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Original article

Rapidly destructive tibiofemoral knee osteoarthritis: Clinicoradiological presentation and outcome after global medical treatment including non-arthroscopic joint lavage plus corticosteroid injection. A single center retrolective study

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ABSTRACT

Objective: To determine (i) clinicoradiological presentation and outcome of rapidly destructive knee osteoarthritis (RDKOA) after global medical treatment including knee lavage plus corticosteroid injection, (ii) predisposing factors of subsequent requirement to knee surgery.
Methods: Retrolective monocenter study with tibiofemoral RDKOA, defined as a loss of at least 50% of joint space width within 1 year, with a post lavage follow-up of at least 1 year.
Results: One hundred and eleven patients were enrolled, age 64.1 years, BMI: 28.9, 70.3% female. VAS pain was 56.1 mm, Lequesne index: 11.9, WOMAC function score: 51.9. Chronic mechanical effusion (216 white cells/mm^3) was aspirated in 102 patients (91.9%), lasting more than 6 months in 71.4%. Medial tibiofemoral compartment was concerned in 79.3%. Joint space loss reached 52.2% in extension and 71.0% in semi-flexed position within a mean 7.3-month period. Radiological chondrocalcinosis was present in 13.5% and osteonecrosis in 12.6%. Lavage (one liter, two 14-gauge cannulae) plus corticosteroid was completed by hyaluronic acid injections in 71.2% of patients. Eighty-nine patients were reviewed with a mean follow-up period of 55.0 months. Thirty-seven (41.6%) required surgery. Mean delay between lavage and surgery was 16.1 months. Pain was acceptable in 100.0% of operated patients and 87.8% of non-operated patients. Multivariate regression analysis determined that functional impairment, assessed by the maximal walking time, and radiological severity in extension were baseline predisposing factors of subsequent requirement to surgery.
Conclusion: The outcome of RDKOA seems less severe than expected after global medical treatment.

1. Introduction

Osteoarthritis (OA) is one of the most frequent diseases of the knee. Usually, radiological progression is slow but sometimes the cartilage destruction can accelerate, in a pattern called rapid chondrolysis or rapidly destructive knee osteoarthritis (RDKOA), which can be idiopathic or occurring after arthroscopic meniscectomy in particular [1–3]. In the absence of specific publications on this topic and in analogy to Lequesne's definition for the hip joint [4,5], RDKOA of tibiofemoral compartments could be considered as a loss of tibiofemoral cartilage width of at least 50% within 1 year.

The medical symptomatic management of knee OA combines pharmacological and non-pharmacological treatments [6–8]. At this time, no treatment has undoubtedly proved a structural effect, especially in case of rapidly destructive knee OA. In the hip joint, the prognosis of rapidly destructive OA is severe. We reported total hip arthroplasty in 27 over 28 patients suffering from this pathology, with 20 arthroplasties done within 12 months after corticosteroid injections, with or without weight bearing elimination by crutches [5]. In the therapeutic possibilities, the non-arthroscopic knee lavage using one or two needles [9–16], with [11,14,16] or without [9,12,15] corticosteroid injection, is proposed in painful knee OA to clean the joint from cytokines, micro- or macroscopic cartilage fragments or calcium phosphate crystals which may cause pain or inflammation. However, in 2010, two meta-analyses reported no favorable results of knee lavage in term of pain relief and improvement of function in knee OA [17,18]. To our knowledge, there is no published study concerning the use of non-arthroscopic joint lavage in the particular and dramatic situation of rapidly destructive tibiofemoral osteoarthritis.

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The primary objective of this study was to evaluate the clinical outcome of RDKOA after non-arthroscopic lavage plus corticosteroid injection, combined with pharmacologic and non-pharmacologic treatments of knee OA, with regard to the requirement to surgery. The secondary objectives were to determine the clinical, radiological and biological presentation of RDKOA, to compare the algofunctional and social status in operated versus non-operated patients, and to determine predisposing factors of subsequent requirement to surgery.

2. Methods

2.1. Study population

The medical records of patients managed at the Rheumatology B Department of Cochin Hospital, Paris, France were reviewed retrospectively in order to identify patients with RDKOA who had a non-arthroscopic lavage followed by corticosteroid injection. Patients were sent for lavage by their rheumatologists in case of painful knee OA despite ambulatory medical treatment. The follow-up reporting was done at least 1 year after knee lavage. The patients were contacted by phone call and a questionnaire was filled with them. If the patient was not reached by phone, follow-up parameters were obtained by contacting his/her rheumatologist and were collected from the last medical report. The study was in agreements with the French ethic standards and a telephonic approval was obtained with the patient himself.

The department's patient database was used to identify patients admitted between 1998 and 2010 (15th July). The selection was done with the keywords "RDKOA", "articular lavage" or "intra-articular injection". Within this population, we identified the patients who experienced at least 50% reduction in radiological medial or lateral tibiofemoral joint space width within the year before knee lavage (or at maximum 100% reduction within the 2 years before knee lavage), as documented by comparing two serial radiographs, in extended and semi-flexed position, performed in Radiology centers, using the following procedures:

- a bilateral weight-bearing anteroposterior view with both knees in full extension, tibial spines centered below the femoral notch, and alignment of posterior and anterior margins of the tibial plateaux and central X-ray by using fluoroscopic guidance [19];
- a bilateral weight-bearing posteroanterior view with both knees in schuss position, i.e. patellae in contact with film cassette and coplanar with the tips of the great toes (20–30° flexion), with tibial spines centered below the femoral notch, and alignment of posterior and anterior margins of the tibial plateaux and central X-ray by using fluoroscopic guidance [20].

The percentage of joint space loss was calculated on paired X-rays spaced of 2 to 20 months, and usually, the second X-ray was done a few days before the lavage (not more than 4 months before). Finally, the diagnosis of RDKOA was confirmed by a senior rheumatologist (X.A.) working in the department, based on loss of at least 50% of the joint space width within 1 year on extended and/or semi-flexed radiographs. Patients were excluded when knee osteoarthritis was caused by infection, inflammatory disease or Paget disease.

2.2. Collected data

2.2.1. Patient's characteristics

For each patient, different items were recorded at the time of lavage on a standardized report form: age, sex, weight, body mass index (BMI), profession (none, sedentary or not sedentary), previous intra-articular injections of corticosteroids (and number) or hyaluronic acid in the 6 past months, recent meniscectomy, previous non-operated rupture of anterior cruciate ligament, nocturnal awakening, morning stiffness (minutes), pain evaluated on a 100 mm visual analogic scale, maximum walking time (minutes) on a flat flour with no rest, Lequesne's algofunctional index ranging from 0 = no disability to 23 = major disability [21], WOMAC function score with a 0–100 normalized unit (0 = normal and 100 = worst condition) [22], clinical knee effusion and its duration before lavage, and C-reactive protein.

2.2.2. Radiological evaluation

As described ahead, patients should have two serial knee X-rays in order to detect the involved tibiofemoral compartment, to measure the leaving cartilage height (mm) in extension and semi-flexed position, to measure the loss (in percentage) of joint space width in extension and semi-flexed position, to measure the rapidity of joint space loss by dividing the percentage of joint space loss by the number of months between the paired X-rays, to detect chondrocalcinosis or appearance of spontaneous osteonecrosis of the knee. The joint space width, defined as the minimum interbone distance, was measured by a senior rheumatologist (X.A.), in millimeters, using a ruler graduated in half millimeters and put directly on minimal joint space width [23].

2.3. Global medical treatment

2.3.1. Knee lavage

Patients were seen in one-day hospital structure. All non-arthroscopic knee lavages combined with corticosteroid injection were done in the intervention room of the Department of Rheumatology, Cochin Hospital, Paris, France. Five rheumatologists performed the same lavage procedure, under local anesthesia, with two separate 14-gauge cannulae to instill and evacuate the joint, using the procedure proposed by Ayral [24]. After preparation of the skin with iodine, arthrocentesis of the knee was performed using the lateral suprapatellar portal. Then, a local anaesthetic (1% lidocaine) was injected intra-articularly (20 ml) and throughout the capsula, subcutaneous tissue, and skin of the lateral suprapatellar portal (10 ml). The medial suprapatellar portal was similarly injected with 1% lidocaine (10 ml). Two 14-gauge cannulae were introduced into the medial and lateral suprapatellar portals (the medial for inflow and the lateral for outflow). The medial cannula was connected to an extension line and infusion set containing sterile 0.9% saline. Evacuation was done by the lateral cannula. Adequate lavage was ensured by manual compression of the distended joint cavity and passive mobilization of the joint with 20° flexion and extension movements combined with stress in valgus and varus position to open and irrigate tibiofemoral compartments. A total of one liter of 0.9% saline was usually injected into and evacuated from the knee joint. At the end of the lavage, corticosteroid was injected into the knee joint by the medial portal. In the absence of joint effusion, local anaesthesia was injected within the joint cavity in order to inflate it and to facilitate the introduction of cannulae. All patients received a single lavage during this study.

The synovial liquid was analyzed: cell count, presence of crystals and absence of infection. Presence of macroscopic cartilage fragments in the outflow fluid was notified by the operators. The quantity of instilled saline was noticed as well as the quality and quantity (unit dose) of injected corticosteroid, either a semi-delayed acting corticosteroid: cortivazol 3.75 mg/1.5 ml (Altim®, Sanofi-Aventis, France) or betamethasone 1 ml (dipropionate: 5 mg and disodic phosphate: 2 mg, combined in Diprostene®, Schering-Plough, France) or delayed acting corticosteroid: triamcinolone hexacetonide 40 mg/2 ml (Hexatrione®, Daiichi Sankyo, France).