Don't take NSAIDs only when you have pain or only when you expect to have pain (such as before a game of golf). NSAIDs may take up to two weeks to reach their full effect.
- E. Don't take NSAIDs with alcohol or caffeine-containing beverages. These beverages make stomach problems worse.
- F. Don't simultaneously take other medications containing aspirin compounds or ibuprofen. Taking the prescribed NSAID in addition may cause side-effects from too much NSAID in your BODY onunload="leave()" . You can take Tylenol together with any of the NSAIDs.
- G. Don't drive or operate machinery if your NSAID makes you feel drowsy or dizzy.

neutraceuticals widely used even though there is less evidence for their efficacy.

9. Hyalgan, Synvisc and Supartz (“viscosupplementation”) are clear liquids purified from rooster combs. They increase the viscosity of joint fluid and the elasticity of the joint cartilage, and are also thought to have a weak NSAID (pain-relieving) effect. It only stays in the joint for about 48 hours, but the improvement can last for six to 12 months. It works best on mild to moderate arthritis. Repeat courses can be given every 6 to 12 months if it works well. FDA approval is only for use in the knee, but it can be used “off label” in the hip joint. A series of three or five injections are given into the joint. You cannot have these injections if you are allergic to eggs or feathers. Synvisc sometimes causes severe inflammation and swelling in the knee. Dr. Huddleston prefers Hyalgan because the side effects are negligible.

On to the Next Section of the Manual:
Keeping Fit with An Arthritic Knee

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HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

KNEE TABLE OF CONTENTS

- Dr. Huddleston Bio
- Sir John Charnley
- Initial Consultation
- Anatomy of the Knee Joint
- Diseases of the Knee
- Symptoms of Knee Disease
- Non-Operative Treatment
- NSAIDs
- Exercise and Fitness
- When to Consider TKR
- Total Knee Replacement Surgery
- Implant Designs and Materials
- Other Surgical Alternatives
- Blood Transfusion
- Scheduling Surgery
- Your Current Medications
- Office Visit Before Surgery
- What to Bring to the Hospital
- Hospital Admission
- Expectations After Surgery
- Expectations at Home
- Home Exercises After Surgery
- Long-Term Care
- Allowable Activities After TKR
- Revision Knee Surgery
- Complications of TKR
- Special Studies

ARTHRITIS OF THE KNEE JOINT

KEEPING FIT WITH AN ARTHRITIC KNEE

A recent study suggests that people with knee arthritis may fare better if they force themselves to remain as active as possible, even if the exercise causes some pain.

Take pain medicine as necessary before exercising. There is no evidence that being active will cause a more rapid deterioration of your arthritic knee. Being active is important for your general health and mental well-being. It also keeps your muscles strong, and this will speed your recovery after surgery. You are the best judge of what you can do. Remain as active as your pain will allow you to be until you decide to proceed with surgery.

Walking a treadmill or jogging will usually aggravate knee pain. The best all-around exercise for you is swimming. The water relieves the stress on your knee as you "walk" about in the shallow end of the pool. Lap swimming is excellent: it involves the use of most of your BODY onunload="leave()" muscles. Dr. Huddleston can prescribe a program of "pool therapy" for you if it is available in your area. Bicycling (stationary or mobile) is also well tolerated. If you do not have access to an exercise bike or pool, then walk as much as you can.

On to the Next Section of the Manual
When Should You Consider a Knee Replacement

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HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

KNEE TABLE OF CONTENTS

- [Dr. Huddleston Bio](#)
- [Sir John Charnley](#)
- [Initial Consultation](#)
- [Anatomy of the Knee Joint](#)
- [Diseases of the Knee](#)
- [Symptoms of Knee Disease](#)
- [Non-Operative Treatment](#)
- [NSAIDs](#)
- [Exercise and Fitness](#)
- [When to Consider TKR](#)
- [Total Knee Replacement Surgery](#)
- [Implant Designs and Materials](#)
- [Other Surgical Alternatives](#)
- [Blood Transfusion](#)
- [Scheduling Surgery](#)
- [Your Current Medications](#)
- [Office Visit Before Surgery](#)
- [What to Bring to the Hospital](#)
- [Hospital Admission](#)
- [Expectations After Surgery](#)
- [Expectations at Home](#)
- [Home Exercises After Surgery](#)
- [Long-Term Care](#)
- [Allowable Activities After TKR](#)
- [Revision Knee Surgery](#)
- [Complications of TKR](#)
- [Special Studies](#)

ARTHRITIS OF THE KNEE JOINT

WHEN SHOULD YOU CONSIDER KNEE REPLACEMENT SURGERY?

If your symptoms are mainly from an arthritic knee, and you are physically fit enough to undergo surgery, when should you consider having your knee replaced? Knee arthritis is not a life-threatening condition: the procedure is “elective”. There are possible complications associated with knee replacement surgery (see [Complications Associated with Knee Replacement Surgery](#)) and Dr. Huddleston will only offer it as an option for you to consider. The decision to have the operation is a highly personal matter, and only you can make that decision. If you are confined to a wheelchair and in constant pain, it is a decision that will be quite easy for you to make, even though the operation (any operation) involves taking a certain amount of risk. If your disability is great enough, the potential benefits are worth the risk. If your arthritis is responding to conservative measures, and you can still walk long distances without a cane, you don't need a knee replacement.

Here are some facts to help you make your decision:

1. Once you have knee arthritis it will never get better. It won't even stay the same. It will generally progress as time goes by. There are no exercises, diets, vitamins, or minerals (including calcium) which will make any difference. Copper bracelets will definitely not make any difference!
2. The rate of further deterioration varies greatly from person to person. The pain may become unbearable within six months for one person, yet drag on at a tolerable level for several years in another person who has the same degree of arthritis.
3. You will never need a knee replacement if you are willing to live with the pain.
4. You may believe that it is better to delay having the operation in hope that the technology of knee replacement will improve with time. However, the rate of progress in this area is extremely slow, so this is something to consider only if you are very young, or your arthritis is mild and you can easily live with your symptoms.

5. More than 96% of patients who have a knee replacement operation have no major complications.
6. The main arguments against waiting too long are:
 - a. The longer your arthritis forces you to “sit around” the softer your bones become, and the weaker your muscles.
 - b. If your pain and disability are not responding to conservative measures, and you realize that you are going to have to have the operation sooner or later anyhow, you may reasonably conclude that there is no point in waiting. Why put it off for another year or two when you could have spent that time enjoying your life free of pain!

If you are in doubt about whether or not you should have the surgery then a second opinion may give you the reassurance you need. You may also discuss your knee problem with your family physician or a rheumatologist, and other people who have had knee replacements. The nice thing to know is that you need never be crippled because of your knee arthritis, because of the option of knee replacement available to you.

On to the Next Section of the Manual
Total Knee Replacement Surgery

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HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

KNEE TABLE OF CONTENTS

- [Dr. Huddleston Bio](#)
- [Sir John Charnley](#)
- [Initial Consultation](#)
- [Anatomy of the Knee Joint](#)
- [Diseases of the Knee](#)
- [Symptoms of Knee Disease](#)
- [Non-Operative Treatment](#)
- [NSAIDs](#)
- [Exercise and Fitness](#)
- [When to Consider TKR](#)
- [Total Knee Replacement Surgery](#)
- [Implant Designs and Materials](#)
- [Other Surgical Alternatives](#)
- [Blood Transfusion](#)
- [Scheduling Surgery](#)
- [Your Current Medications](#)
- [Office Visit Before Surgery](#)
- [What to Bring to the Hospital](#)
- [Hospital Admission](#)
- [Expectations After Surgery](#)
- [Expectations at Home](#)
- [Home Exercises After Surgery](#)
- [Long-Term Care](#)
- [Allowable Activities After TKR](#)
- [Revision Knee Surgery](#)
- [Complications of TKR](#)
- [Special Studies](#)

ARTHRITIS OF THE KNEE JOINT

TOTAL KNEE REPLACEMENT SURGERY

The modern total hip replacement was invented in 1962 by [Sir John Charnley](#), an orthopedic surgeon working in a small country hospital in England. His work has been one of the great triumphs of Twentieth Century surgery. Two revolutionary features of the Charnley hip replacement were 1) the combination of metal gliding on plastic, and 2) the use of methacrylate cement to attach the artificial components to the bone. A Canadian orthopedic surgeon (Gunston) working with John Charnley applied the principles of hip replacement to the knee. His knee replacement was received with some enthusiasm by many surgeons. Other surgeons quickly began to work on newer designs for an improved knee replacement.

The operation has become fairly routine and is successful around 96% of the time.

One of the first American surgeons to perform this type of knee surgery was Charles O. Bechtol. He started a total hip replacement program in 1969 while he was professor of orthopedic surgery at UCLA. He also designed a knee replacement system which was widely used and accepted in the U.S. Dr. Huddleston studied hip and knee surgery with him for one year in 1975. The two later became partners in a private practice restricted to total joint replacement. Dr. Bechtol retired in 1984 and Dr. Huddleston took over the practice and merged the practice with the Southern California Orthopedic Institute in 1988. The knee replacement designs which were available during the early 70's were decidedly inferior when compared to the hip replacement devices available at that time. However, by the late 70's, the surgical technique improved considerably and better designs became available. A major improvement was the development of accurate instrumentation for installing the new knee surfaces. Today knee replacement surgery is at least as good as hip replacement surgery. The major problem with hip replacement surgery is durability. This is also a problem with knee replacements but a good knee replacement is probably a more durable operation than a good hip replacement. The operation of knee replacement is much

more complicated than hip replacement to perform.

The term “knee replacement” sounds like a more radical procedure than it actually is. Most patients imagine that 3 inches of bone is removed from each of the knee bones and that a large metal and plastic device is installed in its place. In actual fact, the procedure is more akin to dentistry and a better term would be Knee Resurfacing. A thin layer of bone is removed from the damaged surface of the femur (thigh bone) using special instruments which remove the correct thickness of bone. The removed bone is then replaced by a thin layer of metal, approximately the same thickness as the bone which was removed. In a similar fashion the upper end of the tibia (shin bone) is removed and is replaced with a wafer of plastic. The back part of the knee cap (patella) may also be resurfaced with a piece of plastic.

The three parts are attached to the bone by means of a “bone cement” (methylmethacrylate). When this cement is first mixed it develops a dough-like consistency. This dough is pressed into the bone and the parts of the Prosthesis are pressed into the dough. The cement then hardens over 10 to 15 minutes into a plastic-like consistency. After the knee has been replaced, the metal “cap” covering the end of the femur rubs against the plastic covering on the end of the tibia, preventing bone from rubbing on bone and giving relief from pain. The plastic is high density polyethylene a material which has a very low wear-rate and a very low frictional resistance when rubbing against the highly polished metal surface.



OTHER SURGICAL CONSIDERATIONS DURING KNEE REPLACEMENT

1. If your leg has a fairly normal alignment to begin with, you can expect that it will be "straight" after the operation. However, if your legs are severely bowed or "knock-kneed" there is a good chance that the alignment will not be "normal" after the operation.
2. Your patellar tendon may require detachment from the shin bone during the operation if you have a "tight" knee with a lot of scar tissue. If so, you may have to wear a splint or cast on the leg for several weeks after the operation, but this is not common.

On to the Next Section of the Manual
Implant Designs and Materials



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HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

KNEE TABLE OF CONTENTS

- [Dr. Huddleston Bio](#)
- [Sir John Charnley](#)
- [Initial Consultation](#)
- [Anatomy of the Knee Joint](#)
- [Diseases of the Knee](#)
- [Symptoms of Knee Disease](#)
- [Non-Operative Treatment](#)
- [NSAIDs](#)
- [Exercise and Fitness](#)
- [When to Consider TKR](#)
- [Total Knee Replacement Surgery](#)
- [Implant Designs and Materials](#)
- [Other Surgical Alternatives](#)
- [Blood Transfusion](#)
- [Scheduling Surgery](#)
- [Your Current Medications](#)
- [Office Visit Before Surgery](#)
- [What to Bring to the Hospital](#)
- [Hospital Admission](#)
- [Expectations After Surgery](#)
- [Expectations at Home](#)
- [Home Exercises After Surgery](#)
- [Long-Term Care](#)
- [Allowable Activities After TKR](#)
- [Revision Knee Surgery](#)
- [Complications of TKR](#)
- [Special Studies](#)

ARTHRITIS OF THE KNEE JOINT

IMPLANT DESIGNS AND MATERIALS

There are many designs of knee implants available to the surgeon. There is no universal agreement as to which design is best. Each surgeon selects what he believes is best, or what he was trained to use.

The most important consideration is that your surgeon should be totally comfortable and familiar with the surgical technique for installation of the implant selected. Each type has unique surgical aspects and considerations which can only be learned by experience with many cases.

Metal parts of the implant are manufactured of Cobalt-chrome or Titanium. There is no agreement as to which is the better metal. But there is universal agreement that it is better if the metal part that moves on the plastic is made of cobalt chrome. The most important problem in the complex field of implant design is the issue of metal and plastic wear (resulting from parts moving on each other) and the tiny particles produced by such wear. These particles may cause adverse responses in the surrounding tissues and bone, resulting in loosening of the implant. The greatest amount of particles is produced by a titanium metal part moving against a plastic part. It is an area of continuing research.

The plastic parts of the implant are made of high-density polyethylene which has proved very acceptable over the years. Efforts are underway to develop "improved" polyethylenes.

The knee implant usually used by Dr. Huddleston is the "Low-Contact-Stress-Knee" manufactured by the Johnson and Johnson Corporation of Warsaw, Indiana. Its metal parts are of cobalt chrome. It has a rotating plastic bearing which improves the range of motion and greatly decreases wear of the plastic and the production of harmful particulates. A potential complication with the bearing is that it may "spin-out", sometimes requiring

re-operation (the operation is minor and the chances of this happening are less than 1/4%).

Note that the metal parts of the knee replacement may trigger airport security devices (about 30% of patients). Dr. Huddleston will give you a plastic card with a picture of your implant x-ray to show security personnel.

A frequently asked question is the weight of the implant: the knee implant weights between 15 and 20 ounces, depending on the size selected for you.

On to the Next Section of the Manual
Other Surgical Options for Knee Arthritis

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HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

KNEE TABLE OF CONTENTS

- [Dr. Huddleston Bio](#)
- [Sir John Charnley](#)
- [Initial Consultation](#)
- [Anatomy of the Knee Joint](#)
- [Diseases of the Knee](#)
- [Symptoms of Knee Disease](#)
- [Non-Operative Treatment](#)
- [NSAIDs](#)
- [Exercise and Fitness](#)
- [When to Consider TKR](#)
- [Total Knee Replacement Surgery](#)
- [Implant Designs and Materials](#)
- [Other Surgical Alternatives](#)
- [Blood Transfusion](#)
- [Scheduling Surgery](#)
- [Your Current Medications](#)
- [Office Visit Before Surgery](#)
- [What to Bring to the Hospital](#)
- [Hospital Admission](#)
- [Expectations After Surgery](#)
- [Expectations at Home](#)
- [Home Exercises After Surgery](#)
- [Long-Term Care](#)
- [Allowable Activities After TKR](#)
- [Revision Knee Surgery](#)
- [Complications of TKR](#)
- [Special Studies](#)

ARTHRITIS OF THE KNEE JOINT

OTHER SURGICAL OPTIONS FOR KNEE ARTHRITIS

Knee disease can be treated by other surgical methods besides total knee replacement.

1. Unicompartamental Knee Replacement - Each knee actually has two "compartments" - an inner and an outer compartment. Not infrequently one compartment will be severely affected by arthritis while the other may be almost normal. In these circumstances you may best be served by having only the "bad" compartment replaced (called a "unicompartamental knee replacement" or a "uni"). The advantages of uni include a better range of motion, quicker recovery and somewhat more lenient long-term restrictions. The main disadvantage is that the non-replaced compartment may continue to deteriorate and later need to be resurfaced anyway: quite frequently within three to four years after the first operation. Unicompartamental knee replacement has been more widely accepted by both surgeons and patients in Europe than in the United States.
2. Arthroscopic Surgery - Mild to moderate cases of knee arthritis frequently benefit from an arthroscopic "clean-out". But the benefits are usually temporary. At best, arthroscopy may delay the time for more major surgery by a year or two.
3. Synovectomy - Is mainly of benefit in selected cases of rheumatoid arthritis. The soft tissue joint lining (synovium) is removed. This may be performed arthroscopically or be an open operation. Unfortunately, the synovium can grow back and the arthritis can then progress.
4. Osteotomy - This is another procedure by which knee arthritis can be treated. This is an operation in which either the tibia or the femur bone is cut and the alignment of the leg is changed. Most patients, as they develop arthritis in the knee, either become increasingly bow-legged or knock-kneed. This deformity of the leg actually accentuates and accelerates the arthritis in the knee. If the leg can be straightened by "osteotomy" then the symptoms of knee arthritis will usually be improved. Osteotomy of the knee is usually reserved for younger patients who have mild disease and bow legs, and who can still straighten their knee completely. Osteotomy under the right circumstances can give excellent pain relief but the results are not as predictable as knee replacement

surgery. Even those patients who have an excellent result can expect to have a knee replacement at some time in the future.

5. Knee Fusion - This is a procedure in which the femur bone is made to fuse to the tibial bone. This results in a permanent and complete stiffness of the knee joint. The procedure is rarely performed today because most patients will not accept a totally stiff knee. Occasionally it is recommended for a young person who's work involves heavy labor. However, it is very inconvenient to have a stiff knee. It makes getting in and out of tight spaces very difficult. A stiff knee is also very inconvenient when sitting in a movie theater or on an airplane and it also makes driving more difficult.

On to the Next Section of the Manual
Blood Transfusion for Total Joint Replacement

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HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

KNEE TABLE OF CONTENTS

- [Dr. Huddleston Bio](#)
- [Sir John Charnley](#)
- [Initial Consultation](#)
- [Anatomy of the Knee Joint](#)
- [Diseases of the Knee](#)
- [Symptoms of Knee Disease](#)
- [Non-Operative Treatment](#)
- [NSAIDs](#)
- [Exercise and Fitness](#)
- [When to Consider TKR](#)
- [Total Knee Replacement Surgery](#)
- [Implant Designs and Materials](#)
- [Other Surgical Alternatives](#)
- [Blood Transfusion](#)
- [Scheduling Surgery](#)
- [Your Current Medications](#)
- [Office Visit Before Surgery](#)
- [What to Bring to the Hospital](#)
- [Hospital Admission](#)
- [Expectations After Surgery](#)
- [Expectations at Home](#)
- [Home Exercises After Surgery](#)
- [Long-Term Care](#)
- [Allowable Activities After TKR](#)
- [Revision Knee Surgery](#)
- [Complications of TKR](#)
- [Special Studies](#)

ARTHRITIS OF THE KNEE JOINT

BLOOD TRANSFUSION FOR TOTAL JOINT REPLACEMENT

We do everything we can to minimize blood loss during surgery. Your blood pressure is lowered during the operation to cut down on bleeding, and cut blood vessels are zealously cauterized, and we use the smallest incision possible. Even so, almost all knee replacement patients need to be transfused after the operation because of oozing from cut surfaces, much of it occurring after the operation is over.

First time knee replacements require a 1 unit transfusion of blood. Revision knee replacements needs 2 units or more.

The advent of AIDS has highlighted the risks associated with using other people's blood ([see Diseases Transmitted Through Blood Transfusion, below](#)). Dr. Huddleston has always recommended that his patients donate their own blood prior to hip surgery because of the other risks associated with transfusion. The blood is stored and given back to you at the time of the operation ([see Autologous Donation below](#)). If you are not able to donate blood for yourself (for whatever reason), it is recommended that you solicit family members or friends to donate on your behalf ([see Directed Blood below](#)). Sometimes a combination of these two methods is chosen: that is, you may donate one unit of your own blood and request friends or relatives to donate two units. Your third option is to use "hospital blood" ([see Volunteer Donor Blood below](#)).

1. Autologous Blood is blood donated by you and later given back to you. It is stored in a liquid state and is good for 42 days from the day of collection. It can be stored frozen for up to a year, but freezing triples the cost and is therefore only used in very special circumstances.

More can be taken over a longer period, but some of the units may have to be frozen if storage is required for more than 42 days. Note that blood already being stored in liquid form cannot be frozen if your surgery is postponed for any reason. Freezing must be done at the time of collection. If you have already given your blood for storage, and your surgery is to be

delayed for any reason, we can use the “piggy-back” technique to save a unit of your banked blood that is about to expire. We give it back to you as a transfusion, wait ten minutes, and then take a fresh unit that will be good for another 42 days!

There is no age requirement for storing your own blood, and no specific weight requirement. However, if you are anemic (Hemoglobin under 11 gm/dl), we cannot take your blood. There are also some medical conditions which might preclude you from donating your own blood, such as some heart disorders.

It is advisable to take minerals and vitamins to help your body replace the blood lost by your donations. Take these from the day of your first donation until the day prior to surgery:

1. Iron (Nu-Iron 150), 1 tablet 2 times a day.
2. Folic acid, 1 mg once a day.
3. Vitamin C, 250 mg twice a day.

2. Directed donor blood is blood donated by a relative or friend. It is carefully labeled and reserved specifically for you. It is rigorously tested for disease, but it is still possible to contract disease through directed blood: the donor may not know he has the disease, and tests may fail to detect it. Directed donor blood is only given to you after surgery if it is medically necessary to do so. If you plan to have directed donors, it is best that you first donate a unit (450 cc) of your blood. Then, when your blood group is known, and the bank has a specimen of your blood to use in cross-match tests, suitable donors can be canvassed. Bear in mind that it takes a minimum of 48 hours to process and test blood before it can be transfused.

WHO CAN GIVE BLOOD FOR YOU?

Someone who is:

1. Seventeen years or older.
2. Weighs more than 110 pounds.
3. Is in good health at present and does not have anemia.
4. Has never had yellow jaundice or liver disease.
5. Has never tested positive for AIDS.
6. Has not donated blood in the past eight weeks.
7. Has not received a blood transfusion in the past six months.
8. Has never been turned down as a blood donor.
9. Has a compatible blood group (see table below).

Once you know your own blood group the following table will help you to determine who might be a compatible donor:

Your Blood Group	You Can Receive Blood From Donors With
A+	A+, A-, O+, or O-
A-	A- or O-
B+	B+, B-, O+, or O-
B-	B- or O-
AB+	A+, A-, B+, B-, AB+, AB-, O+, O-
AB-	A-, B-, or O-
O+	O+ or O-
O-	O-

Tell the prospective donor to go to the same blood bank where you gave your first unit, and to inform the bank that they want to give a directed unit of blood for you. You do not need to be present.

3. Volunteer donor blood is blood donated by a member of the general public unknown to you. Potential donors fill out an extensive health questionnaire and the blood is rigorously tested. There are risks associated with receiving volunteer blood. Sometimes, in emergency situations, we may have to use volunteer blood if the amount of blood pre-stored for you is insufficient. But we would only do so in a rare, life-saving situation. Volunteer blood is rigorously tested and is safer now than it has ever been in the past.

DISEASE TRANSMISSION THROUGH BLOOD TRANSFUSION

All blood intended for transfusion is screened for AIDS, but the tests are not sensitive enough. There is a gap ("window"), believed to be between six and 12 months, during which infected persons will test negative. This is the great danger of accepting blood from others. This problem will persist until a test is available which will show positive as soon as an AIDS victim has the virus in his blood. Other diseases can be transmitted through blood; for example, hepatitis. Fortunately the tests for them are more accurate. The chances of getting AIDS through volunteer blood is currently about 1:2,000,000.

WHERE TO DONATE YOUR BLOOD

You may donate at the blood bank of the hospital at which you will have your surgery. If you live far from that hospital, or out of state, you may elect to donate blood at a major hospital near your home. It will be transferred to Dr. Huddleston's hospital before surgery.

Blood can also be donated at any American Red Cross blood collection facility. Please call (800) 974-2113 to locate the center nearest your home.

When making donations, please come with someone who can drive you home, since you may feel a little dizzy.

FORCING YOUR BODY TO MAKE MORE BLOOD.

Epogen, a new hormone wonder-drug given by injection, can speed up the rate of production of new blood by your own body. It is especially useful if you cannot give blood for yourself. It can be given to anemic patients before surgery, or after surgery if you did not donate sufficient blood and your hemoglobin level is low.

Jehovah's Witnesses: Although most patients require two or more units of blood transfusion after hip replacement, such transfusion is not mandatory. We have operated upon many Jehovah's Witness patients and have been able to avoid transfusion altogether. The main disadvantage is that it takes longer for you to get back to full strength. It may take three months or more on iron and vitamin supplements to return the blood level to normal. Genetically engineered erythropoietin ("Epo") given by injection can "force" the body to restore your own blood more rapidly.

On to the Next Section of the Manual
Scheduling Your Knee Replacement Surgery

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HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

KNEE TABLE OF CONTENTS

- [Dr. Huddleston Bio](#)
- [Sir John Charnley](#)
- [Initial Consultation](#)
- [Anatomy of the Knee Joint](#)
- [Diseases of the Knee](#)
- [Symptoms of Knee Disease](#)
- [Non-Operative Treatment](#)
- [NSAIDs](#)
- [Exercise and Fitness](#)
- [When to Consider TKR](#)
- [Total Knee Replacement Surgery](#)
- [Implant Designs and Materials](#)
- [Other Surgical Alternatives](#)
- [Blood Transfusion](#)
- [Scheduling Surgery](#)
- [Your Current Medications](#)
- [Office Visit Before Surgery](#)
- [What to Bring to the Hospital](#)
- [Hospital Admission](#)
- [Expectations After Surgery](#)
- [Expectations at Home](#)
- [Home Exercises After Surgery](#)
- [Long-Term Care](#)
- [Allowable Activities After TKR](#)
- [Revision Knee Surgery](#)
- [Complications of TKR](#)
- [Special Studies](#)

ARTHRITIS OF THE KNEE JOINT

SCHEDULING YOUR SURGERY

Once you have decided to proceed with surgery, there are a number of things that need to be taken care of before the day of the operation:

1. Schedule the date for your surgery (see below).
2. Store your blood at the blood bank. (see [Blood Transfusion for Total Knee Replacement](#)).
3. Start taking iron and vitamin supplements (see [Blood Transfusion for Total Knee Replacement](#)).
4. Make an appointment to see the internist (see below).
5. Have the necessary lab work done (see below).
6. Stop taking certain medications in the days before surgery (see [Knee Surgery and Your Current Medications](#)).
7. See Dr. Huddleston for a final visit to make sure everything is in order (see [Final Office Visit Before Surgery](#)).

SELECTING A DATE FOR SURGERY

Dr. Huddleston's assistant will arrange scheduling. Dr. Huddleston is usually scheduled ahead for about four weeks. The surgical assistant will also assist you with getting your blood storage program started, and with selecting an internist if you do not have one on staff at the hospital where you will have your surgery.

APPOINTMENT WITH THE INTERNIST

This is major surgery so medical evaluation by an internist is needed before we proceed with the operation. The internist will also see you daily while you are in the hospital to make sure that any medical complications which may develop are promptly recognized and treated.

It is best when your own internist is on staff at the same hospital as Dr. Huddleston. If not, we will select an internist for you who is familiar with joint replacement patients, and works with Dr. Huddleston on a regular basis. An appointment with the internist is usually made 5 to 7 days before

surgery, unless you have some serious medical problems that need more time to correct. If you have any infection (teeth, bladder, prostate, kidney, uterus, etc.), it should be treated and cleared up before undergoing joint replacement surgery.

Diseases such as diabetes and heart disease do not disqualify you from surgery, as long as they are under control. Some conditions may make the risk of joint replacement too great (chronic infection or a recent heart attack or stroke). The internist will help you weigh the risks of surgery against your age and general health.

DUTIES OF THE INTERNIST:

1. Dictate your complete medical history and physical examination into the hospital transcription system.
2. Order and evaluate necessary lab tests, including: complete blood count, chemistry and electrolyte panel, urine analysis, coagulation profile, electrocardiogram, chest x-ray and any other necessary tests needed to be sure that surgery is not too risky for you.
3. Prescribe any special medications (if any) before and after surgery including anticoagulants to prevent blood clots).
4. Transmit the results of all your lab tests to Dr. Huddleston's office at least two days prior to the surgery date.
5. See you in the hospital after surgery on the day of surgery, and then daily thereafter while you are in the hospital.
6. Order and monitor (with blood tests) anticoagulant medications needed to help prevent deep vein thrombosis after surgery.
7. Continue to administer and monitor the anticoagulant medications for four weeks after the operation.

Please show this section of this book to your internist to appraise him/her of these special needs, to take you safely through your knee operation.

If your own internist (or an associate) is not able to see you everyday while you are in the hospital, he or she can still perform the pre-operative evaluation and clearance for surgery, and fax the report to Dr. Huddleston (fax 818-708-7129). We will then assign an internist to see you and follow along daily while you are in the hospital, and will hand your care back to your own doctor after you leave the hospital.

It must be clearly understood that you **MUST BE SEEN DAILY BY THE INTERNIST WHILE YOU ARE IN THE HOSPITAL.**

On to the Next Section of the Manual
Knee Surgery and Your Current Medications



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HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

KNEE TABLE OF CONTENTS

- Dr. Huddleston Bio
- Sir John Charnley
- Initial Consultation
- Anatomy of the Knee Joint
- Diseases of the Knee
- Symptoms of Knee Disease
- Non-Operative Treatment
- NSAIDs
- Exercise and Fitness
- When to Consider TKR
- Total Knee Replacement Surgery
- Implant Designs and Materials
- Other Surgical Alternatives
- Blood Transfusion
- Scheduling Surgery
- Your Current Medications
- Office Visit Before Surgery
- What to Bring to the Hospital
- Hospital Admission
- Expectations After Surgery
- Expectations at Home
- Home Exercises After Surgery
- Long-Term Care
- Allowable Activities After TKR
- Revision Knee Surgery
- Complications of TKR
- Special Studies

ARTHRITIS OF THE KNEE JOINT

KNEE SURGERY AND YOUR CURRENT MEDICATIONS

Non-steroidal anti-inflammatory medications should be stopped three days prior to your knee surgery. These medications are **listed here**. If you are taking aspirin or aspirin-containing drugs such as Percodan, Excedrin, or Anacin, these should be stopped 7 days prior to your surgery. Some of these drugs are **listed here**. If you are on Coumadin it will have to be stopped, under the supervision of your internist, several days prior to your surgery.

The reason that these medications are discontinued is because they can increase bleeding at the time of surgery.

Extra strength Tylenol, Darvocet, Percocet and Tylenol with Codeine may be taken by mouth up to the night before your operation. Your internist may want you to take certain of your regular medicines with a sip of water on the morning of surgery, even though you are not supposed to eat or drink anything after midnight. You may do so.

On to the Next Section of the Manual
Final Office Visit with Dr. Huddleston Before Surgery

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HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

KNEE TABLE OF CONTENTS

- Dr. Huddleston Bio
- Sir John Charnley
- Initial Consultation
- Anatomy of the Knee Joint
- Diseases of the Knee
- Symptoms of Knee Disease
- Non-Operative Treatment
- NSAIDs
- Exercise and Fitness
- When to Consider TKR
- Total Knee Replacement Surgery
- Implant Designs and Materials
- Other Surgical Alternatives
- Blood Transfusion
- Scheduling Surgery
- Your Current Medications
- Office Visit Before Surgery
- What to Bring to the Hospital
- Hospital Admission
- Expectations After Surgery
- Expectations at Home
- Home Exercises After Surgery
- Long-Term Care
- Allowable Activities After TKR
- Revision Knee Surgery
- Complications of TKR
- Special Studies

ARTHRITIS OF THE KNEE JOINT

FINAL OFFICE VISIT WITH DR. HUDDLESTON BEFORE SURGERY

A day or two prior to your surgery you will come to our office for a final preoperative visit to make sure everything is in order. Your vital signs will be checked, allergies and current medications will be reviewed, and the surgery scheduler will give you papers to take with you to the hospital. You will also have a chance to ask Dr. Huddleston any unanswered questions you may have. If your internist has not done all the necessary blood tests, we will send you to the hospital to do additional tests.

On to the Next Section of the Manual
What to Bring to the Hospital

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HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

KNEE TABLE OF CONTENTS

- Dr. Huddleston Bio
- Sir John Charnley
- Initial Consultation
- Anatomy of the Knee Joint
- Diseases of the Knee
- Symptoms of Knee Disease
- Non-Operative Treatment
- NSAIDs
- Exercise and Fitness
- When to Consider TKR
- Total Knee Replacement Surgery
- Implant Designs and Materials
- Other Surgical Alternatives
- Blood Transfusion
- Scheduling Surgery
- Your Current Medications
- Office Visit Before Surgery
- What to Bring to the Hospital
- Hospital Admission
- Expectations After Surgery
- Expectations at Home
- Home Exercises After Surgery
- Long-Term Care
- Allowable Activities After TKR
- Revision Knee Surgery
- Complications of TKR
- Special Studies

ARTHRITIS OF THE KNEE JOINT

WHAT TO BRING TO THE HOSPITAL

1. Bring this manual with you.
2. The forms and papers given to you in the office to take to the hospital.
3. Toiletries.
4. Make-up kit (women).
5. A list of important phone numbers, including those of friends you might want to call while you are in the hospital.
6. Sturdy bedroom slippers with non-skid soles.
7. The hospital will provide you with a gown to wear in bed but you may bring your own if you wish.
8. A knee-length robe (a longer robe makes walking difficult).
9. Do not bring your own medications - it causes confusion and the nurses prefer to dispense all medication (including vitamins) so that they know what you are getting.
10. Do not bring credit cards, jewelry or other valuable items, and no more than \$5 in cash.
11. Some people like to bring their favorite pillow.
12. Medical insurance card(s). (Medicare and/or other)
13. Reading material.
14. Cassette recorder, headphones and tapes if you want music.
15. Crutches or walker: if you already have these have someone bring them to the hospital the day after surgery. If not, they will be provided for you to take home when you leave the hospital.

THE NIGHT BEFORE SURGERY

You can spend the night before surgery at home or in a local hotel. Please be sure to arrive at the hospital on time. The night before surgery, you should take a long shower or bath.

Food in the stomach can cause anesthetic complications. The night before the surgery you should not have anything to eat or drink after midnight. Do not drink any alcohol for 48 hours before surgery, it delays the emptying of the stomach. Try not to smoke (at least

cut back) for 48 hours before surgery:
smoking increases anesthetic risk.

On to the Next Section of the Manual
Admission to the Hospital

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Suite 324

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HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

KNEE TABLE OF CONTENTS

- Dr. Huddleston Bio
- Sir John Charnley
- Initial Consultation
- Anatomy of the Knee Joint
- Diseases of the Knee
- Symptoms of Knee Disease
- Non-Operative Treatment
- NSAIDs
- Exercise and Fitness
- When to Consider TKR
- Total Knee Replacement Surgery
- Implant Designs and Materials
- Other Surgical Alternatives
- Blood Transfusion
- Scheduling Surgery
- Your Current Medications
- Office Visit Before Surgery
- What to Bring to the Hospital
- Hospital Admission
- Expectations After Surgery
- Expectations at Home
- Home Exercises After Surgery
- Long-Term Care
- Allowable Activities After TKR
- Revision Knee Surgery
- Complications of TKR
- Special Studies

ARTHRITIS OF THE KNEE JOINT

HOSPITAL ADMISSION

Patients are admitted to the hospital the same day as the surgery. Most insurance companies insist that patients not be admitted the day before surgery because of the expense.

If your surgery is the first one that day, the check-in time is 5:30 a.m. If your surgery is later, then you will check in around 8:00 a.m. Please be on time.

When you arrive at the hospital on the morning of surgery, go directly to the admitting office. From there you will be taken to the pre-anesthesia area where you will change into a hospital gown, and an intravenous line will be started.

The anesthesiologist will see you there and discuss anesthetic options and risks. He will discuss the advantages of general anesthesia (in which you are unconscious) and spinal or epidural anesthesia in which the lower half of your body is completely numb (and pain-free) and you will sleep lightly but not be unconscious.

Dr. Huddleston prefers his patients to have spinal or epidural anesthesia coupled with heavy sedation or light general anesthetic.

With the epidural, the recovery is smoother. Most doctors having surgery themselves would probably elect to have an epidural. With certain conditions (especially chronic lung disease) epidural anesthesia is considered safer. The final choice of anesthetic is made by you and the anesthesiologist. You will be given sedatives before being taken to the operating room.

IN THE OPERATING ROOM

First-time knee replacements take 1 to 2 hours of operating time. You

will be in the operating room for about another hour (for anesthetic induction and other necessary procedures before and after the operation). Revision operations can take up to 4 hours of operating time (or even more). When the operation is over Dr. Huddleston will meet with relatives or friends in the surgical waiting area to give them a progress report.

On to the Next Section of the Manual
What to Expect After Leaving the Operating Room

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(818) 708-9090

HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

KNEE TABLE OF CONTENTS

- Dr. Huddleston Bio
- Sir John Charnley
- Initial Consultation
- Anatomy of the Knee Joint
- Diseases of the Knee
- Symptoms of Knee Disease
- Non-Operative Treatment
- NSAIDs
- Exercise and Fitness
- When to Consider TKR
- Total Knee Replacement Surgery
- Implant Designs and Materials
- Other Surgical Alternatives
- Blood Transfusion
- Scheduling Surgery
- Your Current Medications
- Office Visit Before Surgery
- What to Bring to the Hospital
- Hospital Admission
- Expectations After Surgery
- Expectations at Home
- Home Exercises After Surgery
- Long-Term Care
- Allowable Activities After TKR
- Revision Knee Surgery
- Complications of TKR
- Special Studies

ARTHRITIS OF THE KNEE JOINT

WHAT TO EXPECT AFTER LEAVING THE OPERATING ROOM

You will wake up in the recovery room. You will be comfortable and usually surprisingly free of pain. You can not be visited in the recovery room, but can be visited as soon as you get to your room. You will be in the recovery room for about 2 hours. Some patients are admitted to the Intensive Care Unit (ICU) for 24 hours before being transferred to the orthopedic floor. This does not mean that their condition is critical, but only that Dr. Huddleston feels the need for closer monitoring because of their age or pre-operative medical problems that increase risk.

Knee Replacement Surgery use to be extremely painful. Thanks to the combination of the "pain cocktail" and minimally invasive surgery it is now almost painless!

PAIN CONTROL

Dr. Huddleston is fanatical about pain control, and does everything possible to keep your pain to a minimum. You will be amazed at how little pain you will have. There are two major reasons for this.

The first is that the surgery is minimally invasive, and less tissue is cut that can cause pain.

The second is the use of the pain cocktail, also known as the "Magic Cocktail", which is a mixture of medications that is injected into all the deep soft tissues around the wound prior to closing the skin. The mixture consists of a long acting anesthetic, morphine and an anti-inflammatory medication. The pain-cancelling property of this technique is truly "magical". Many patients have absolutely no pain at all after the operation.

As a back-up, in case you do have some pain, you will also have the PCA Unit (Patient Controlled Analgesia): a computerized device that

attaches to your intravenous line. It enables you to self-administer a small dose of narcotic at the press of a button whenever you feel the slightest pain, eliminating having to call a nurse. Since only small doses of narcotic are given at a time, you will not be as drowsy as with big-dose injections every 3 hours. The PCA is pre-programmed for your weight and age, so it is not possible for you to over-dose. Most patients also receive an anti-inflammatory medication by IV for 48 hours. After 2 days, the PCA unit will be disconnected because it is cumbersome and impedes your walking progress. If necessary, it may be continued for a few more days. After it is discontinued, pain injections are ordered, to be given every 3 hours if needed. Pain pills are ordered for milder pain.

Most patients are surprised at how little pain they have after the operation.

OTHER DRUGS

Drugs are also ordered for nausea, constipation, and sleep. If you run a fever you will be given extra-strength Tylenol.

Note that practically every patient runs a temperature up to 99.5 or even a hundred degrees in the first few days after knee replacement. It is so common as to be considered "normal". If your temperature goes over 101 degrees it starts to be a source of concern.

All patients get stool softeners, but many patients still develop constipation and need a mild laxative on the second or third day after surgery. All patients are given antibiotics to prevent infection (see [Complications of Knee Replacement Surgery](#)) starting just before the operation and for a few days after the surgery.

You must ask for sleeping pills, pain pills or pain injections because the nurses will not automatically give them. Do not restrict yourself from using the PCA machine or asking for pain medications. Dr. Huddleston does not want you to be in pain. You need not fear that you will become addicted to the pain medication.

In order to prevent blood clots from forming (see [Complications of Knee Replacement Surgery](#)), most patients are given Coumadin (warfarin), which is a blood thinner. The internist calculates the dosage of Coumadin by daily blood tests. If the blood becomes too "thin" then bleeding problems can develop. If you do form blood clots you will be given heparin intravenously and be confined to bed for about three days, and then physical therapy will be resumed.

While you are in the hospital, please let the nurses or the internist know if you have calf pain, chest pain or shortness of breath. These may be signs of blood clots.

If you are put on Coumadin the internist may want you to continue it for a few weeks after you leave the hospital. He will give you a "take home" prescription for the Coumadin, and order any necessary blood tests needed.

Your blood count (Hemoglobin) will be monitored on a daily basis for a few days, and you will be given iron supplements and blood transfusions as necessary.

DRAINAGE TUBES

Suction drainage tubes are usually placed in the wound to remove any blood which collects after surgery. Some of this blood will be filtered and given back to you intravenously. This technique is called "re-infusion". The drains are removed 2 days after surgery. Removal is not painful.

Many patients have difficulty passing urine right after surgery and catheterization is then necessary. For this reason, we may insert a urinary catheter (in most patients during anesthesia), and remove it on the second post-operative day. Removal is also not painful. We try to avoid catheters for longer than necessary because urinary infection can develop.

THE OPERATIVE WOUND

The wound is over the front of the knee and will be about four and a half inches in length. The dressings are usually changed after the drainage tubes are removed, and as often as necessary after that.

PHYSICAL THERAPY

The physical therapist will get you up on the first or second day after surgery, and will teach you the right amount of weight to put on your operated leg.

During waking hours you should "pedal" your feet up and down every five minutes or so, the entire time you are in the hospital, to help prevent blood clots from forming.

Special pneumatic pumps will be applied to your legs in the recovery room, and will be kept in place for several days. They massage your calves every forty-five seconds. Most patients find them very comfortable. You

may also wear special stockings. The pedaling exercise, the pumps and the stockings all help to prevent blood clots from forming in your legs.

After the surgery (usually on the second day) the leg is placed in a CPM (Continuous Passive Motion) machine which will gradually exercise your knee. This machine is not particularly uncomfortable and will help you regain your knee movement. The amount of movement that the machine goes through will be gradually increased over the course of your hospitalization. You will be taught how to increase the amount of bending by adjusting the controls on the CPM. Please try to increase the amount of bending as much as possible, even if it hurts to do so. Ask for pain medication if necessary to help you work on this. The therapist will come twice a day and exercise your knee out of the machine. You should plan to use the CPM machine for at least six hours out of each day. By the time you leave the hospital we like you to have at least 90 degrees of knee motion and good control of muscles about your knee.

Most patients by the second or third day after surgery no longer have an IV, and are feeling quite well.

You will be allowed to go home when your temperature is normal and you are able to get in and out of bed by yourself, and go to the bathroom by yourself. Some patients reach this goal within five days, others take as long as ten days.

EQUIPMENT YOU WILL NEED AT HOME

While you are in the hospital, a social worker and the physical therapist will help you decide what equipment you will need when you get home. You will need crutches or a walker to help with walking for about six weeks after surgery. Crutches are actually easier to handle, but most people feel more secure with a walker. A hospital bed is hardly ever needed at home, but we will be happy to order one for you if you want it. Most insurance plans cover it. We will provide a "reacher" to help you dress or pick things up off the floor. A toilet seat extension will be needed so that you do not sit too low on the toilet. Most patients are able to go up and down stairs when they get home, holding onto the rail. If you live in a two-story house you might want to move a bed downstairs and convalesce there. You will also need a thermometer and a shower stool.

You will be independent when you get home, able to dress yourself and able get in and out of bed unassisted. Do not expect to be an invalid. Get out of your pajamas each morning and put on regular clothes. Go places by car and do things. Walk as much as comfort will allow you. Get off your walker and cane as soon as you can do so safely.

THE REHAB OR SKILLED NURSING UNIT

Older patients, especially those who live alone, are advised to stay in the hospital's Rehabilitation Unit for additional therapy and general care. This will, in any case, greatly speed your progress to full recovery. The Rehab Units at Dr. Huddleston's two hospitals are superbly geared to the special needs of joint replacement patients. Medicare may cover your stay there. Most private insurance companies will not. In the Rehab Unit, a doctor who is specialized in physical medicine will see you daily. Your internist will also see you there regularly. If you need facility care, and your insurance does not cover the Rehab Unit we can transfer you to Lake Balboa Convalescent Hospital which is covered by all insurance programs including Medicare.

On to the Next Section of the Manual
After You Get Home

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HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

KNEE TABLE OF CONTENTS

- [Dr. Huddleston Bio](#)
- [Sir John Charnley](#)
- [Initial Consultation](#)
- [Anatomy of the Knee Joint](#)
- [Diseases of the Knee](#)
- [Symptoms of Knee Disease](#)
- [Non-Operative Treatment](#)
- [NSAIDs](#)
- [Exercise and Fitness](#)
- [When to Consider TKR](#)
- [Total Knee Replacement Surgery](#)
- [Implant Designs and Materials](#)
- [Other Surgical Alternatives](#)
- [Blood Transfusion](#)
- [Scheduling Surgery](#)
- [Your Current Medications](#)
- [Office Visit Before Surgery](#)
- [What to Bring to the Hospital](#)
- [Hospital Admission](#)
- [Expectations After Surgery](#)
- [Expectations at Home](#)
- [Home Exercises After Surgery](#)
- [Long-Term Care](#)
- [Allowable Activities After TKR](#)
- [Revision Knee Surgery](#)
- [Complications of TKR](#)
- [Special Studies](#)

ARTHRITIS OF THE KNEE JOINT

AFTER YOU GET HOME

You will be able to go home in a regular sized car. It is better if someone can be at home with you for at least portions of each day to assist you with shopping, meal preparation, etc. Constant nursing care is rarely needed at home. We will arrange for a home physical therapist as well as for a visiting nurse to see you at home, if your insurance will cover these services (Medicare does).

Most patients who have had a knee replacement need instruction and visits with a physical therapist for several weeks after they go home. Usually this is done 3 times a week for 3 to 4 weeks. It is very important that exercises be done vigorously for the first weeks after surgery so that the knee flexibility can be maximized.

Please do the exercises demonstrated in [Home Exercises for the First Eight Weeks After Surgery](#). Continue all these exercises for two months and do numbers 8, 9 and 10 for at least six more months.

You must call the office after you get home to set a date for an office visit. The first office visit after you leave the hospital is usually 6 weeks following the day of surgery. Until then continue all the restrictions which you were taught in the hospital. If any problem develops you will need to come in sooner.

You may be provided with a CPM machine at home. You should use it for about four hours a day the same way you used it in the hospital.

It is not uncommon to develop some swelling of the knee, foot and ankle in the weeks after surgery. If this occurs, you should elevate your leg on pillows when you are not up and about.

Wound sutures or staples are usually removed on the fourteenth day after surgery. If you are discharged before that time, they may be removed by a visiting nurse at your home, or you may be asked to come to the office for removal. One day after staple removal you may take a shower. Up to that point the wound should be kept dry. It is best to shower rather than get into a tub. We recommend avoiding a tub for at least two months after surgery. A shower stool is helpful so as to avoid slipping while taking a

shower.

Once you get home you are not expected to stay in bed. You should be up and about on your walker or crutches most of the time, but rest as much as you need to. You should also do the exercises illustrated in [Home Exercises for the First Eight Weeks After Surgery](#).

You should get off the walker and go to a cane as soon as you can. You should then get off the cane as soon as you can.

Most patients are walking without a walker or cane by the end of two weeks. Many are off all walking aids by the third day after surgery.

You will be independent when you get home, able to dress yourself and able get in and out of bed unassisted. Do not expect to be an invalid. Get out of your pajamas each morning and put on regular clothes. Go places by car and do things. Walk as much as comfort will allow you. Get off your walker and cane as soon as you can do so safely.

DRIVING AFTER KNEE REPLACEMENT SURGERY

Driving is best to avoid until about 6 weeks after the surgery, but avoidance is not essential if the left knee has been operated on and you drive an automatic and are not taking strong pain medications that might cloud your judgment. Driving is not likely to injure the knee replacement, but you may not be able to operate the car as well as needed to prevent an accident. Dr. Huddleston can not judge whether you are safe to drive from a legal standpoint but can simply tell you if you are safe to drive from a standpoint on injuring your knee replacement.

RETURNING TO WORK AFTER KNEE REPLACEMENT SURGERY

You will probably not return to work for 6 to 8 weeks after the operation. Quite a few patients do return earlier, depending on the nature of their work, and depending on how important it is for them to be back at work. Some patients with strong motivation and a suitable job return to work in as little as a week. Discuss this with Dr. Huddleston if you need to be back at work sooner.

The first office visit after you leave the hospital is usually 6 weeks after surgery. You should call Dr. Huddleston's secretary at 818-708-9090 to schedule an appointment. Sometimes Dr. Huddleston will have you come in earlier than six weeks to check the wound.

PROBLEMS YOU MAY ENCOUNTER AT HOME

1. Excessive swelling of your leg and foot: It is not uncommon to develop some swelling in the first few weeks after surgery. If this occurs, you should elevate your leg whenever you are not up to walking. However, excessive swelling of the foot and lower leg can be due to thrombosis (blood clots) in the veins in the leg.

We should be notified if swelling is associated with pain or tenderness in the calf muscles, or if the swelling just seems over-excessive, and doesn't respond to elevation.

2. Chest pain, a cough or shortness of breath may be signs of embolism. Please do not ignore these symptoms. Call us right away.
3. Drainage from the wound, or increasing redness around the wound, could signify impending infection. Our office should be notified, and in most instances you will need to come in and let Dr. Huddleston take a look at it.
4. High fever could also be a sign of impending infection. You need to take your temperature twice a day for a month after surgery. Take it three times a day if it is elevated over 99 degrees. If you get two readings, at least three hours apart, of over 100 degrees, you need to notify us immediately.
5. Increasing knee pain. Pain should be decreasing from day to day. If it seems to be steadily increasing, let us know.
6. The knee loses motion. If Dr. Huddleston feels that your knee flexibility is not satisfactory (because of developing scar tissue, see [Complications of Total Knee Replacement Surgery](#)) he may recommend manipulation of the knee under general anesthetic. This procedure may be performed before you leave the hospital, or, after you leave the hospital it may be performed at the Surgery Center as an out-patient. It involves putting you to sleep for at least 5 minutes during which time Dr. Huddleston will gently manipulate the knee while you are asleep to break down the developing scar tissue. It is possible for the femur to fracture during this procedure if you have osteoporosis, but the chances of this happening are extremely small.

IN GENERAL, THE LEG SHOULD BE GETTING BETTER EACH DAY. IF YOU THINK YOU ARE GETTING WORSE IN ANY WAY, PLEASE GIVE US A CALL.

On to the Next Section of the Manual
Home Exercises for the First 8 Weeks

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HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

KNEE TABLE OF CONTENTS

- Dr. Huddleston Bio
- Sir John Charnley
- Initial Consultation
- Anatomy of the Knee Joint
- Diseases of the Knee
- Symptoms of Knee Disease
- Non-Operative Treatment
- NSAIDs
- Exercise and Fitness
- When to Consider TKR
- Total Knee Replacement Surgery
- Implant Designs and Materials
- Other Surgical Alternatives
- Blood Transfusion
- Scheduling Surgery
- Your Current Medications
- Office Visit Before Surgery
- What to Bring to the Hospital
- Hospital Admission
- Expectations After Surgery
- Expectations at Home
- Home Exercises After Surgery
- Long-Term Care
- Allowable Activities After TKR
- Revision Knee Surgery
- Complications of TKR
- Special Studies

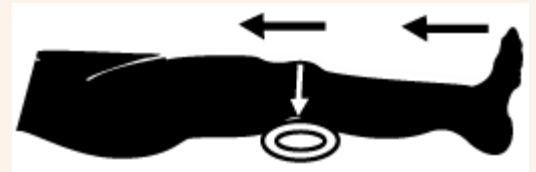
ARTHRITIS OF THE KNEE JOINT

HOME EXERCISES FOR THE FIRST 8 WEEKS AFTER TOTAL KNEE REPLACEMENT

SITTING OR BACK LYING

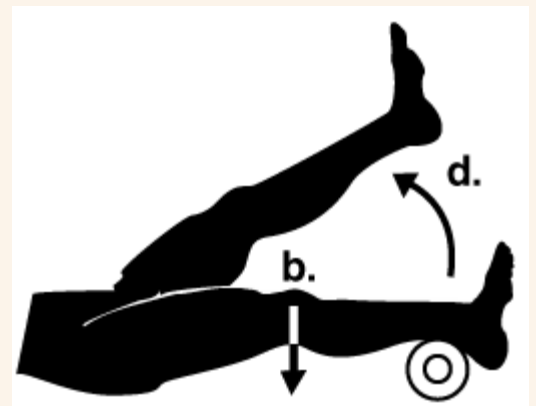
1. Quad Set Exercise

- Tighten the muscles on top of the thigh as tightly as possible and hold.
 - Pull your toes back.
 - Push the back of your knee down to the floor.
 - Try to push out and up through the heel.
- Pull 10 seconds, trying every second to pull even tighter.
- Relax 5 seconds.
- Repeat for 2 sets of ten times. Rest 60 seconds between sets.



2. Knee Extension with Leg Lift

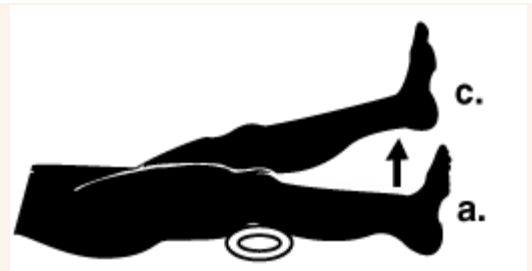
- Start as above, but with a full toilet paper roll under your heel.
- Push knee down.
- Lock it.
- Lift leg up.
- Then lower to roll.
- Repeat for 2 sets of 10 times.



3. Drake Exercise

- Tighten top of thigh muscles.
- Hold this for 2 seconds.
- While maintaining hold, raise leg 4 " from floor.
- Hold this position for 2 counts (1-1000, 2-2000).
- While maintaining tension, lower leg

- to floor.
- f. Hold tension for 2 counts while leg is down.
 - g. Rest for 5 counts.
 - h. Repeat for 2 sets of 10 times.



4. Static Hold Exercise

- a. Place a hard, round object or toilet paper roll under your knee to hold it at a height of 4-6".
- b. Keep back of knee in contact with object at all times.
- c. Lift heel off table as high as possible.
- d. Straighten knee and tighten top of thigh as tight as possible.
- e. Hold for 5 seconds.
- f. Rest for 5 seconds.
- g. Repeat for 2 sets of 10 times.



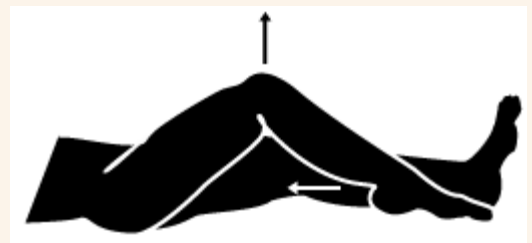
5. Straight Leg Raise

- a. Tighten the muscles on top of the thigh as tightly as possible and hold.
- b. Raise the entire leg holding the knee as tight as possible. Hold 5 seconds.
- c. Lower leg and rest 2 seconds.
- d. Repeat for 2 sets of 10 times.
- e. Rest 1 minute between sets.



6. Heel Slide

- a. Lie on back with legs out straight and back flat.
- b. Slide one heel up, bringing knee toward chest.
- c. Then slide heel back down.
- d. Repeat for 2 sets of 5 times.



7. Hamstring Set Exercises

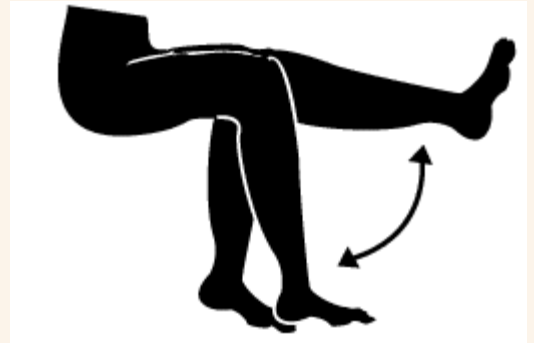
- a. Bend the knee to a height of about 6".
- b. Tighten the muscles on the back of the thigh fully by pulling down and back with the heel. The heel should remain stationary.
- c. Pull for 5-10 seconds, trying every second to pull even tighter.
- d. Relax 5 seconds.



- e. Repeat for 2 sets of 5 times, resting 60 seconds between sets.

8. Flexion and Extension

- a. Sit on something high enough to keep foot off the floor.
- b. Bend the knee as far back as possible.
- c. Straighten knee as far forward as possible and hold it straight.
- d. Then relax. (Like pumping on a swing.)
- e. Repeat for 3 sets of 10 times.



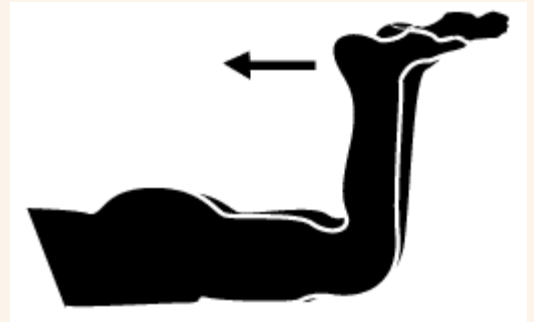
9. Assisted Knee Flexion

- a. Sit as above.
- b. Place ankle of good leg over ankle of operated leg.
- c. Gently push ankles back, bending knees.
- d. Hold and then relax.
- e. Repeat for 2 sets of 5 times.



10. Assisted Knee Flexion

- a. Lying on your stomach, bend involved knee up.
- b. Use uninvolved leg to help push knee into more flexion.
- c. Hold for 10 seconds.
- d. Repeat for 2 sets of 5 times.



On to the Next Section of the Manual
Long Term Care for Your Knee Replacement

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HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

KNEE TABLE OF CONTENTS

- Dr. Huddleston Bio
- Sir John Charnley
- Initial Consultation
- Anatomy of the Knee Joint
- Diseases of the Knee
- Symptoms of Knee Disease
- Non-Operative Treatment
- NSAIDs
- Exercise and Fitness
- When to Consider TKR
- Total Knee Replacement Surgery
- Implant Designs and Materials
- Other Surgical Alternatives
- Blood Transfusion
- Scheduling Surgery
- Your Current Medications
- Office Visit Before Surgery
- What to Bring to the Hospital
- Hospital Admission
- Expectations After Surgery
- Expectations at Home
- Home Exercises After Surgery
- Long-Term Care
- Allowable Activities After TKR
- Revision Knee Surgery
- Complications of TKR
- Special Studies

ARTHRITIS OF THE KNEE JOINT

LONG TERM CARE OF YOUR KNEE REPLACEMENT

The main long-term problem of joint replacements is loosening.

Annual visits to have your knee examined and x-rayed are essential for monitoring the results of your surgery, and giving you periodic advice for the care of your knee replacement.

With time and stress, fixation of cement to bone can fail. It is hoped that in time cementless replacements will prove more able to withstand vigorous activities than the cemented replacements. They have not been in use long enough for anyone to be sure yet that this will be the case. Both cemented and cementless knees should therefore be treated with the same care. You should minimize activities which could cause loosening (see below). If the implant comes loose, movement between it and bone can cause pain and require re-operation.

If you have a cemented knee, your new knee should be pain-free after 3 months. However, from time to time, especially in the first year, you may have a twinge of pain. This you can ignore. If you have pain that doesn't go away, or seems to increase from day to day, you should come in to see Dr. Huddleston for x-rays and evaluation. It could signify infection or loosening.

The longevity of your knee replacement can be increased by:

AVOIDING stressful activities such as all types of impact sports including:

- running
- jogging
- tennis
- racquetball
- badminton
- football
- baseball
- horseback riding

- other activities

Heavy lifting, weight-lifting, jumping from heights, falls and some exercise machines for the legs are dangerous for you. Never lift or carry more than forty pounds.

It is important that you not become overweight, since excess weight increases the stresses on the knee replacement, and can cause loosening.

The possibility of infection occurring around the replacement is another concern.

For the rest of your life if you develop an infection elsewhere in your body (for example bladder infection, infected cuts, boils, dental abscesses) this infection can travel via your bloodstream to the replacement.

Therefore, if you develop an infection you should consult your family physician and have him treat it promptly. Viral infections, such as colds and most sore throats, are not a problem. Dental work can push bacteria into your bloodstream and cause an infection in your joint replacement. We recommend that you take antibiotics if you are to have dental work (other than simple cleaning of your teeth). You will be given a plastic card to keep in your wallet containing information about dosage.

ALWAYS NOTIFY YOUR DENTIST OR ANY TREATING PHYSICIANS THAT YOU HAVE A JOINT REPLACEMENT

If you are to have cystoscopy, bronchoscopy, or colonoscopy you should also be covered by an antibiotic. Doctors vary on their recommendations as to which antibiotics should be used and for how long.

The following is recommended:

Not Allergic to Penicillin: Cefalexin or amoxicillin: two grams by mouth one hour before the procedure.

Allergic to Penicillin: Clindamycin 600 mg. by mouth one hour before the procedure.

Dental procedures that pose increased risk and should be covered by antibiotics: extractions, periodontal procedures, dental implant placement, root canal work, and dental cleaning where bleeding is anticipated.

Patients with immunosuppression, rheumatoid arthritis, lupus erythematosus, insulin-dependent diabetes, hemophilia, or who have had previous prosthetic joint infections, are especially at risk and should take these precautions for life. A recently published American Academy of Orthopedic Surgeons Advisory Statement suggests that all others are at risk for only

two years after a joint replacement operation.

Call your doctor immediately if you develop any infection. Never, ever allow any physician to inject Cortisone or any other medication into or near your artificial joint. It may cause disastrous infection in the knee joint.

On to the Next Section of the Manual
Allowable Activities After Knee Replacement

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HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

KNEE TABLE OF CONTENTS

- Dr. Huddleston Bio
- Sir John Charnley
- Initial Consultation
- Anatomy of the Knee Joint
- Diseases of the Knee
- Symptoms of Knee Disease
- Non-Operative Treatment
- NSAIDs
- Exercise and Fitness
- When to Consider TKR
- Total Knee Replacement Surgery
- Implant Designs and Materials
- Other Surgical Alternatives
- Blood Transfusion
- Scheduling Surgery
- Your Current Medications
- Office Visit Before Surgery
- What to Bring to the Hospital
- Hospital Admission
- Expectations After Surgery
- Expectations at Home
- Home Exercises After Surgery
- Long-Term Care
- Allowable Activities After TKR
- Revision Knee Surgery
- Complications of TKR
- Special Studies

ARTHRITIS OF THE KNEE JOINT

ALLOWABLE ACTIVITIES AFTER KNEE REPLACEMENT

The key word is commonsense. Your knee will probably last for your entire lifetime if it is subjected to no stresses at all! The aim is therefore to minimize stresses. You will be able to take part in physical activities which were impossible before surgery. You can walk as much as you like.

The best recommended activities are walking and swimming.

You can ballroom dance, play golf, and ride a stationary or mobile bike. It is best to use a golf cart so that you don't have to carry a heavy bag of clubs if you play golf. Bicycling on a level surface is quite clearly less stressful than biking in hill country. Skiing smooth, groomed slopes in good light is relatively safe, but falls could result in serious injury to someone with a knee replacement.

On to the Next Section of the Manual
Revision Knee Surgery

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HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

KNEE TABLE OF CONTENTS

- Dr. Huddleston Bio
- Sir John Charnley
- Initial Consultation
- Anatomy of the Knee Joint
- Diseases of the Knee
- Symptoms of Knee Disease
- Non-Operative Treatment
- NSAIDs
- Exercise and Fitness
- When to Consider TKR
- Total Knee Replacement Surgery
- Implant Designs and Materials
- Other Surgical Alternatives
- Blood Transfusion
- Scheduling Surgery
- Your Current Medications
- Office Visit Before Surgery
- What to Bring to the Hospital
- Hospital Admission
- Expectations After Surgery
- Expectations at Home
- Home Exercises After Surgery
- Long-Term Care
- Allowable Activities After TKR
- Revision Knee Surgery
- Complications of TKR
- Special Studies

ARTHRITIS OF THE KNEE JOINT

REVISION KNEE SURGERY

Total knee replacement implants may fail after 10 to 15 years, or occasionally sooner. The parts may come loose or they may wear out. In either case an operation will be required to replace the damaged part or even the entire implant.

Revision surgery is much more complex and technically much more difficult than first-time surgery, and requires prolonged operating time.

It may also require an increase in the length of the hospital stay. The magnitude of this surgery depends on the difficulty of prosthesis removal and on the quality and quantity of bone left behind after the implant has been removed. The revision operation may require bone grafts from a bone bank to be used. A custom prosthesis is sometimes needed (a prosthesis specially manufactured for a specific patient). Patients who have had knee revision operations are frequently advised to continue the use of a full-time support (such as a cane), in order to protect the replacement. This is especially true of those who are younger than 70, have higher activity levels, increased weight, and other stress factors.

These complex operations are much riskier than first-time knee replacement surgeries. All the risks associated with first-time knee replacement are present, but the chances of these complications occurring are greatly increased.

There is a chance that your leg may be shorter than it was before the operation, there is also a great risk that the alignment of the leg will not be entirely normal. There is also a good chance that the range of motion in the knee will be much less than after a first-time knee replacement. These technically demanding operations should be performed by a surgeon skilled and

experienced in both first-time knee replacement surgery and revision surgery.

On to the Next Section of the Manual
Complications of Knee Replacement Surgery

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HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

KNEE TABLE OF CONTENTS

- [Dr. Huddleston Bio](#)
- [Sir John Charnley](#)
- [Initial Consultation](#)
- [Anatomy of the Knee Joint](#)
- [Diseases of the Knee](#)
- [Symptoms of Knee Disease](#)
- [Non-Operative Treatment](#)
- [NSAIDs](#)
- [Exercise and Fitness](#)
- [When to Consider TKR](#)
- [Total Knee Replacement Surgery](#)
- [Implant Designs and Materials](#)
- [Other Surgical Alternatives](#)
- [Blood Transfusion](#)
- [Scheduling Surgery](#)
- [Your Current Medications](#)
- [Office Visit Before Surgery](#)
- [What to Bring to the Hospital](#)
- [Hospital Admission](#)
- [Expectations After Surgery](#)
- [Expectations at Home](#)
- [Home Exercises After Surgery](#)
- [Long-Term Care](#)
- [Allowable Activities After TKR](#)
- [Revision Knee Surgery](#)
- [Complications of TKR](#)
- [Special Studies](#)

ARTHRITIS OF THE KNEE JOINT

COMPLICATIONS OF KNEE REPLACEMENT SURGERY

Unfortunately, even the most minor of surgical operations carries some risk of complications occurring. Knee replacement surgery is very successful, and complications are relatively uncommon, considering the complexity of the procedure.

It is fair to say that you have about a 96% chance that you will go through the operation without any significant complication occurring.

The most common complication is blood clots in the legs. The most serious complication is infection. The most important long-term complication is loosening.

1. Bloodclots in the veins of the legs are the most common complication of knee replacement surgery. As long as the clots remain in the legs they are a relatively minor problem. Occasionally, they dislodge and travel through the heart to the lungs (pulmonary embolism). This is a potentially serious problem, since (very rarely) death can result from embolism. The chances of this are one out of several hundred. The internist will prescribe Coumadin (warfarin), heparin or Lovenox (blood thinning drugs) to help prevent clots from forming after your surgery. Additionally, compressive calf pumps are used and leg exercises are encouraged to prevent blood clots. Blood clots can occur despite all these precautions. They are usually not dangerous if appropriately treated, but may delay your discharge from the hospital for two or three days.
2. Infection. The risk of an infection in first-time knee replacement is currently reported as being about 0.5%. The risk of infection after joint replacement is much greater than with most other operations, unless special precautions are taken. Since bacteria can enter the open wound at the time of the surgery in a regular operating room, we operate in a laminar flow operating room in which special filters provide clean air, free of most bacteria. In addition, the surgeon and assistants wear a sterile space suit. The suit encloses the entire head and body, and includes a sterile face mask. Antibiotics given to you before, during and after the operation further help to lower the rate of infection. Dr. Huddleston uses all these special precautions, and has had only one infected knee replacement in sixteen years as a joint replacement surgeon.

The risk of infection in the weeks after the operation is increased if you have rheumatoid arthritis or diabetes, if you have been taking cortisone for prolonged periods of time, if the affected joint has had previous infection, or if you have infection anywhere else in your body" (teeth,bladder, etc) at the time of surgery. The artificial joint can become infected many years after the operation. The bacteria travel through the blood stream from a source elsewhere in the body" , such as from an infected wound, or a gall-bladder infection. Even regular dental work can release bacteria into the blood. Infections of the bladder, teeth, prostate, kidneys, etc. should be cleared up by appropriate treatment well before the day of surgery. Patients who have had joint replacements must take antibiotics by mouth before and after any dental work and must have all infections vigorously treated.

3. Loosening of the prosthesis from the bone is the most important long-term problem. How long the bond will last depends on a number of factors.
 - a. How well the surgery is done. This is by far the most important factor. Choose a surgeon who has had a great deal of experience with knee replacement, and preferably one who restricts his practice to joint replacement surgery.
 - b. The quality of your bones. The harder your bones are, the better the bond will be, and the longer the replacement will last. Osteoporosis is a factor of age, as well as the type of arthritis you have. People with rheumatoid arthritis have especially soft bones.
 - c. How active you are. Excessive force on the implant can cause the bond to loosen. If you stayed in bed for the rest of your life the implant will probably never come loose! Activities such as running and heavy lifting should be avoided. The key thing is to use common sense. (See Allowable Activities After Knee Replacement).
 - d. Your weight. You should also keep your weight down because every pound you gain adds three pounds to the force to the knee.
 - e. The design of the implant. Small abrasion particles from the implant may play a role in implant loosening. Some designs shed more particles than others.
4. Wound healing can occasionally be a problem after knee replacement. The skin wound over the knee sometimes does not heal completely. Parts of the skin may die after the surgery. This is a major complication which occurs very rarely. Every precaution is taken to prevent it. If it occurs it may require skin grafting and possibly "rotation" of a muscle from the calf to cover the implant and prevent it from becoming infected. Fat legs are more prone to this complication.
5. Nerve damage can (rarely) occur with knee replacement. The most common nerve damaged is the nerve to the muscles which bring the foot up toward the face (the peroneal nerve). The odds of this occurring are probably one in many hundreds. If it does occur, the affected nerve usually recovers after 6 to 12 months. Quite commonly the skin around the knee feels "numb" because of small skin nerves that get cut at surgery. Sensation usually returns to normal within a few months.
6. Patellar complications can occur. Occasionally the knee cap does not track properly causing it to "jump" as the knee bends. The chance of this occurring is less than 1%. The plastic part on the patella can wear through. These problems sometimes need reoperation for correction.
7. Injuries to the arteries of the leg is a remotely possible but serious complication. The major arteries of the leg lie just behind the knee joint. Arterial injury can usually be repaired by a vascular surgeon. If not, you could even lose your leg. The chance of this occurring is extremely small.

8. Loss of knee motion: It is difficult to regain bending motion that has been lost for many years and if the knee only bends 90 degrees before the operation, it is unlikely to bend much more after the operation. For unexplained reasons, some patients form excessive scar tissue in the knee after surgery, resulting in diminished bending of the knee (a condition called arthrofibrosis). It is impossible to predict ahead of time which patients might develop arthrofibrosis. Sometimes it helps to manipulate the knee under an anesthetic to break down the excessive scar tissue (see [Problems You May Encounter at Home](#)).
9. Fracture of the knee bones rarely occurs during knee replacement. It is more common during revision knee surgery. Fractures can also occur later from any trauma such as falling down stairs, and (rarely) during manipulation for arthrofibrosis.
10. Bleeding complications.
 - Sometimes bleeding can occur into the wound several days after surgery (“hematoma formation”) as a result of the use of blood thinners. If it is excessive, it may require re-opening the wound under anesthesia to let the blood out.
 - Occasionally the blood thinners may cause bleeding into the urine (or elsewhere), but this is usually temporary, and not of serious consequence.
11. Anesthetic complications can occur, and very rarely even death can occur from the anesthesia. Your anesthesiologist will see you before surgery and explain the risks involved.
12. Allergy to the metal parts of the implant has occasionally been reported. People who know they have metal allergies should be tested with extracts of the various metal components of the implant prior to surgery. You should notify Dr. Huddleston if you believe you have a metal allergy. Metal allergies are rare and the tests are not completely reliable, so they are only performed if a metal allergy is suspected. Allergy to the plastic parts has never been reported. Small particles of plastic or metal from the implant may cause a reaction in the bone but this is not a true allergy.
13. Complications From Blood Transfusions. The risks of getting AIDS from screened, banked blood is thought to be in the range of 1 in 250,000 units transfused. The risk of Hepatitis B is estimated to be approximately 1 in 550 units, and Hepatitis C is 1 in 100. It is not known if the risk of disease transmission from directed blood (see Blood Transfusion for Total Joint Replacement) is lower than the risk from ordinary banked blood. The risk of an allergic reaction (hives) is 1 in 500. You can have an allergic reaction to donor blood even though it has been properly cross matched. The risk of a Hemolytic Transfusion Reaction is 1 in 10,000. The risk of a Fatal Hemolytic Transfusion Reaction is 1 in 100,000.

All blood intended for transfusion (including your own) is screened by the blood bank for Hepatitis B virus, Hepatitis C virus, syphilis, Human T Cell Leukemia virus, and the AIDS virus.

14. Fat Embolism. Fat from the bone marrow can get into the circulation and cause lung or neurological symptoms. This is a very rare complication.
15. Numbness around part of the wound is common and permanent. Never apply hot packs to the area since you could burn the skin.
16. Other minor complications can rarely occur. You should keep in mind that the

chances of any significant complication are very small.

On to the Next Section of the Manual
Special Studies

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HOME

HIPS

KNEES

ABOUT DR H.

TESTIMONIALS

NEWSLETTER

CONTACT

KNEE TABLE OF CONTENTS

- [Dr. Huddleston Bio](#)
- [Sir John Charnley](#)
- [Initial Consultation](#)
- [Anatomy of the Knee Joint](#)
- [Diseases of the Knee](#)
- [Symptoms of Knee Disease](#)
- [Non-Operative Treatment](#)
- [NSAIDs](#)
- [Exercise and Fitness](#)
- [When to Consider TKR](#)
- [Total Knee Replacement Surgery](#)
- [Implant Designs and Materials](#)
- [Other Surgical Alternatives](#)
- [Blood Transfusion](#)
- [Scheduling Surgery](#)
- [Your Current Medications](#)
- [Office Visit Before Surgery](#)
- [What to Bring to the Hospital](#)
- [Hospital Admission](#)
- [Expectations After Surgery](#)
- [Expectations at Home](#)
- [Home Exercises After Surgery](#)
- [Long-Term Care](#)
- [Allowable Activities After TKR](#)
- [Revision Knee Surgery](#)
- [Complications of TKR](#)
- [Special Studies](#)

ARTHRITIS OF THE KNEE JOINT

SPECIAL STUDIES

To assist us in selecting the most appropriate method of treatment, additional studies may be required on an out-patient basis.

1. **Knee Aspiration.** This is performed if there is suspicion of infection in a knee replacement. A needle is inserted into the joint using local anesthetic. It is not particularly uncomfortable. Fluid obtained from the knee joint is sent to the laboratory for culture (results usually take 10 days to 2 weeks to be returned to Dr. Huddleston).
2. **Bone Scans.** There are several types of bone scan: (a) The most routine type is done utilizing Technetium Diphosphonate (TDP). The radioactive material is injected intra-venously and the whole body is scanned a few hours later. This test is most useful in identifying hairline bone fractures which do not show up on x-ray, and bone tumors. It may be helpful in diagnosing loosening of a hip or knee implant. (b) A Gallium Scan is ordered if there is concern about infection. (c) Another test that may be performed if infection is suspected is an Indium-111 Radioisotope Scan. This requires removing some of your own blood, labeling it with an isotopic material (Indium-111) and re-injecting it. You return a day later, and the joint is scanned. This is a relatively new procedure, sometimes used in combination with other, more routine types of scans. The isotopic agents are relatively innocuous. The amount of radiation is generally not much more than that in a single x-ray.
3. **Magnetic Resonance Imaging (MRI).** MRI has been a diagnostic revolution. It is done using giant magnets. No radiation is involved. It is useful in diagnosing the early stages of osteonecrosis, or in searching for bone tumors, and in determining if the knee menisci are intact (see [Meniscal Injuries - Diseases of the Knee Joint](#)). It is important for you and your family physician to know that there is no contra-indication to having MRI if you have an artificial joint, even though parts of the implant are made of metal.

Major surgery is not without risk. There are risks in everything we do in life. Our medical staff will do everything we can to minimize the risks that you undertake. The worse your preoperative symptoms are, the more reasonable it is that you take the risk inherent in having a knee replacement. Please feel free to ask Dr. Huddleston any questions you might have. We

look forward to taking care of you.

On the whole total knee replacement has proven to be an extremely beneficial contribution to modern surgery. We are pleased to be able to present you with this manual, which we hope will help you to understand your problem and the possible treatments you can obtain.

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