



The use of arthroscopic debridement and viscosupplementation in knee osteoarthritis

Gonartrozda artroskopik debridman ve viskosuplementasyonun yeri

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Amaç: Gonartrozlu dizlerde artroskopik debridman ve değişik hiyalüronik asit (HA) preparatları ile uygulanan viskosuplementasyonun uygun hastalarda yararlılığı değerlendirildi.

Çalışma planı: Çalışmaya, modifiye ARA (American Rheumatism Association) ölçütlerine göre tanı konan ve Ahlback sınıflamasına göre en çok evre 4 gonartrozu olan 77 kadın hasta (ort. yaş 50±5; dağılım 40-60) alındı. Olguların tümünde dejeneratif menisküs yırtığı saptandı. Olgulara artroskopik tedaviden (parsiyel menisektomi ve debridman) üç hafta sonra rastgele seçimle Na-hiyaluronat (Orthovisc, n=38), streptokokal HA (Adant, n=21), Hylan G-F 20 (Synvisc, n=18) ile haftada bir kez olmak üzere, üç kez eklemi viskosuplementasyon uygulandı. Uygulanan tedaviler, ameliyat öncesi, enjeksiyondan önce ve üç hafta sonrasında olmak üzere memnuniyet durumu anketi, görsel ağrı skorlaması (GAS) ve WOMAC (Western Ontario and McMaster Universities) osteoartrit indeksi ile değerlendirildi.

Sonuçlar: Tedavi öncesine göre artroskopi ve viskosuplementasyondan ayrı ayrı çok ileri derecede düzelme sağlandığı görüldü ($p<0.0001$). Na-hiyaluronat ve Hylan G-F 20 uygulanan gruplarda enjeksiyon sonrası memnuniyet düzeylerinde ($p<0.01$), WOMAC ve GAS skorlarında ($p<0.0001$) anlamlı değişim görüldü. Streptokokal HA grubunda ise enjeksiyon sonrasında sadece GAS skorunda anlamlı değişim görüldü ($p<0.0001$). Ancak, üç grup karşılaştırıldığında, memnuniyet düzeyi, WOMAC ve GAS skoru açısından fark anlamlı bulunmadı ($p>0.05$).

Çıkarımlar: Diz osteoartritinde, uygun seçilmiş hastalarda artroskopik debridman ve viskosuplementasyonun başarılı bir tedavi yöntemi olduğunu düşünüyoruz.

Anahtar sözcükler: Artroskopi; debridman; hiyalüronik asit/terapötik kullanım; enjeksiyon, eklemi; diz eklemi; osteoartrit, diz tedavi.

Objectives: We investigated the effectiveness of arthroscopic debridement followed by viscosupplementation using different hyaluronic acid (HA) products in selected patients with knee osteoarthritis.

Methods: The study included 77 women (mean age 50±5 years; range 40 to 60 years) who had mild knee osteoarthritis according to the modified ARA (American Rheumatism Association) criteria and Ahlback classification. All the patients had degenerative meniscal tears. After three weeks from arthroscopic treatment (partial meniscectomy and debridement), the patients were randomly assigned to intra-articular injections of Na-hyaluronate (Orthovisc, n=38), streptococcal HA (Adant, n=21), and Hylan G-F 20 (Synvisc, n=18) given once a week for three weeks. Evaluations were made preoperatively, before and three weeks after injections using a patient satisfaction questionnaire, visual analog scale (VAS), and the WOMAC (Western Ontario and McMaster Universities) osteoarthritis index.

Results: All patients had significant improvement following both arthroscopic treatment and viscosupplementation ($p<0.0001$). Following injections, patient satisfaction ($p<0.01$), WOMAC and VAS ($p<0.0001$) scores were significantly improved in the Na-hyaluronate and Hylan G-F 20 groups, whereas the only significant change was in VAS scores in the streptococcal HA group. However, comparison of the three groups did not yield any significant difference with respect to patient satisfaction, WOMAC, and VAS scores ($p>0.05$).

Conclusion: Our results suggest that arthroscopic debridement combined with viscosupplementation is an effective treatment option for selected patients with knee osteoarthritis.

Key words: Arthroscopy; debridement; hyaluronic acid/therapeutic use; injections, intra-articular; knee joint; osteoarthritis, knee therapy.

Osteoarthritis is a disease characterized by progressive cartilage loss, osteophyte formation and subchondral sclerosis in the weight bearing joints. It is most commonly seen in the knee joint and named as gonarthrosis. Patient education, weight loss, physiotherapy and exercise, assistive devices, pharmacological therapies and surgery are treatment modalities used in gonarthrosis. Arthroscopic debridement and intraarticular hyaluronic acid (HA) injection are one of these modalities but views on their usage are controversial. In this study effectiveness of arthroscopic debridement followed by viscosupplementation using three different hyaluronic acid (HA) containing drugs was investigated.

Patients and method

Between 2001-2003, 78 women aged between 40-60 years admitted to our clinic were included in this study. Patients with knee OA according to Modified ARA (American Rheumatism Association) criteria^[1] with Ahlback classification^[2] grades IV were included in the study. One patient who had recurrent knee synovitis episodes after arthroscopy was excluded from the study. Inclusion criteria were knee pain within past 12 months, Ahlback classification grade I-IV radiographic evidence of gonarthrosis in radiographies taken within past 12 months, unstable degenerative meniscus tear in arthroscopy, ability to walk at least 150 meters without help, agreement to discontinue all analgesic drugs and non-steroidal anti-inflammatory drugs (NSAID) a week before baseline and to use only paracetamol (Acetaminophen) as an analgesic during the study. Exclusion criteria was any injection or surgical intervention to knee joint, parenteral or oral steroid use within past two months, flexion contracture in the knee more than 10 degrees, varus or valgus deformity more than 15 degrees in the standing radiographies, allergy to paracetamol (acetaminophen) or eggs and bird product and patients diagnosed with inflammatory joint disorders (rheumatoid arthritis, ankylosing spondylitis, gout). Unstable degenerative meniscal tears were identified in MRI's of all patients. All patients were surveyed with visual pain score (VAS) and WOMAC (Western Ontario

and McMaster Universities) osteoarthritis index to assess preoperative satisfaction status. Arthroscopic procedures were performed by four orthopedic surgeons from our clinic. Partial meniscectomy with chondral debridement were performed for all patients.

Regular cold application with cryocuff during their one day postoperative hospital stay, 20 minutes cold application with ice gel after discharge, low calorie diet and straight leg raising to increase quadriceps strength and knee stretching and compression exercises to increase knee flexor muscles were assigned to patients preoperatively. Postoperatively patients were ambulated with crutches bearing weight as much as they could tolerate pain. During the study patients were allowed to use only oral paracetamol 500 mg pills up to 2 gr/day. GAS and WOMAC surveys were applied to assess satisfaction status at postoperative third week aside from regular follow ups and dressing changes. Afterwards viscosupplementation prepreparates were injected under sterile conditions to randomly chosen patients once a week for three weeks. Na-hyaluronate (Orthovisc, Anika Therapeutics, Woburn, MA, ABD) to 38 (49.4%) patients, streptococcal HA (Adant, Meiji-Seika Kaisha, Japan) to 21 (27.3%) patients, Hylan G-F 20 (Synvisc, Genzyme, Cambridge, MA, USA) to 18 (23.4%) patients.

Third week after injections ended (postoperative 9th week) patients were called out for follow up; satisfaction status surveys after injection, GAS and WOMAC surveys and knee examination were repeated. NCSS 2000 software. (Mc Graw Hill) was used for statistical analysis. Descriptive statistical methods (mean, standard deviation) were used for data evaluation; Tukey pair wise comparison test for subgroup comparison, paired t test for comparison of groups before and after treatment. $P < 0.05$ was considered as statistically significant.

Results

Median age of 77 patients included in the study was 50 ± 5 (distribution 40-60). Forty five (%58.4) of them were operated from their right, thirty two (%41.6) of them were operated from their left knee. In sixty six

Table 1. The prepreparates and the age distribution of the patients

	NaHyaluronate (n=38)	Streptokokal HA (n=21)	Hylan G-F 20 (n=18)	F	Sig.
Age	50 ± 5	52 ± 6	50 ± 6	0.83	>0.05

Table 2. VAS scores, WOMAC survey results and satisfaction status of the patients in pre-arthros- copy and postinjection

Whole group	Pre arthroscopy	Post arthroscopy	t	p	Post injection	t	p*
Satisfaction	3.4±0.8	1.4±0.7	22.47	<0.0001	1.0±0.8	4.68	<0.0001
WOMAC	76.9±17.0	39.2±9.2	21.31	<0.0001	35.19±8.3	5.52	<0.0001
VAS	8.3±1.2	3.7±1.0	32.86	<0.0001	3.1±1.2	27.81	<0.0001

patients (%85.7) unstable medial degenerative complex tears and in five patients (%6.5) lateral degenerative tears in meniscus were identified. Both medial and lateral meniscus tears were found in six patients (%7.8). In all cases variable degrees of chondromalasia was established in medial femoral condyle. There was no significant relation between patients ages and active substrate used in the treatment (p>0.05, Table 1).

When all the patients were taken as a single group, compared to pre-treatment period there was very good recovery with arthroscopy and viscosupplemantation separately. (p<0.0001,Table 2).After three injections patients' satisfaction status, WOMAC survey and VAS scores were questioned again. There was a significant difference in satisfaction status in Naha-lyuronat anda Hylan G-F 20 groups after operation and injection (p<0.01), also WOMAC and VAS scores were significantly different (p<0.0001).

Also for streptococcal HA there was a significant difference in VAS score (p<0.0001), but there were no significant difference in satisfaction status and WOMAC survey (p>0.05, Table 3).

However with postoperative and postinjection evaluation there was no significant difference between three preparates for satisfaction status, WOMAC survey results and VAS scores (p>0.05, Table 4).

During follow-up there were no complaints in 45 (%58.4) of 77 patients after injection. However in 14 (%18.2) patients there was pain in the injection site and knee, 12 patients had synovitis and effusion (%15.6) (intra-articular puncture was needed in one patient, activity restriction and cold therapy was enough for the rest) ,aching in injection site in four (%5.2) anda headache, dizziness and malaise developed in two (%2.6).Although synovitis in streptococcal HA patients (n=6) was more frequent, it was not statistically significant due to small number of cases (p>0.05). There was no statictically significant difference between complication rates between the groups (p>0.05).

Discussion

Knee pain is one of the most encountered problems in orthopaedic outpatient clinics. Preliminary treatment options are conservative treatment and oral

Table 3. Evaluation of viscosupplementation with satisfaction status, WOMAC survey results and VAS scores

		Na-hiyaluronat	Streptokokal HA	Hylan G-F 20	F	p
Satisfaction	Post-arthros- copy (Ort.±SS)	1.2±0.8	1.6±0.5	1.6±0.7	3.66	<0.05
	Post-İnjection (Ort.±SS)	0.8±0.7	1.2±0.8	1.1±0.8	1.59	>0.05
	t	3.14	1.78	3.35		
	p	<0.01	>0.05	<0.01		
WOMAC	Post-arthros- copy (Ort.±SS)	37.4±8.6	39.0±7.7	43.1±11.3	2.37	>0.05
	Post-İnjection (Ort.±SS)	34.5±7.2	35.0±7.8	36.4±11.0	0.33	>0.05
	t	3.45	1.93	4.74		
	p	<0.0001	>0.05	<0.0001		
VAS	Post-arthros- copy (Ort.±SS)	3.4±0.9	3.8±0.9	4.1±1.3	2.75	>0.05
	Post-İnjection (Ort.±SS)	3.0±0.9	3.0±1.4	3.4±1.5	0.80	>0.05
	t	27.80	13.61	9.95		
	p	<0.0001	<0.0001	<0.0001		

Table 4. Subgroup comparison of preperates with evaluation of percentage difference in satisfaction status, WOMAC survey results and VAS scores

	% Difference (PostOp-PostInj)			F	Sig.
	Na Hyaluronate	Streptokokal HA	Hylan G-F 20		
Memnuniyet	27.8±46.6	13.0±63.0	32.4±41.8	0.62	>0.05
WOMAC	11.5±13.1	7.4±18.2	10.8±12.1	2.12	>0.05
VAS	12.8±23.2	8.5±43.6	13.2±21.9	0.28	>0.05

NSAII administration. Conservative therapy and oral NSAII's are preliminary treatments and if there are no improvements intraarticular HA preperate injection and arthroscopic debridement can be done afterwards. Joint replacement surgery is the final choice of treatment. The questions that have to be answered about these treatment approaches are: is this a correct treatment algorithm? Is arthroscopy a standard step in the treatment for all patients? Should we use HA in every patient? In older people asymptomatic meniscus tear rate approaches to %65'tir. when both knees of a patient is evaluated with MRI it is not surprising that pain is seen in only one knee even there are similar degenerative meniscal tears in both knees,^[3] Timoney et al.^[4] found %70 and 50% good results with arthroscopic debridement early and late periods respectively, menisectomy did not affected their results.^[4] However in other studies when performed in patients with minimal cartilage damage arthroscopy results were excellent.^[5,6] In another study by Dearborn et al.^[7] especially patients with axis deviation benefits from menisectomy. In our study in patients with degenerative meniscal tears we had successful results with arthroscopy. Reports are controversial on usage of arthroscopic debridement for different grades of gonarthrosis with cartilage destruction .Gossec and Dougados^[8] reported intrarticular steroids and HA are more efficacious than arthroscopic debridement. Clarke and Scott^[9] reported 66.% of patients with advanced gonarthrosis benefits from arthroscopic debridement in midterm. Krystallis et al.^[10] reported 85% successful results in 197 patients after 32 months follow up. Bernstein and Quach^[11] accentuated the importance of patient selection for arthroscopic debridement. In a well matched patient population with arthroscopic debridement Fond et al.^[12] reported 90% success in two years and 70% success in five years .

Chronic complaints, previous surgical intervention, pain at rest, degenerative changes in two or three compartments, obesity, significant axis deviation,

ligament imbalance, persistent joint contracture and severe cartilage destruction are common characteristics of patients who are candidates for unsatisfactory results after arthroscopy and not suitable for operation. Patients with minimal degenerative changes, normal axis, acute mechanical complaints and meniscal tears are good candidates for arthroscopic debridement.^[5,6] When we evaluate the results of the Turkish studies the mean follow up was 22 months (distribution 8-39 months) and until the first year 71% (distribution 38-84%), and 64%(distribution 22-97%) successful results are reported. ^[13-16] When we analyze our results from patient satisfaction aspect only four (%5.2) out of 77 patients status were same or worse than their preoperative status.

There was a positive change in all patients (%100) postoperative. WOMAC and GAS scores When compared to preoperative results, the satisfaction status, WOMAC survey results and VAS scores change positively by 60%, 50% and 55% respectively.

Our results were better than other studies given above. We think there are two reasons for this. First reason for this is we evaluated our patients during the early postoperative period (three weeks). Naturally, there will be a decrease in these successful results. Second and the most important reason is our patient selection was based on specific criteria and we relieved

Inclusion criteria were showing the patient profile appropriate for arthroscopic debridement. We think this the main reason for the very high success rate.

Viscosupplementation restores collagen fibers normal structure and protects by shock absorption and acting as a barrier; so regeneration can take place under this elastoviscous barrier. Peyron and Balazs^[16] reported first results of HA use in humans in 1974.First clinical study was published by Namiki et al.^[17] in 1982 and they reported 71% success. After 1999, studies advocating HA's role in osteoarthritis treatment is insig-

nificant and case reports on adverse effects of different preperates started to appear in the literature.

In 2001 Kirwan^[18] showed clinical results of HA and corticosteroid injections are similar, HA's effect starts later but lasts longer and there is a higher risk for developing adverse effects. In 2002 Pullman-Mooar et al^[19] observed aseptic reaction in 40% of HA injected knees and white blood cell count in the joint fluid could reach up to and HA degradation products are responsible from this. Goldberg and Coutts^[20] reported septic arthritis can be seen in all HA preperates. In our study 12 patients has effusion and intraarticular puncture was indicated in one of them; but none of them were fitting in the condition named aseptic reaction and we did not have to stop treatment in any patient. On the other hand there are studies supporting HA injection. Ateş et al.^[21] followed patients for 21 weeks and they reported there was a significant improvement in all pain and function scores except night pain. In their meta-analysis of 20 double blinded placebo controlled studies Wang et al.^[22] reported there is a significant relief with HA; but there is a significant decrease in this successful results in patients older than 65 years and grade 4 gonarthrosis.

Kobayashi et al.^[23] showed HA decreases C45 and C65 levels, inhibites TNF_α and pain receptors and acts as an anti inflammatory agent by binding PG and cytokines in the joint

In our study when we evaluate satisfaction status before and after injection, regardless of the chosen preperate, results were same in 42 (54.6%) patients, worse in five (6.5%), WOMAC survey results were same 10 (13%) and worse in fourteen (18.2%); VAS scores were same in 27 (35.1%), worse in 9 (11.7%).

When we consider different preperates we used in our study, postoperative and post injection satisfaction status was significantly different in Na-hyaluronate and Hylan G-F 20 groups

($p < 0.01$), WOMAC survey and VAS scores were highly significant ($p < 0.0001$). There was a significant difference for VAS with streptococcal HA ($p < 0.0001$); but there wasn't a significant difference for satisfaction status and WOMAC ($p > 0.05$). We think there are two reasons for our results to contradict with studies with very successful results in the literature (i) Because patients benefited a lot from the arthroscopic debridement, they felt a lower improvement relatively; (ii) Although

HA's effect appear later and lasts longer, we evaluated patients three weeks later than injections finished.

Recently there is an increase in intraarticular HA application after arthroscopic debridement in gonarthrosis and results of the studies are often satisfactory. The controversial point is the time of viscosupplementation and how long this well being will last? Vad et al.^[24] treated their patients by closed lavage and applied HA a week after and only by HA, results were good 79.5% and 54% respectively. In our opinion there are two reasons for 95% good results in our study.

Firstly we evaluated patients in an early period. We know these very successful results will decrease in long term. Second and more important thing is, as we pointed out before our patient selection was based on certain criteria. As a result, although there are inconsistent studies on both arthroscopic debridement and viscosupplementation, we think in meticulously chosen knee osteoarthritis patients arthroscopic debridement and viscosupplementation will give good results. Nevertheless it is obvious that comparison of arthroscopic debridement and placebo alone and arthroscopic debridement with viscosupplementation will give us more accurate results. However further controlled clinical studies with longer follow up periods are need to compare this method with HA application alone or arthroscopic debridement with regards to patient satisfaction and efficiency of the treatment controlled on a cellular basis and by arthroscopy .

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