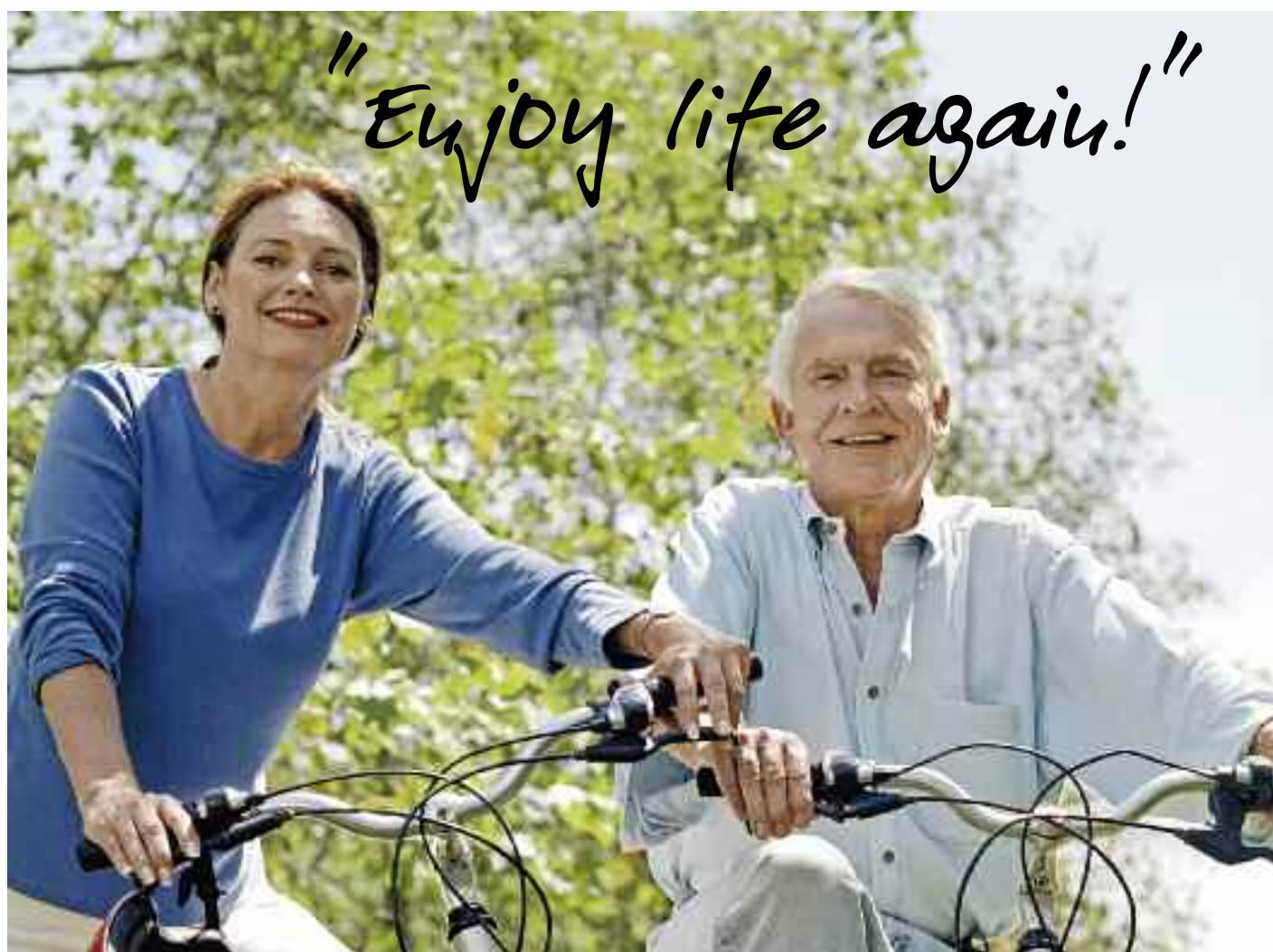




In spite of arthritis:

Be active again with modern high-tech joint replacements

- Facts about the cause and progression of the disease
- Current trends in joint replacement surgery
- New materials for implant use
- Tips and advice for the post-operative time period



Published by the Bone and Joint Decade

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Preface

Joint replacement: Getting back to an active, pain-free life



*Prof. Lars Lidgren
President of the Bone and Joint Decade*

Joint diseases caused by osteoarthritis and rheumatoid arthritis affect several hundred millions of people worldwide. This figure is set for a sharp increase due to the predictable doubling in the number of people over the age of 50 in the next twenty years.

Joint diseases are the leading cause of disability in the developed countries and account for half of all chronic conditions in persons age 65 and over. Osteoarthritis is the fourth most frequent cause of health problems in women worldwide and the eighth in men.

It is, however, more important, that these conditions affect the ability of people to work and to live a productive and enjoyable life and increase the dependency on health care and social support.

The Bone and Joint Decade UN/WHO initiative which started in 2000 was established to draw global attention to and ultimately improve the health related quality of life for millions of people who are affected by musculoskeletal conditions worldwide. It is a global multidisciplinary and collaborative initiative in partnership with patient advocacy groups, non-profit and scientific organisations, industry, researchers, universities and governments.

It is important that we focus on early diagnosis of joint diseases and that society is well informed about preventive measures and interventions. Patients with advanced joint disease will greatly bene-

fit from joint replacement, which in fact is one of the most successful surgical procedures ever invented.

You know the typical problem with pain when you get up in the morning, pain when you climb the stairs, pain at weight bearing. Advances in joint replacement today offer almost all patients the opportunity of enjoying a pain-free active life. New high-tech implants contribute to success and the surgical procedures are also effective for younger people enjoying outdoor activities who can return to an active life. In this information leaflet you will get answers to most of your questions concerning joint disease, the development and treatment options with an emphasis on joint replacement. There is a lot of evidence based information available today on the net. In a number of countries national implant registers have been established where you can seek information on a specific implant type and surgical techniques. In this brochure you will also find answers to some of your questions and important information and tips for the time period after the operation. I hope that this information leaflet will help you find your way to a successful treatment and that you will be able to enjoy an active, pain-free life soon again.

Professor Lars Lidgren

*Head of Department of Orthopedics, Lund,
Sweden
Chairman, International Steering Committee*



"...it's sometimes hard for
me to get out of the car"



Arthritis

What is going on inside the joint when it is permanently or repeatedly painful?

Our hip and knee joints are wonders of nature. But unfortunately – like all high performance systems – they are susceptible to wear processes. More often than other joints they are affected by so-called arthritis. So what exactly is happening to the joint? What are the causes of the disease and how will it progress?

With arthritis, the pathological wearing out of the joint, these processes proceed at a much faster rate. Cartilage, which covers the bony surfaces of the joint and makes possible the ‘frictionless’ motion of one surface against the other, is quickly worn away. It becomes rough and cracked, and soon cannot withstand normal weight-bearing. Small particles are released, irritating the inner capsula of the joint, which then produces more joint fluid. This condition causes inflammation of the joint, increasing pain and discomfort. Doctors refer to this as an active osteoarthritis.

As the disease progresses the bone underneath the cartilage is also changed. It attempts to compensate for the defective cartilage, it becomes harder and on the edge of the joint surfaces it forms bony “attachments”. These changes are responsible, particularly in the hip joint, for the decreased range of motion. In the final stage of arthritis the joint can be completely encased in bone and the cartilage can be completely worn away. If this happens, then bone rubs against bone, producing a cracking sound.

There are many risk factors

How quickly these processes progress and whether they eventually lead to increased wear of the joint, can depend on various factors. Risks for arthritis include abnormal loading and overloading of the joint. Perhaps you have been participating in active sports for many years. For

risk factors, so it is not always possible to say with certainty what is the precise cause of arthritis. Only in the case of secondary arthritis is it possible to specify the cause with some certainty, especially if the arthritis is preceded by another illness or injury. This could be a fracture, a



Arthritis can be caused by several reasons: Overweight is one of the risk factors for joint deterioration at an early stage

example, overloading the joints especially in contact sports can lead to incipient damage to the cartilage and can accelerate the deterioration process. Also anatomical abnormalities, for example if you are bow-legged or if you have a leg-length discrepancy, and certain childhood disorders can lead to arthritis. Being overweight can play a role. (Even in normal walking every kilo of body weight produces a force in the joint which is multiplied many times.) Also, heredity can be another reason for arthritis. In most cases there are many

damaged meniscus or a systemic inflammation as in rheumatoid arthritis. This is a disease of the auto-immune system which attacks the joint with the patient’s own tissue. Specifically in the hip, an anatomic deformation as for example dysplasia can cause arthritis. Similarly, a disturbance of the circulation of blood through the femoral head can be responsible for a localised destruction of the femoral head. This is known as femoral head necrosis.

Arthritis

Pain becomes a part of your life

Whatever the cause of your arthritis may be, one thing is clear: once your cartilage is damaged a normal cartilage cannot regenerate. Consequently this is referred to by doctors as a chronic disease. The deterioration process follows a well-established course. As the disease progresses, pain becomes a part of your life. For most people, who are affected, there is a pain at weight-bearing, which becomes increasingly worse. But this can vary. Possibly in your case the pain occurs at rest and radiates from one spot to another. Or perhaps you have to exercise to ease the pain. In any case it is completely understandable if you attempt to go easy on your joint and to avoid unnecessary exertion. Many arthritis sufferers, who previously had been active and had participated in sport, gradually retreat into a state of passivity. But that does not have to be the case!



Deterioration of the cartilage can be seen best on x-ray. The bone structures are clearly visible. The cartilage between the joint surfaces is visible in the gap. If the cartilage is diseased, much of it is worn away. In such cases, when you walk, frictionless motion of the joint surfaces is no longer possible.

Info

The most important risk factors for arthritis at a glance:

- All types of contact sports which overload the joints
- Serious or competitive sport
- Anatomical abnormalities, e.g. leg-length inequality
- Childhood disorders with deformation of the joint
- Ligament and meniscal injuries
- Overweight
- Genetic factors
- Systemic inflammatory conditions

The hip joint is a so-called socket and ball joint. It consists of the femoral head, which is the upper part of the femoral neck, and the pelvic socket. The socket does not completely encompass the femoral head, resulting in increased range of motion. The joint is held together by means of a strong joint capsule, which connects the pelvis to the femur, together with the adjacent muscle groups.



Our largest weight bearing joints

The knee joint is a hinged joint. It connects the femur to the tibia. In the front between the two so-called femoral condyles lies the patella (or knee cap). Its function is to improve the lever mechanism provided by the tendons and muscles. Between the femur and the tibia lie the menisci, which act as shock absorbers and are formed from crescent shaped layers of fibrous cartilage.

The joint surfaces in a healthy joint are covered with a smooth **layer of cartilage**. This allows frictionless movement of the bones against one another. The joint fluid, which is continuously produced, particularly in the course of motion, reduces the friction forces. The cartilage acts as a shock absorber. It absorbs load in the course of normal activities.



Non Operative Therapies* and Joint Restoring Operations

They can't cure you, but they can relieve the pain and postpone or prevent major surgery

There is a series of conservative and joint restoring operative therapies which can be used before joint replacement is considered. They cannot cure the disease, but they can at least make life tolerable for a considerable period of time.

- **Pain-Relieving Drugs (Analgesics)**

Pain-killers play an important role. If your arthritis is severe, you can't cope without them. To relieve pain and to reduce joint inflammation, doctors usually prescribe non-steroidal anti-inflammatory drugs (NSAIDs) or cortisone. In addition the classical pain-killers like paracetamol often help.

- **Physiotherapy and related treatments**

In addition to medication, treatments such as warm or cold appliances, knee braces can relieve pain. Even more efficient is joint mobilization and specifically targeted exercises. In this way the joint remains functional and the surrounding musculature is strengthened. It is important, however, when moving the joint, that you don't overload it. You can do exercise, for example, by swimming or bicycling and by guided physiotherapy.

- **Injections**

Injections of hyaluronic acid* into the joint may cause pain relief. The substance, which is similar to that produced by the human body, replaces the degraded joint fluid. Injections with longacting cortisone combat in-



flammation. The effect of these injections usually lasts a few months. The injections can usually be repeated 3-4 times yearly.

- **Arthroscopy***

Using arthroscopy the doctor can see into the knee joint without the need for a large skin incision and can remove loose particles.

Alternatively the cartilage can be taken from a healthy part of the same joint to repair a localised injury. In the hip joint, however, this is difficult, since the hip ball sits tightly inside the pelvic socket. For this reason the current therapies involving cartilage transplantation are mainly done in the knee. These procedures are useful and effective when the cartilage defect is small, for example as a result of a sports injury but does yet work in elderly.

- **Realignment Osteotomies**

In an alignment operation, if only part of the joint is affected by arthritis, this could be unloaded by means of bone realignment. The tibial bone is divided and then reset at the appropriate desired angle loading the healthy part of the joint. Such realignment operations are also normally limited to the knee. In the hip they are useful in the treatment of congenital dysplasia and carried out on the pelvic side.

* see glossary



Interview with a Specialist

Keep moving!

For arthritis patients that is the most important recommendation



Ute Weins
Physiotherapist

So, how do you break the vicious circle between pain and disuse of the joint?

Appropriate motion reduces pain and prevents muscle and bone degeneration. This is because there are two different types of sensory receptors. There are the motion receptors, also known as the mechanical receptors, and there are the pain receptors. In motion the mechanical receptors are activated and they produce the so-called pain-blocking effect. Physiotherapy makes use of this effect.

How can physiotherapy help with arthritis?

If you have arthritis, physiotherapy can be very useful. Often patients have developed a joint sparing gait or posture, which they are no longer aware of. The physiotherapist can focus on this specifically and can achieve an improvement

by means of walking and corrective posture training. In a single session manipulation of the affected joint can have an effect. It can improve the joint mobility and the associated joint structures. With soft tissue techniques the musculature, which has become physiologically short, can be elongated and strengthened. In this context all types of supporting physiotherapy such as heat, cold and traction can be effective.

If you have pain all year round, you know that the pain does not reside solely in the hip. Because of poor posture and poor application of forces, pain just as often extends to neighbouring joints such as the knee and the lower lumbar portion of the spine. Therefore the physiotherapist works out an individual exercise program for each patient. This can be a home program that the patient should follow in the therapy sessions and – more importantly – at home, once or twice daily, after the therapy sessions are over.

Furthermore, one should discuss with the patient what types of sport may be useful. Well-proven possibilities are swimming, hydrotherapy, bicycling and Nordic Walking. Light weight training using exercise machines also prevents further muscle degeneration and helps to support the damaged joint. Such exercises should only be done with appropriate guidance. If you are not inclined to

start on your own or if you are unsure how to proceed, then you can join a self-help group or you can avail yourself of the group therapy sessions at your local physiotherapy practice.

Is physiotherapy useful if you are planning to have your joint replaced?

As already mentioned, the time before your operation can be used very effectively and with appropriate supervision can provide a useful increase in muscle function with associated pain reduction. Patients who engage in regular physiotherapy are far better prepared for their operation and the subsequent rehabilitation is shorter.

What can you do to prepare yourself for a joint replacement operation?

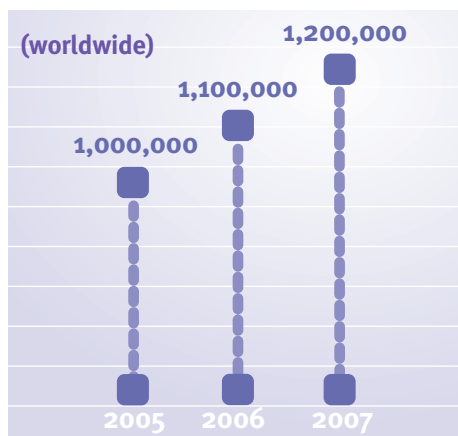
If you know that after your operation you will need to use temporary walking aids, it is advisable to practice walking with them beforehand. The same is true for stair climbing.

Joint Replacement

The best choice when the pain level is high

If, in spite of medication and other therapeutic measures, your quality of life becomes increasingly poor, then joint replacement is the best recommendation. Joint replacement can turn the clock back many years.

With a modern joint replacement you can move just as naturally and without pain as you could before the onset of your disease-related symptoms. To manage your daily professional and private life, to take part in some sports again, to enjoy your leisure with your partner, your children and your grandchildren – with a properly planned operation all this is possible without pain and for the long term. What exactly happens when you have a joint replacement operation and what do you need to know about the different implant options?



Compared with previous years the tendency is sharply upwards. Experts attribute this increase to advances in prosthetic technology and to improvements in operating procedures.

First, we distinguish between partial joint replacements (for example the so-called Bipolar prostheses* or surface replacement prostheses*) and total joint replacements. As the name suggests partial joint replacements replace only a part of the joint. They are therefore only a possibility for certain patients with certain diagnoses.

So what is the advantage of a partial joint replacement? On implantation less bone has to be removed. But, if a partial joint replacement has to be replaced as a result of implant loosening, then the bone loss at revision – particularly in hip replacement – can be all the greater. Therefore the gold standard is still total joint replacement (TJR). TJR completely recreates the damaged hip or knee joint – and in fact raises it to a very high level of performance. TJR has been continuously improved over many decades and is available in appropriately fitting sizes for everybody. Long term studies reliably demonstrate good results and very low complication rates.

Hip Joint Replacement

Total hip replacement consists essentially of two components: a socket and a joint ball head. The socket is attached to the pelvis, while the joint ball head is attached to the femur with the aid of a stem.



This type of prosthesis is known as a stemmed prosthesis*. A stemmed prosthesis can be attached by two different means: with or without cement. A cemented hip is fixed using so-called bone cement* into the pelvis and the femur. The cement becomes hard within a few minutes, so that the prosthesis is completely stable and can be fully loaded after the first postoperative phase. A cementless prosthesis is anchored to the bone without any auxiliary means. In the course of the healing process it becomes attached by the formation of new bone tissue which grips it and makes it stable. For this reason a prosthesis must not be heavily loaded for a period of time, which means that walking aids have to be used. Sometimes the two methods of fixation are combined, in other words one part of the new joint is ce-



Joint Replacement

mented, while the other is cementless. This is the so called “Hybrid” technique.

Which of the different techniques is used in any given individual case depends particularly on age and the condition of the bone. In case of worse condition of the bone and in higher ages, it is more likely that the surgeon will advise that a cemented hip is used.

The surgical technique for hip replacement

Hip replacement operations are routine these days, performed worldwide approximately 1,200,000 times per year. Minimally Invasive Surgery* is current trend, where the surgeon attempts to keep the skin incision small and to dissect as few muscle groups as possible.

Even so an 8 to 15 cm long (3–6 inches) skin incision is normal depending on the particular operation type. This incision is located at the side of the hip, where the femur and pelvis come together. In this procedure the damaged parts of the joint are removed and replaced with the prosthesis.

In order for the new joint to function perfectly in use, the optimal leg axis and the corresponding implant alignment are carefully planned pre-operatively and this planning is taken into account during the operation.

Some surgeons use a computer assisted navigation system to display the pre-operative planning data during the operation.

The total duration of the operation, when performed by an experienced surgeon, is between one hour and one hour and a half. Normally, the associated risks are no greater than for any other operation involving a general anaesthetic.

For higher risk patients, for example those with cardiovascular disease, a partial anesthetic (an epidural*) is currently used. Possibly you may be recommended to give blood pre-operatively as a precaution, so that your own blood can be given back to you again during the operation, if needed.

After two days you should be on your feet again

A long period of bed rest after a joint replacement operation is no longer common practice. In most hospitals you will be helped to your feet the very next day by a nurse or a physiotherapist. On the



following day or the day after you can make your first careful steps with your new hip joint and after a few days you will be able to explore the ward and the hospital without help. Soon thereafter most patients are allowed to return home.

A physiotherapist will do specific exercises with you on a regular basis to re-strengthen your muscles and to develop an optimal gait when walking. Between 10 and 14 days after your operation the stitches or clamps will be removed.

Info

Joint replacement surgery is an operation which is planned in advance and whose approximate date you yourself can decide. Therefore choose a date when you will be best prepared both for the operation and for the time after the operation. In any case, pay a visit to your doctor and get a check-up. Cardiovascular problems, high blood pressure or diabetes must be well controlled using medication. Infections, for example in the bladder or in the teeth, must be treated before the operation.

Pay attention to your weight. Based on experience patients, who are not overweight, become active more quickly and have fewer complications and fewer health problems.

* see glossary



*"Play a full part,
in life again"*



Joint Replacement

Knee Joint Replacement

Knee replacement is now done more frequently in many countries and is not more complicated than hip replacement. The damaged joint surfaces can be replaced. Usually, the femoral and tibial parts are replaced. Sometimes the back-facing surface of the patella is replaced.



As in the natural knee, the individual constituent parts of the replacement knee are not normally connected together, which means that that sliding motion can take place as it does in the natural knee. If only one side of the knee is damaged that part of the joint can be replaced with an uni prosthesis. Knee replacements in which the constituent parts are tightly connected together are only rarely required, for example if the ligaments are completely damaged or unstable.

The knee replacement operation is performed by means of an incision at the front of the knee. Under general or epidural anaesthetic the damaged joint surfaces are removed and the prosthetic components are implanted with or without cement. Normally on the day after

the operation you can lift your leg and stand on your feet with the help of a physiotherapist and on the following day you can usually take your first steps. A short time later the majority of patients can walk independently and can even climb stairs. From four to six weeks following the implant, the joint must not be heavily

loaded which means that walking aids are recommended. Thereafter you can take part in daily life normally again.

The only limitation is the slightly reduced range of motion of the joint, which you would notice for example, if you tried to make a deep knee bend. In daily life, however, this causes no noticeable limitation.



Info

Facts about hip and knee replacement operations at a glance:

Operating Time:	About 60 to 90 minutes
Anaesthetic:	General or Epidural
Bed-rest:	1 to 2 days
Length of hospital stay:	3 to 10 days
Risks:	The same as for any other surgical operation
Rehabilitation:	About 6 weeks is recommended either as an outpatient or in rehab clinic





Prosthetic Materials

Why they have an important effect on long term results

You have already noticed: with joint replacement there are many options, which you have to discuss and decide upon with your surgeon before the operation. These options include not only the model of joint replacement prosthesis which suits you best, but also the material from which this prosthesis is made. For younger and more active patients the choice of material can have a direct effect on the life expectancy of the implant. A total joint replacement prosthesis never – or only very rarely – fails. But it can become loose and then it must be exchanged in a second operation. Such an operation is known as a revision operation. How long it takes for the prosthesis to become loose depends on various factors: disorders in the healing process can play a role as can excessive or inappropriate loads. But one main cause of early implant loosening is the wear of the materials that make up the articulation and the resulting wear particles.

The articulation surfaces are the most critical part of the implant system, since these are the surfaces which continually rub against one another as you walk, run or exercise. For this reason they are known as wear couples*. Depending on the material used every day millions of particles can be created and released into the surrounding tissues. These accumulate at the bone-implant interface over time and cause reactions which are similar to inflammation. One severe consequence of these reactions is that

the bone resorbs and the joint replacement implanted components gradually lose their stability. Doctors describe these reactions as osteolysis* or – be-



The surfaces of the cup and ball head in a hip joint rub against one another continuously during walking

cause of the cause – “Particle Disease”. “Particle Disease” is the most frequently occurring long term complication and occurs in particular, when a polyethylene* (plastic) wear surface is used. The biggest risk arises in hip replacement. The hip has a small joint space, so wear particles, especially large wear particles, cannot easily escape and cannot be transported away from the site. The risk formula, especially in hip joint replacement, is the following: the greater the level of activity, the greater the amount of wear and therefore the greater the risk of early loosening of the joint. Above all, younger and more active patients

should therefore pay particular attention to the choice of material and should place particular value on the highest performance option.

The long history of implant materials

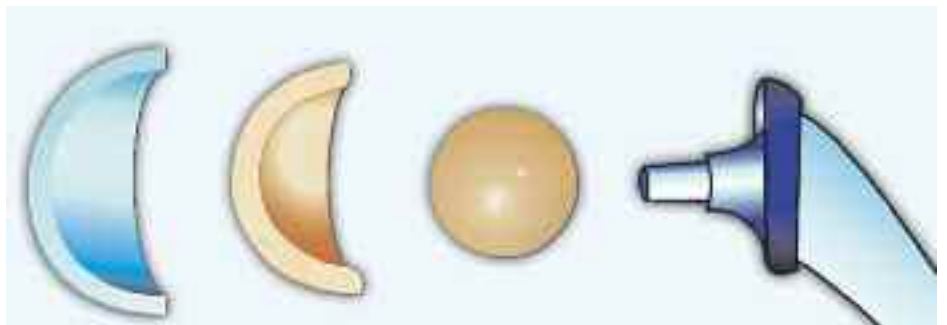
Throughout the more than 100 year history of development of joint replacements the problem of the durability of the implant material has been of great importance. Which material is strong and indestructible enough to withstand for many years the high loads which occur in walking? Ivory, the naturally-occurring bone substance from which Themistocles Gluck in 1880 in Berlin made the first hip replacement, could not manage this. In the following years experiments were tried with practically all materials known at the time including glass, bakelite, cobalt chrome based alloys, Teflon, nickel alloy steels and other alloys. Reasonable success, however, was not achieved until the 1950s and 1960s. The combination of metal and plastic (polyethylene) proved stable and so for the first time a large number of joint replacement operations was performed. During these early times, however, wear of some of the materials became apparent and with it the associated problem of bone resorption.

As a result of these early time era, the growing number of patients in the 1970s produced a flood of loosened implants and a correspondingly high quantity of revision operations in the 1980s.

Prosthetic Options

In the following decades the development of polyethylene and especially research into new materials was continuously moving. High performance ceramics, which had already proved themselves in space technology, finally led to a breakthrough. This stable, highly biocompatible material proved itself to be extremely wear resistant and could increase the life expectancy of the joint replacement. At the same time, improved metal wear couples for joint replacement were developed. All in all, for the first time a long-term solution became available for younger and more active patients. Today joint replacement surfaces are made of highly specialised polyethylene, metal alloys and high-tech ceramics in various combinations.

* see glossary



In hip replacement the constituent parts which are attached to the femoral neck and the pelvis (the stem and the hip cup, respectively) are usually made of metal (cobalt chromium or titanium alloys). For the prosthesis constituents, which rub against each other when you move (the ball head and the cup insert), there are many options including polyethylene, metal alloy and ceramic in various combinations. Of all of these materials, ceramic is the most wear resistant one. In order to obtain the best long term results from the implant system it is critical that the wear couple best suited for you as a patient is selected.

Info

Today, the average life expectancy of joint replacements is 15 to 20 years. With ceramic wear couples, modern implant designs, and modern operating techniques, expanded life times can be foreseen based on the first long-term clinical results. If, however, a joint replacement prosthesis becomes loose, then it is good to know that the joint can be exchanged once or if necessary, more times.



Wear Couples in Total Hip Arthroplasty

Wear couple type	For whom suitable	Advantages	Disadvantages
Metal/Polyethylene¹	Less active, older patients.	Long clinical experience.	<p>Long term osteolysis due to polyethylene wear and a corresponding implant loosening.</p> <p>Fatigue of the material and wear of the polyethylene.</p>
Ceramic/Polyethylene²	Active patients.	The wear compared with metal/polyethylene is about half and there is a significant reduction in the rate of particle-induced implant loosening.	<p>Long term osteolysis due to raised levels of polyethylene wear, but less than with metal/polyethylene.</p> <p>Fatigue of the material and wear of the polyethylene.</p>
Ceramic/Ceramic	Active and younger patients, patients with metal sensitivity or a suspicion of it, and patients who are concerned about possible health problems resulting from the use of a metal/metal wear couple.	<p>Extremely high wear resistance. Do not release metal ions and do not cause undesirable allergic reactions.</p> <p>Of all wear couples the wear is the lowest and the least harmful. Particle induced implant loosening can be reduced.</p>	Implant fracture in very rare cases.
Metal/Metal²	Active and younger patients.	Low wear volume. High wear resistance.	<p>Very small wear particles, which can distribute themselves in the body and the organs. In spite of good wear resistance these can occur in large quantities.</p> <p>Allergic reactions to the metal components cannot be excluded. Possible long term health problems as a result of metal ion release.</p>

The above information is based on published scientific and medical evidence.

- ¹ Highly cross-linked polyethylene has been developed by some implant manufacturers in an attempt to improve the abrasion and wear properties of conventional polyethylene. The long-term effects of the resulting ultra small wear particles are still unknown. Since at present there are no long-term results, the risks and complication rates cannot be adequately estimated.
- ² Also when used in Hip Resurfacing, the long term effects of the resulting metal wear particles are still unknown. The risks and complication rates, especially for younger and more active patients, cannot be adequately estimated.

Interview with a Specialist

Growing life expectancy raises the issue of artificial joint materials



Professor Michael A. R. Freeman, MD, FRCS was among the first surgeons to replace hip and knee joints in the 1960s and 1970s. To date, he is academically active in the field of arthroplasty.

Why is arthroplasty performed on more and more younger people?

In the early years we didn't know how long an artificial joint would last. Therefore the surgeons were reluctant to implant them into younger patients. Today, we know that they can stay in place for up to 20 years and more.

Why is it important that an artificial joint should last very long?

If an artificial joint fails revision arthroplasty becomes inevitable, meaning that the joint has to be removed and replaced by a new one. Revision is technically difficult, it is a far more severe operation than a primary arthroplasty and it will leave the patient with less bone to fix the new implant in.

What are the causes for revision?

The most severe risk is that the area of

the operation becomes infected. In this case the implant gets loose and you have an infection in the bone that can be very hard to get rid of. Medical science has only limited means to prevent this "septic loosening" which fortunately happens only in a small number of cases. We do have an influence on the most frequently occurring complication, though, the "aseptic loosening" that occurs without an infection.

Why can this be influenced?

Because it depends greatly on two man-made factors. One is the skill of the surgeon who should be an experienced specialist. The other important factor is the material of the artificial joint, and especially of the parts that rub against each other with every step of the patient. This "wear couple" produces wear debris which, over time, can cause aseptic loosening.

How can this be avoided?

The less wear the materials produce, the better. The wear rates are different for the different wear combinations in hip arthroplasty. You can use metal ball heads with a polyethylene cup. To reduce wear here you need a good finish of the metal surface and you can choose one of the considerably improved polyethylenes that are currently available. The second combination is metal on metal, the metal being an alloy of mainly cobalt and chrome. This wears more slowly in terms of volume than polyethylene, but the particles are much smaller so that for a given volume of wear debris you have even more

particles of metal than of polyethylene. There is also an issue of the blood levels of cobalt and chromium ions that are released when metal-on-metal wear couples are used.

Why is this an issue?

Metal ions are suspected of causing allergic reactions in some patients. We may never know if they really do, but elevated ion levels in the blood are abnormal and should be avoided. This can also be done with the third wear combination that involves ceramics. According to the data available, ceramic implant materials are extremely stable, they have the lowest wear rates and the release of ceramic material into the blood stream is negligible or even zero. You can combine a ceramic ball head with a cup made of polyethylene or one made also of ceramics. For a patient with a life expectancy of around ten years it would be difficult to demonstrate a clear advantage for any of the modern wear couples. They all show good results. But the greater the life expectancy the more important the issue of material. There is a strong argument for using ceramic wear couples in hip arthroplasty for younger patients.

What is the right time to perform primary arthroplasty?

The right time for it is when the patient has fully understood the hazards and downsides of arthroplasty and still wants it done. The well informed patient has to decide if his joint hurts so badly that he is ready to put up with the risks.

A photograph of a family of three walking on a grassy field. The father is in the center, wearing a light blue polo shirt and blue jeans, holding the hands of a young girl on his left and a woman on his right. The girl is wearing a light blue t-shirt and blue jeans. The woman is wearing a red top and blue jeans. They are all smiling and looking towards the camera. The background is a bright, sunny outdoor setting with green grass and trees.

*"A new lease
of life!"*



*"Every day...
pain-free at last"*



Post Operative Rehabilitation

How to get fit again for everyday life, as quickly as possible

For most patients it is a small miracle that they can be back on their feet so quickly and that they can move their hip without pain. Of course, it is true that you will not be fully recovered and completely well within a week.



First your wounds must heal properly – not just the skin, but also the deep tissues. Your muscles have become weak and sometimes previous poor posture can cause problems. So the ideal solution after your stay in hospital is to have a four to six week period of rehabilitation as an out-patient in a supervised program. There, in an intensive training program, you will learn how to use and load your joint in the right way.

Usually you can conduct your recovery at home by availing yourselves of the services provided by an out-patient rehabilitation program. This means that you would have to frequent a local out-patient rehabilitation centre either daily or at agreed times in order to strengthen your muscles and improve your recovery. These services are usually available to you regardless of whether you are on a public or private insurance scheme.

If your recovery is uncomplicated, your joint should be fully healed roughly 4 to 6 weeks after your surgery depending on your recovery process. By 6 to 12 weeks you should normally be able to go back to work and resume your daily activities. In the following weeks and months you will gradually completely forget about your joint and accept it as a normal part of your body. Still, you should not overload it. Particularly in the beginning you should take to heart the advice of your physiotherapist and you should not deviate from it, either to prove something to yourself or to impress others.

Info

Tips for the first few weeks after your operation:

- Remove from your house things that you could trip over such as doormats, loose carpets, etc.
- Put non-slip adhesive tape in your shower tray or bath.
- Make sure that all the things that you need at home on a regular basis are within easy reach.
- If in the beginning you need walking aids or crutches, take a small rucksack with you to carry your everyday items.
- Don't hang things on your walking aids.
- Slippers are completely unsuitable – even for short trips. For the time when you will be in hospital, get hard shoes without shoelaces, but with non-slip soles.
- Get a long shoehorn. It will help you get into your shoes.
- In the first few days after your operation wear a jogging suit. You will be more mobile than in a bathrobe.
- In the first few months with your new joint avoid making turning movements, as you would make for example when getting out of a car. Instead first sit facing sideways, then put both feet outside the car and only then stand up.

Sport and Leisure

How to be active and pain-free with your new joint



Walking, swimming, bicycling and golf are no problem with an artificial joint. But, with a new hip or knee can one really participate in active sports again?

Can I play tennis again or even go skiing? Can I play ball with my children or grandchildren? When deciding whether or not to have a joint replacement operation, the answers to these questions often play an important role.

First, you must be aware that sports involving heavy impact loads, extreme ranges of motion and abrupt changes in direction put a big strain on the joint. Clinical studies show these stresses cause loosening of the joint earlier than joint-sparing sports such as walking, swimming, bicycling, golf and even cross-country skiing.

But with our present knowledge, it is not possible to state categorically which sports are suitable and which are not. For some patients with a high perform-

ance implant and a suitably adapted range of motion, some types of sports may be suitable. It's probably advisable to return to a sport that you did before your operation rather than to learn a new one. Before beginning, do appropriate exercises to strengthen your muscles and ligaments. By doing this, you can reduce the joint forces and spare the joint. Get advice from your physiotherapist on appropriate exercises. Start your training carefully and gradually, take rest breaks and slowly increase the level of activity. Stop exercising if you feel pain or if your leg gets tired.

Info

Examples of suitable types of sport are

- Walking
- Hiking
- Bicycling
- Swimming
- Sailing
- Golf
- Dancing
- Cross-country skiing
- Bowling or skittles



*"... I can enjoy my
leisure time again"*





The Experience of Patients

To find out how it was for others can often be comforting and can help with the decision-making process. For this reason in this final section we relate the experience of a former arthritis patient, who at the age of 45 decided to go ahead with hip replacement.



Barbara S., 48 year old physiotherapist and mother of two daughters.

As a physiotherapist I knew that arthritis pain usually increases without you really being aware of it. But with me the pain was acute at the age of 43. My left hip joint, which previously had never caused any problems, started causing me unbearable pain. In the beginning it went away again for short periods of time. Under load, or for example when standing up, it started up again suddenly and fiercely. I saw many orthopaedic sur-

geons, who diagnosed arthritis and prescribed medication. Also I was advised to lose weight to reduce the force on the hip joint. One year after the first onset of the condition, I was already in continuous pain. I could hardly walk and I was only able to do my job with the understanding support of my colleagues.

Two years later, when I was 45, it was clear to me that I couldn't go on like this. I could not sleep because of the pain, I could only walk in a pain-relieving posture and I had practically no quality of life. When I visited another orthopaedic surgeon I requested effective and, if necessary, surgical help. The doctor attributed the arthritis to a congenital misalignment of the joint, for which I had compensated for many years by my sporting activities – I had been a competitive swimmer from childhood on.

He therefore proposed surgical realignment of my hip. He said the rehabilitation time would be at least six months and he couldn't assure me that the operation would improve the condition. I was prepared to accept the risk and finally the operation date was fixed.

On the day before the operation I visited the surgeon who was going to operate. He had checked my x-rays and told me that in his opinion surgical realignment was not very promising. After taking new x-rays he suggested that the only sensible solution for my hip, which by then had become completely deformed,

would be total joint replacement. He gave me great hope that with this treatment I would be able to walk again completely normally before long.

Within a few hours I agreed to the operation. The following day the operation took place. On my request I had an epidural rather than a general anaesthetic. There were no complications. Already a few hours after the operation I detected the relief of pain in my hip. For the first time in years I was pain-free. Of course, there was some pain from the wound in the first few days. But that was not the same as joint pain. Two days after the operation I was able to take my first steps using walking aids. Since I received an uncemented hip joint, I had to initially use walking aids for 4 weeks to prevent overloading of the hip. But I could walk quite normally without pain. After physical rehabilitation, my walking was normal again and the muscles in my back and groin were getting stronger. After exactly three month and three days I was back at work and at last my life had returned to normal.

It was then three years since my operation. Recently I had a follow-up examination, which showed that my hip was in very good shape. I feel well. I ride my bike, swim and walk regularly. But I'm careful and for example, I do not intend to go ice-skating anymore. In no way do I want to endanger my newly acquired quality of life.

Glossary of Terms

- **Arthritis:** Pathological wearing out of the joint.
- **Arthroscope:** A small, optical instrument (endoscope) for the diagnosis and/or the treatment of knee joints.
- **Computer Assisted Navigation System:** An aid to orientation in the operating field where visibility is restricted. It allows the surgeon to follow the movements of his instruments on a screen and to control their correct position with respect to the bones in three dimensions.
- **Bipolar Hip:** Partial joint replacement for the hip. With this type of prosthesis only the femoral part of the hip joint is replaced. The pelvic part is not replaced and is conserved.
- **Wear Couple:** The surfaces in an artificial joint that constantly rub one against another.
- **Hyaluronic Acid:** Substance occurring naturally in the human body and which, for therapeutic purposes, is also produced synthetically.
- **Bone Cement (Acrylate):** Very durable two-component medical plastic, which is used among other things for the fixation of implants in bone.
- **Conservative Therapies:** Non-surgical treatments.
- **Minimally Invasive Surgery:** Particularly conservative surgery. The objective of minimally invasive surgery is to produce as little soft-tissue damage as possible.
- **Hip Resurfacing Prostheses:** Partial joint replacement for the hip. With this type of prosthesis the damaged femoral head is not replaced, but is crowned – like a tooth. On the pelvic side the joint cup is completely replaced (as for a stemmed prosthesis). This is a relatively new type of prosthesis. No long term clinical evidence is yet available.
- **Osteolysis:** Resorption of bone tissue caused, for example, by the inflammation from wear particles from joint prostheses (“Particle Disease”).
- **Polyethylene (abbreviation: PE):** Plastic. The starting material for the production of this polymer is petroleum.
- **Rehabilitation:** Measures taken to restore health.
- **Epidural Anaesthetic:** By injecting a local anaesthetic close to the spinal cord the lower half of the body is anaesthetised.
- **Stemmed Prosthesis:** Total Joint Replacement for the Hip. The damaged joint head is completely reconstructed. The stem supports the joint head. Stemmed prostheses are the joint replacement type having the greatest amount of long term clinical evidence and the lowest complication rate.
- **Exchange Operation or Revision:** Exchange of an existing artificial joint, normally as a result of infection or loosening of the prosthesis.



Acknowledgements

**Publisher:
The Bone and Joint Decade**

www.boneandjointdecade.org

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Date: February 2009

Grafic-Design:

LoopKomm
Corporate Publishing

Terlaner Str. 8
D-79111 Freiburg

Tel.: +49 7634 55 19 46
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www.loopkomm.de

Printer:

Jütte Messedruck, Leipzig

Text:

Linda Jacobs, Ratingen,
Klartext von Pekker,
Heitersheim

Photos:

Creatas, Fotolia, Zefa

