

Case study: Seeking for an ultimate solution for Knee Osteoarthritis based on Evidence-based medicine research

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임상사례 : 골관절염에 대한 최소한의 치료적 방법

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국문초록

무릎 골관절염을 가진 환자에게 근거에 기초한 물리치료 접근법으로 15번 임상 치료하였다. 이 환자의 두가지 중요한 손상을 고려하여(stiffness and pain) 두가지의 물리치료 방법이 시행되었으며 그 결과는 Western Ontario and McMaster Universities osteoarthritis (OA) index (WOMAC)로 측정 되었다. 이 임상 연구를 통해 도수치료와 치료적 운동법, 그리고 TENS(Transcutaneous Electrical Nerve Stimulation)의 적용이 무릎 골관절염을 가진 환자의 경직(Stiffness)과 통증(pain)을 경감시킬수도 있으며 기능을 향상시킬 수도 있음을 관찰할 수 있었다.

Summary Evidence based physical therapy interventions for this patient was applied in 15 clinical sessions. Considering the patient's two main impairments, two physical therapy interventions were delivered with WOMAC index outcome measurement. From this case report, I observed that a combined physical therapy interventions consisting of manual therapy, therapeutic exercise, and TENS Unit in patients with knee osteoarthritis may result in decreased pain, stiffness and increased physical function.

Introduction

For my directed independent study, I have decided to study osteoarthritis of the knee. There were three reasons why I chose this impairment. First, arthritis has been identified as most common cause of disability in US. (1, 2) Secondly, knee osteoarthritis is the most common diagnosis I have witnessed in my clinical experience. Thirdly, despite the fact that knee osteoarthritis has been the most common diagnosis for my clinical experience, I still am not fully confident to treat this impairment. Due to these reasons, I wanted to conduct further study on knee osteoarthritis through literature research with evidence-based medicine. In order to increase the validity of this study, I selected a qualifying patient with knee osteoarthritis who met following requirements.

- 1) The patient had to either speak and understand English or Korean,
- 2) The patient had to provide his/her written consent for participation,
- 3) The patient had to be free from receiving cortisone injection during the past 60 days.

Patient history, examination, diagnosis and intervention

The patient was a 60 year old female who was referred to this physical therapist by an orthopedic surgeon on 08/09/2004, due to increased pain and crepitus in her left knee. The patient chiefly complained about pain in her left knee (5-6/10) and stiffness that had been significantly hindered

her functional activities. The patient's pain was increased with activities such as walking and negotiating stairs and later would be alleviated by resting. The patient used to work at a post office as a mail distributor for 10 years and retired on August, 1999. The patient's orthopedic surgeon diagnosed her symptom as left knee osteoarthritis. Despite not experiencing any traumatic accident, the patient stated her knee pain started about a year ago with deep aching and dull pain. She also stated that she refused taking any medications that her orthopedic surgeon recommended and instead, received 10 sets of acupuncture treatments that provided temporary relief (30min to 3 hours). In addition, the patient received a cortisone injection in December, 2003 that lasted its effect for 2 months. The patient had no history of traumatic injury and systemic disease except stomach ulcer.

In order to diagnose the patient's condition, I referred to the study of Altman and colleagues (3), which the article was summarized in a format of critically appraised topic (4, CAT 1). There are three classifications of criteria for knee osteoarthritis (3);

- 1) Clinical examination and laboratory test,
- 2) Clinical examination, laboratory tests, and radiographs,
- 3) Clinical examination alone.

For the patient's diagnosis, only the clinical examination was conducted. This decision was due to the difficulty in accessibility radiograph and laboratory test in reality.

To ensure the diagnosis of knee osteoarthritis given by orthopedic surgeon, four

clinical criteria were used as following.

- 1) Knee pain, age 38 years or younger, and bony enlargement,
- 2) Knee pain, age 39 years or older, morning stiffness for more than 30 minutes, and bony enlargement,
- 3) Knee pain, crepitus on active motion, morning stiffness for more than 30 minutes, and bony enlargement; or
- 4) Knee pain, crepitus on active motion, morning stiffness for more than 30 minutes, and age 38 years or older.

Altman et al. demonstrated this criterion to be 89% sensitive and 88% specific(3). Reflecting these criteria, my patient falls under number 4. In addition, in order to conduct differential diagnosis from ligamentous and meniscal damage, four different examinations were performed as shown in Appendix 1 that were extracted from the article of "Evaluation of Acute Knee Pain in Primary Care" written by Jackson, Jeffery L et al.(5); 1) Lachman maneuver, 2) Anterior drawer test, 3) Pivot test, and 4) McMurray test (Appendix. 1). Based on the four tests, I concluded my patient's condition was 'clinically negative'. Even though Ottawa's rule had to be examined to a possibility of fractures (6), this exam was excluded. It was because I could not access the patient's radiograph. Through the literature research for interventions based on evidence-based practice, a combination of manual therapy and therapeutic exercises and Transcutaneous Electrical Nerve Stimulation(TENS) methods were applied (7,8 and CAT 2,3).

Search strategy, databases and the best available evidence

For diagnostic literature research, I visited Ovid (9). In Ovid, I selected "select more than one database to search" and I selected three databases that are Journals@Ovid Full Text, CINAHL - Cumulative Index to Nursing & Allied Health Literature, and Ovid MEDLINE. These three databases were selected according to the recommendation of a librarian at the Rocky Mountain University of Health Professions. After using various keywords and combinations, I found the best keyword that were following; 1) knee osteoarthritis, 2) diagnostic test, and 3) the combination of 1) and 2). Due to a great number of articles selected from the research using keywords and combination, I narrowed down the research option to "English language and full text". The final article that I chose was called "Evaluation of Acute Knee Pain in Primary Care" written by Jackson, Jeffrey L and colleagues (5). This article collected information through MEDLINE search from 1996 to October 2002 for the evaluation of acute knee pain (5). From the section in the article 'clinical versus radiologic osteoarthritis

criteria,' I found the clinical criteria for knee osteoarthritis. Researching the bibliography in this article, I found the original article that provided the original information about clinical osteoarthritis written by Altman et al. This article was called "Development of criteria for the classification and reporting of osteoarthritis. Classification of osteoarthritis of the knee (3)." Conducting this research allowed me to discover that the article coincided with diagnostic criteria for my independent study. Reflecting the criteria contained in Sackett's book (10) for the validity of this literature, I found that this article (3) satisfied the three standards recommended by David L Sackett et al (10). The patient in my experiment had two major impairments of pain and stiffness. These two impairments interrupted the patient's functional activities. In order to discover the best outcome measurement for the patient's impairments, I used the keywords such as 1) outcome measures, 2) osteoarthritis, 3) knee osteoarthritis, 4) physical therapy, 5) validity, and 6) reliability. From conducting this research, I found 16 articles. After the abstract reviews, I could locate an article written by Ward, Michael M called "Outcome measurement: health status and quality of life" (11). This article explained that Western Ontario and McMaster Universities Osteoarthritis (OA) Index (WOMAC) had an excellent internal consistency, test-retest reliability, good validity as measured by correlations with performance measures or other self-reported measures, and good responsiveness for the pain and function subscales. To ensure that this WOMAC index was a valid outcome measurement index, a literature research performed again using a title 'WOMAC' in MEDLINE and I found an article supporting this index. Using the standardized response mean (SRM), effect size, and Guyatt's responsiveness statistic(12), Angst F. and colleagues(13) found that responsiveness of WOMAC index was higher than the generic Short Form-36(SF-36) in the measurements of pain and functional scales. Next, using a combination of keywords such as 1) knee osteoarthritis, 2) physical therapy intervention, 3) intervention, and 4) rehabilitation intervention, a literature research was

performed to find the best available intervention for knee osteoarthritis. Through an elimination process to decrease the number of articles, I located two articles called "Philadelphia Panel Evidence-based clinical practice guidelines on selected rehabilitation interventions for knee pain" (14) and "Role of physical therapy in management of knee osteoarthritis" (15). Both the articles were systematic review articles that were the best in the hierarchy of evidence based medicine. From these articles, I found two interventions that coincided with both of the articles and with my patients' two impairments of pain and stiffness (7, 8 and CAT2, 3). Therefore, I decided to implement two intervention of a combination in manual therapy and therapeutic exercise following the study of Deyle and et al (7) and TENS application by Osiri M et al (8).

Results

The total of 15 physical therapy interventions was performed. The outcome measurement with WOMAC index was examined at baseline, week 3 and week 5.

Table 1. WOMAC scores at baseline, week3, and week 5

	Pain Domain(mm)	Left Knee Stiffness(mm)	Physical Function(mm)	Total Scores (mm)
Baseline	221	100	817	1,138
Week 3	140	71	561	778
Week 5	97	46	577	520

Through the physical therapy interventions with a combination of manual therapy and supervised exercise, and TENS application, my patient demonstrated significant improvement in the outcome measurements as following:

- (1) WOMAC scores of 56% in pain domain,
- (2) 54% in left knee stiffness scale, and
- (3) 53% in physical function domain and 54% in total scores.

Discussion

Reviewing all of my research and experiment, it is valid to

say that Altman and colleagues article (3) can be implemented into Evidence-Based Medicine's criteria questions as strong evidence (10). Also, Deyle and colleagues' article (7) was a randomized controlled trial and Osiri and colleagues' article (8) was a systematic review article. These two types of approach fall under strong position on the hierarchy of Evidence-Based Medicine (12).

On the other hand, I should admit some of my weaknesses I experienced during this study. First, I had extreme difficulty locating articles with strong evidences due to lack of experience in literature research. At often times, I could hardly determine proper keywords and wasted much time and effort to maximize outcome. I believe that this challenge will be solved with continuous trials and efforts in the future. Secondly, I realized that I have not been practicing as an evidence-based practitioner in the past. To be honest, I have hardly used TENS Unit on my patients with knee osteoarthritis because I had not realized the efficacy of TENS Unit in the past. Thirdly, this case study was completed during short period with only one clinical case. Therefore, this study does not have strong reliability and validity as an evidence based literature. Lastly, I believe that now I have more confidence to plan and manage difficult clinical cases in the future as an evidence-based practitioner, thanks to this study

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CAT Bank

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CAT 2: Effectiveness of Manual Physical Therapy and Exercise in Osteoarthritis of the Knee: A Randomized, Controlled Trial

This study indicated that a combination of manual physical therapy and supervised exercise yields functional benefits for patients with osteoarthritis of the knee and may delay or prevent the need for surgical intervention.

Citation/s:

Deyle, Gail D, MPT; Henderson, Nancy E, PhD, MPT; Matekel, Robert L, MPT; Ryder, Michael G, MPT; Garber, Matthew B, MPT; Allison, Stephen C, PhD, MPT, ECS. Effectiveness of Manual Physical Therapy and Exercise in Osteoarthritis of the knee: A Randomized, Controlled Trial. *Annals of Internal Medicine*. 132(3): 173-181. Feb. 1, 2000

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Three-part Clinical Question: For a 60-year old female with left knee osteoarthritis, is PT program of manual therapy plus exercise more effective than placebo in improving function, reducing symptoms on WOMAC index and 6-minute walk distances?

Search Terms: Ovid- Journals@Ovid Full Text, CINAHL, and Ovid Medline(R). My key words were knee osteoarthritis and physical therapy intervention and intervention and rehabilitation intervention.

The Study:

Single-blinded concealed randomized controlled trial with intention-to-treat.

The Study Patients: 83 patients with osteoarthritis of the knee who were randomly assigned to receive treatment (n=42; 15 men and 27 women [mean age, 60 + 11 years]) or placebo (n=41; 19 men and 22 women [mean age + 10 years])

Control group (N = 41; 36 analyzed): Placebo group had

sub therapeutic ultrasound to the knee at an intensity of 0.1W/cm² with 10% pulse mode

Experimental group (N = 42; 33 analyzed): The treatment group received manual therapy, applied to the knee as well as to the lumbar spine, hip, and ankle as required and performed a standardized knee exercise program in the clinic and at home

The Evidence:

Outcome	Time to Outcome	CER	LEER	RRR	ARR	NNI [†]
knee surgery	1 year	0.176	0.039	78%	0.137	7
	95% Confidence Intervals:		4% to 100%		0.007 to 0.267	4 to 153
steroid injection	1 year	0.132	0.039	70%	0.093	11
	95% Confidence Intervals:		-20% to 100%		-0.026 to 0.212	NNI [†] = 5 to INF; NNI [†] = 38 to INF
Non-Event Outcomes		Time to outcome/s	Control group	Experimental group	P-value	
WOMAC index		4 weeks	500 mm (95% CI)	916 mm (95% CI)	P(0.05)	
6-minute walk distance		4 weeks	400 m (95% CI)	482 m (95% CI)	P(0.05)	

Comments:

This article shows that a combination of manual therapy and therapeutic exercise improved patients' function in 6-minute walk distance and WOMAC scores. However, this study's reliability can be threatened because only 33/42 patients completed the study.

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Kill or Update By: 09/26/2005

※CAT1, CAT3는 저자의 요청으로 생략합니다