

Ciobotaru Camelia, Iliescu Madalina, Arghir Oana

The evolution of pain in knee osteoarthritis treatment with sodium hyaluronate

Discipline of Balneophysiotherapy, Department II – medical disciplines, Faculty of medicine, University “Ovidius” Constanța

ABSTRACT

Although the knee osteoarthritis is often benign, severe degenerative modifications can determine serious malfunction. In joints affected by arthritic processes, Sodium hyaluronate is found in reduced concentrations, the normal articular cartilage being replaced by fibrocartilage [6].

The present concepts suggest that osteoarthritis is not a predictable stage in ageing and prophylactic and therapeutic approaches could be taken in the future.

Keywords: osteoarthritis, pain, chondro protective.

Iliescu M.

Department of Balneophysiotherapy, Faculty of medicine, University “Ovidius” Constanța, Romania
Aleea Universitatii, Nr. 1, Campus B, Constanța, Romania
madalina@anatomie.ro

Introduction

Of all the degenerative diseases, osteoarthritis (OA) is the most frequent cause of articular pain and discomfort in western countries, including the USA and Great Britain [1,2], OA having great impact on the individual's good functioning, daily activity and work in society [4].

Knee OA is the main cause of malfunction in aged people in the USA [2]; compared to other joints affected by the disease, the knee OA has the highest rate 29.8% (knee), 14.9% (phalange), 7.7% (hip) the above mentioned results being obtained on a population in Italy [3].

The prevalence of OA increases according to age, thus, approximately 3% of the patients over 55 years develop OA annually and about 4% of the OA diagnosed manifest the disease progressively [1].

Although the articular cartilage is seen as the major target in OA, it is not innervated by nociceptors and the mechanism of the connection between losing the articular cartilage and the accentuation of the symptoms hasn't been made clear.

The pain in OA is caused by more factors and it occurs in periarticular structures, the articular capsule, the articular ligaments the outer layers of the meniscus, bursitis the bone and the medulla and the pathological structures (synovitis and capillarity's associated) are unnerved and can be affected in OA. These could be the direct source of pain, but also the indirect one, secondary to the abnormal forces and the destruction of the cartilage.

The loss of the cartilage is thought to increase the stress of the subchondral bone, causing bone modifications. These modifications make the stress sensitivity bigger, which can cause, pain and medulla injuries.

Moreover, the painful feeling can be influenced by other factors, such as culture, sex, and behavior factors [5].

Risk factors

The epidemiologic studies identified a lot of risk factors (etiological factors) when OA occurs, some of them with modifiable character [2]

Table I - Risk factors in OA

Age
Major articular traumas*
Repetitive stress and articular burden*
Obesity*
Sedentarism
Race
Gentic factors
Female
Congenital or acquired defects muscle weakness*
Quadriceps muscle weakness
Inflammatory articular disease
Endocrine or metabolic diseases
Proprioceptive deficit

*modifiable character chart on Brandt

Within this article we aim towards a clinical study of pain in patients diagnosed with knee OA, after the intra articular treatment with Sodium hyaluronate

Material and method

The patients have been recruited in two stages: 50 patients in the period between 01.09.2004 and 01.03.2005 and in the second stage, other 50 patients, selected in the period 01.09.2013-15.12.2012, within the Clinic Laboratory of Physical Medicine, Rehabilitation and Rheumatology and the Magnetic Resonance Imaging Service of Clinical County Hospital of Constanta.

The study been included patients diagnosed on ACR criteria (American College of Rheumatology) with primary one-side or bilateral knee OA (idiopathic), with pain quantified on the visual analogue scale from 1 to 10.

Patients with knee OA secondary to diseases such as rheumatoid arthritis, spondylartropathy, gout, tuberculosis and so on have been excluded

The record that we used within the study is presented as follows:

Name..... Age..... Sex.....
Weight.....IMC.....Traumatisms
.....

Pain

RIGHT LEFT

Pain while walking Up and down steps
Pain when walking on flat grounds
Pain in resting position
Pain superpatella
Pain in patella (kneecap) mobilization
Pain in goosefoot insertion
Pain in medial space articulation
Pain in lateral space articulation
Pain in popliteal fossa

Objective

Cracments
Tumefaction
Flexibility active/passive
Extension active/passive
Antero/posterior instability
Med - Lat Instability
Genu flexum/Genu valgum/Genu varum
Genu recurvatum

Measurements and snusde retractions

Medial kneecapThigh circumference
 Ischias skin retractions.....
 Rightanteriorretraction.....
 Testing flexor muscles
 Testing extensor muscles
 Maximum walking perimeter
 Walking limits without pain.....
 AINS daily dose.....Painkiller daily dose

 Number of infiltrations/although year round.....

Radiology :

Joint space Kellgren

Table II - Characteristics of the selected lot

Characteristics	% nr. patients / media limits
Feminine sex	75% (75)
Age	63.33±5,89 ani (52-70)
Body mass index	32.8±5.79 (20.3-42.23)
Obesity	55.7%
Infiltrations in the last year	0
Associated pathology (Cardiovascular)	80%
Lequesne Index (0-24)	12-14
Standard knee x-ray with std. Kellgren- Lawrence II-III-IV	100%

The anamnesis focused on information about knee symptomatology: the presence of pain and its location, the presence of the cracments in mobilization, knee tumefaction, maximum grades of flexibility/extension, the presence of the antero-posterior instability, the presence of deformities (genu flexum, genu valgum, genu varum, genu recurvatum), filling in a standard personal medical chart, made on the occasion of this study, when it started, 30 days and 90 days after the intraarticular injection.

For the imaging estimation, in parallel with the clinic examination we used the evaluation of the radiographic modifications on (Table III), on antero-posterior and profile-knee radiographies to determine

the stage of Kellgren-Lawrence knee OA.

Table III - Kellgren-Lawrance Radiographic classification

Stage	Severity of OA	Radiographic modifications
0	No	Normal
I	Uncertain	Small osteophytes doubtful significance
II	Minimum	Big osteophytes normal articular space
III	Moderate	Moderate narrowing of articular space
IV	Severe	Severe narrowing of the articular space with subchondral bone sclerosis

After Scott [13]

Figures 1 and 2 present the patients according to their pain registering on the visual analogue scale.

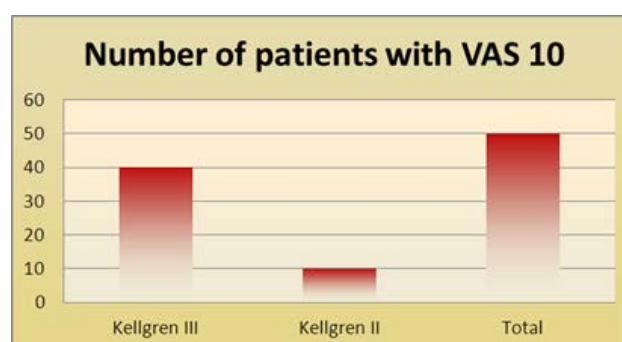


Figure 1 - Number of patients with visual analogue scale (VAS) 10

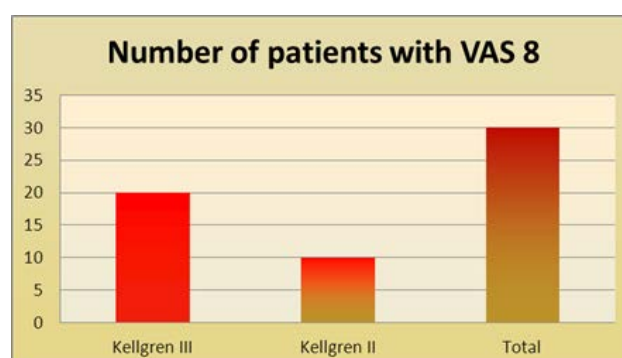


Figure 2 - Number of patients with visual analogue scale (VAS) 8

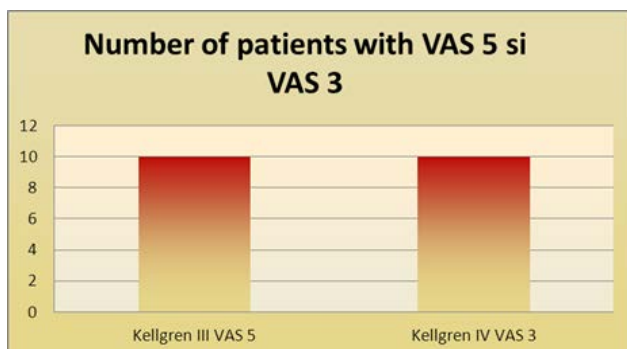


Figure 3 - Number of patients with visual analogue scale (VAS) 5 and 3

The intra-articular injections were performed, taking the previous approach, with the knee flexed 90°, having as a reference point the tendon, the lower edge of the lateral femoral condyle and the higher edge of the tibial plateau.

We injected Sodium hyaluronate 2%, 3 injections, once every week; the use of this method was based on the interference of the pathogenic processes of declining of the articular cartilage.

Results

In the initial studies of the arthritis disease, one can notice a modification of collagen and proteoglycan synthesis, owing to the affected chondrocyte metabolism, synthesizing collagen types I, III, IX, X with reduced resistance and elasticity, and the proteoglycan have low dimensions and capacity of fixing the Hyaluronic acid.

It is demonstrated that joints affected by osteoarthritis processes the hyaluronate is found in reduced concentrations, the normal articular cartilage being replaced by fibrocartilage, in which the collagen type I is richly represented but its qualities are much inferior.

The exogen contribution of Sodium hyaluronate slows down the declining cartilage processes [6].

The statistical data is presented under the form average \pm standard deviations. The statistic processing was made using test 1 student, values $X^2 = 6.35$; 2 degrees of freedom $p < 0.042$, at the limit of statistical significance but the difference are noticeable statistically

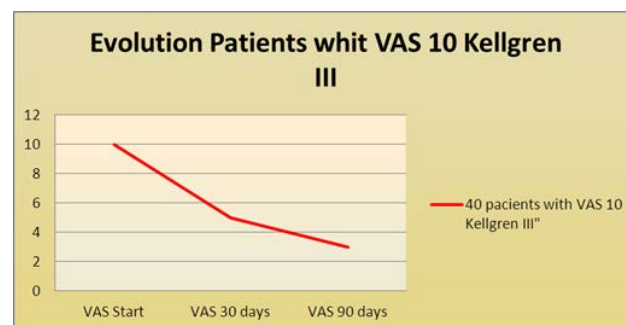


Figure 4 Evaluation Patients with VAS 10 Kellgren III

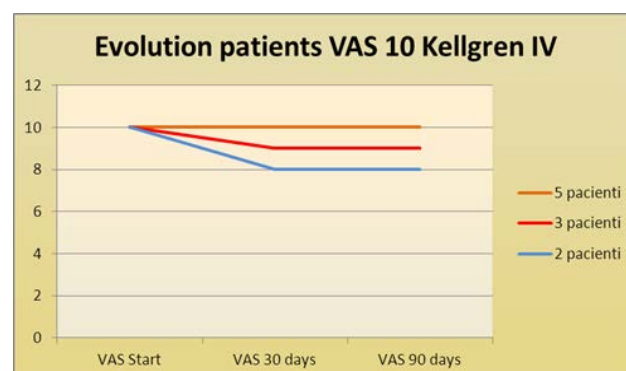


Figure 5 Evolution patients VAS 10 Kellgren IV

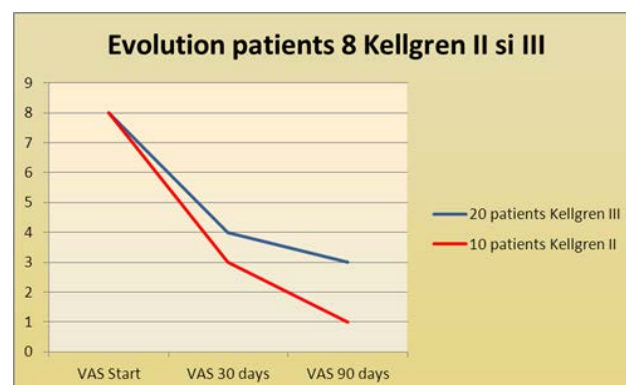


Figure 6 Evolution patients 8 Kellgren II and III

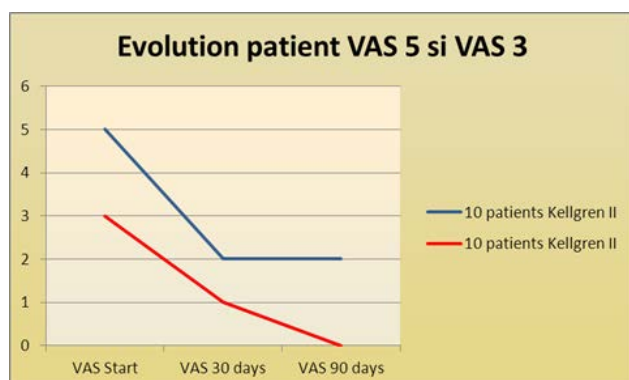


Figure 7 Evolution patient VAS 5 and VAS 3

- pain estimation 30 days and 90 days after the last intra articular injection has been made

- there has been noticed a visible release from pain measured on SAV, to patients whose degree/ value of pain, before the treatment with Sodium hyaluronate 2% was lower (3-5)

- there has been noticed the visible release from pain measured on SAV to patients with radiologic modifications included in II and III stage.

Conclusions

- Sodium hyaluronate is a therapeutical method in knee OA
- at least in the period following its administration, one can feel pain release and better functioning (flat ground walking, going up and down the stairs)
- the results are obvious visible pain release and better functioning with patients in Kellgren radiological stages II and III of arthritic disease
- getting better to complete release with patients whose pain was less severe, before the treatment but also included radiologically in Kellgren II stage.
- the pain is not visibly released after the

treatment with Sodium Hyaluronate in stage IV Kellgren of arthritic disease and when the initial value on VAS is higher 8-10.

- one can draw the conclusion that the chondroprotective solutions, administered locally in initial stages of knee OA represent a way of treatment well tolerated, which reduces the pain symptomatology.
- no general or local side effects at the knee treated have been noticed.

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