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Update article

Surgical treatments for osteoarthritis

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ABSTRACT

There are two main surgical treatments for osteoarthritis: conservative treatments, where the damaged cartilage is left in place, and radical treatments, where the cartilage is replaced by an artificial endoprosthesis; this latter procedure is termed joint arthroplasty. These treatments are only offered to symptomatic patients. Arthrodesis is yet another surgical intervention in cases of osteoarthritis. It will sacrifice the joint's articular function and is performed on small osteoarthritic joints, such as wrists and ankles, for instance. Osteoarthritis symptoms are usually the consequence of an imbalance between the load applied to a joint and the surface available to support that load. Therefore, conservative treatments will either tend to decrease the load exerted on the joint, such as in a tibial valgus osteotomy for instance, or to improve the articular surface supporting that load. Sometimes, both can be provided at the same time; the peri-acetabular osteotomy for hip dysplasia is an example of such a procedure. Conservative treatments are usually offered to young patients in order to delay, if not avoid, the need for a joint prosthesis. They are usually performed before osteoarthritis appears or at an early stage. Joint arthroplasties have overwhelmingly excellent functional results and today's research is directed towards providing rapid recovery, very long-term stability, and the assurance of a good functionality in extreme conditions. However, complications with joint arthroplasties can be serious with little, if any, reasonable salvage solution. Therefore, these procedures are offered to patients who have failed adequate medical treatment measures.

1. Introduction

There are two main surgical treatments for osteoarthritis (OA): conservative, with the damaged cartilage left in place, and radical, with the cartilage replaced by an artificial endoprosthesis, the latter procedure termed joint arthroplasty. These treatments are offered only to symptomatic patients. Arthrodesis is another surgical intervention in cases of OA. It sacrifices the joint's articular function and is performed on small osteoarthritic joints, such as wrists and ankles.

OA symptoms usually result from an imbalance between the load applied to a joint and the surface available to support that load. Therefore, conservative treatments will tend to decrease the load exerted on the joint, such as in tibial valgus osteotomy, or improve the articular surface supporting that load. Sometimes, both solutions can be provided at the same time; peri-acetabular osteotomy for hip dysplasia is one example.

Conservative treatments are usually offered to young patients so as to delay, if not avoid, the need for joint prosthesis. They are usually performed before OA appears or at an early stage. Joint arthroplasty has overwhelmingly excellent functional results and today's research is directed toward providing rapid recovery, very long-term stability, and the assurance of good functionality in extreme conditions. However, complications with joint arthroplasty can be serious with little, if any, reasonable salvage solution. Therefore, these procedures are offered to patients with failure of adequate medical treatment measures.

In the following sections, we discuss the main surgical treatments for hip, knee, and shoulder OA. We present both conservative and radical options along with patient selection criteria, a brief description of the technique, and the expected results.

2. Hip OA

2.1. Conservative treatment

Conservative surgical treatments of hip OA have declined over the last decades after the implementation of total hip replacement

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(THR). Nonetheless, significant indications remain for young patients. These treatments will surely delay but not always avoid the need for joint replacement in the long-term [1,2]. The 3 main surgical procedures that can be performed are femoral osteotomy, pelvic osteotomy, and cartilage and labrum procedures under arthroscopy.

2.2. Femoral osteotomy

This osteotomy reorients the femoral head, with one of 2 main goals: positioning an adequate portion of the femoral cartilage in front of the acetabulum, such as in rotational osteotomy of the femoral neck for osteonecrosis [3], and changing the biomechanics of the hip to reduce the load going through the joint, such as in femoral varus osteotomy. The most common osteotomies are valgus and varus femoral osteotomies; others such as flexion, extension or rotation osteotomy or a combination of these are less frequent. The varus femoral osteotomy is usually indicated for hip dysplasia, osteonecrosis, and valgus deformation. It closes the neck-shaft angle when it is superior to 135° [4]. The long-term results for early OA are good, with 75% 10-year survival, defined as the delay before hip replacement. Second-line hip replacement will have the same prognosis as first-line replacement. The procedure is not recommended with isolated serious dysplasia [5]. Valgus femoral osteotomy is mainly performed for femoral neck non-union, slip upper-femoral epiphysis sequelae and congenital varus deformity of the femoral neck.

2.3. Pelvic osteotomy

Pelvis osteotomy (including the shelf procedure) is only rarely performed today but can still provide excellent results. The common eligibility criterion is a painful, dysplastic hip in a relatively young patient (usually < 30 years old). Beyond that, we also rely on some other indications such as cartilage degeneration stage and coxometric parameters to decide on the surgical procedure. Shelf operation consists of a bone graft addition on top of the hip where the femoral head is uncovered; although it provides support and balances the load, it does not provide cartilage (Fig. 1).

The Chiari osteotomy is an augmentation osteotomy similar to the shelf procedure that decreases the contact stresses going through the joint, even though it does not provide any cartilage. The Bernese peri-acetabular osteotomy is a reorientation procedure that lets the acetabulum rotate around the femoral head to cover the uncovered anterior and lateral portion of the head. [6].

When these surgeries are performed in carefully selected patients, they provide good results and delay the need for a hip replacement in the long-term. Conversion to hip replacement occurs at 10 years in about 40% of patients for the shelf procedure and in 15 to 20% for peri-acetabular and Chiari osteotomies. [7].

2.4. Arthroscopy

Arthroscopy is indicated for femoroacetabular impingement (FAI). It occurs when anatomic variation of the hip causes impingement between the femoral head–neck junction and the acetabular rim during functional motion. This condition is mainly seen in young and active men. Open or arthroscopic osteochondroplasty of the femoral head–neck junction is the surgical treatment for symptomatic cam impingement. Depending on the surgeon, it may be performed with an anterior open approach with or without arthroscopy [8] by surgical dislocation [9] or by arthroscopy exclusively. Good to excellent results are reported in 70 to 95% of patients.

2.5. THR

THR has been coined the "operation of the century". Millions of THRs are performed worldwide to treat OA, with more than 95% of

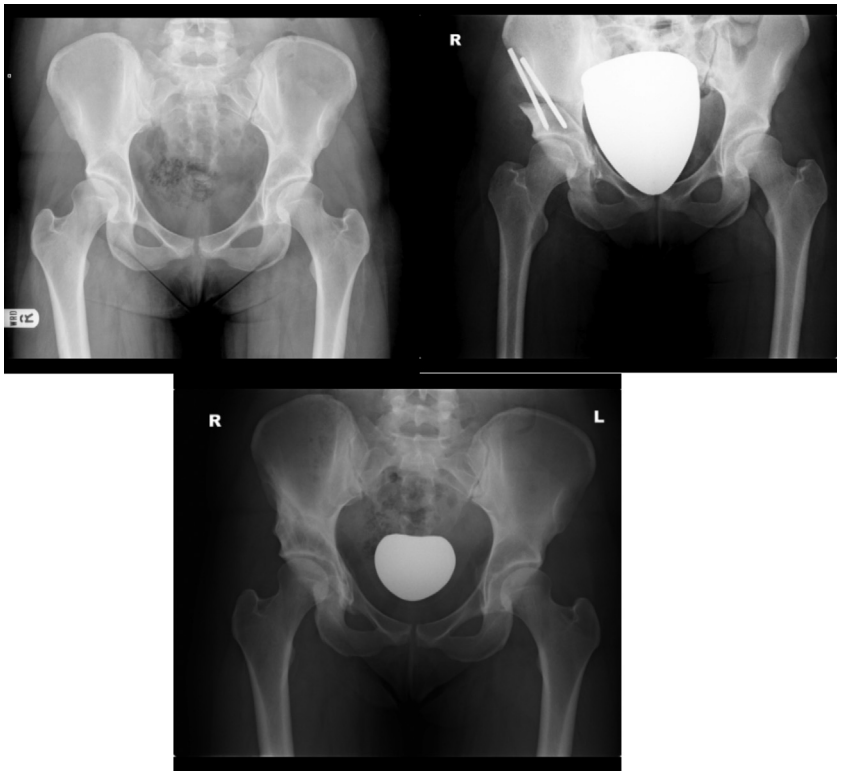

Fig. 1. Peri-acetabular osteotomy of the left hip (preoperative, postoperative and long-term radiographs).