2017

Meniscectomy of a college athlete

Aaron Bakker

University of North Dakota

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MENISCECTOMY OF A COLLEGE ATHLETE

by

Aaron Bakker, SPT
Bachelor of Psychology, Minnesota State University-Mankato, 2011

A Scholarly Project Submitted to the Graduate Faculty of the

Department of Physical Therapy
School of Medicine
University of North Dakota

In partial fulfillment of the requirements for the degree of
Doctor of Physical Therapy

Grand Forks, North Dakota
May 2017
This Scholarly Project, submitted by Aaron Bakker in partial fulfillment of the requirements for the Degree of Doctor of Physical Therapy from the University of North Dakota, has been read by the Advisor and Chairperson of Physical Therapy under whom the work has been done and is hereby approved.

[Signature]
(Graduate School Advisor)

[Signature]
(Chairperson, Physical Therapy)
PERMISSION

Title               Meniscectomy of a College Athlete

Department         Physical Therapy

Degree              Doctor of Physical Therapy

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Date  07/06/2016
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ABSTRACT

Background and Purpose: The purpose of this case study is to describe the case of an athlete who sustained a meniscus injury and his subsequent course of physical therapy.

Case Description: The patient in the study is a 20 year old college football player seen by physical therapy following a left knee arthroscopic lateral meniscectomy. He injured his knee while cutting to change direction during football practice.

Intervention: Initial treatment for the patient started off as basic body weight resistance along with modalities and ice to reduce inflammation. Each week he progressed from bodyweight to weighted resistance activities and ending with dynamic strength and explosive activities closely related to his sport.

Outcomes: The patient completed therapy after achieving all his goals and was pain free with all activities. He was able to resume full football activities and was satisfied with his level of treatment.

Discussion. The patient in the case study was sent to physical therapy following a lateral meniscectomy. He was able to regain full function of his knee and resume football activities. A limitation of the study was the lack of use of functional assessment tools. Future studies should look at the effectiveness of modalities and aquatic therapy with meniscus patients.
CHAPTER I

BACKGROUND AND PURPOSE

The purpose of this case study is to describe the case of an athlete who sustained a meniscus injury and his subsequent course of physical therapy. Each year there are hundreds of thousands of knee injuries involving athletes and the general public, and many of those injuries involve the menisci. Meniscal injuries are reported to be the most common injury sustained by athletes, but sports injuries account for only 30% of all meniscal lesions.¹ In the United States, meniscal injuries account for approximately 850,000 arthroscopic surgeries per year.² Meniscal injuries are common in athletes, specifically football players, due to the high impact collisions and constant change in direction when running.

The main function of the menisci are to transmit compression loads and shock absorption through the knee joint.³ Menisci are estimated to bear 40% to 70% of the load through the knee, with the rest distributed between the articular cartilage.⁴,⁵ This is why they are important with load bearing activities, such as walking and running. They also act as a cushion to support the knee joint, resting on the tibial plateau between the tibia and femur. The nerves to the menisci are supplied by the posterior branch of the tibial nerve.⁶ The menisci also play an important role in knee stability, which is essential for athletes.⁴ Menisci are made up of three zones based on vascularity (red, red-white, and white). Depending on
where the meniscal tear occurs determines the recommended treatment option and estimated time frame for recovery.\textsuperscript{7} The red zone is highly vascularized, the red-white zone is partially vascularized, and the white zone has no vascularization. The lateral menisci are mostly in the white or red-white zone, meaning they are 75\% to 90\% avascular, which is why recovery generally takes many weeks to properly heal.\textsuperscript{8} This is also the reason, depending on the injury site, that surgery is recommended for athletes rather than conservative treatment. In this case study, it was determined that in his best interest, based on the repeated injury and location of the injury, the best treatment option was to perform a total meniscectomy of his left lateral meniscus. Arthroscopic meniscectomy have been shown to provide better results compared to an open meniscectomy.\textsuperscript{9}
CHAPTER II

CASE DESCRIPTION

Mechanism of Injury

The patient in the study will be named Bill. He is a 20-year-old football player who was sent to our clinic three days following an arthroscopic lateral meniscectomy to his left knee. He states he injured his meniscus during football practice. He was making a cut to his right, thus planting his left foot into the ground and says he felt immediate pain in his knee. He was unable to complete practice, and upon immediate testing by the athletic training staff, they determined he had a meniscal injury. An MRI revealed Bill had a complex tear to his lateral meniscus, and it was determined that in his best interest that he have a lateral meniscectomy performed to his left knee. Bill had a similar injury the previous year, in which he had a grade II tear to the same meniscus, which he had surgically repaired.

Examination, Evaluation, and Diagnosis

During the initial evaluation, Bill was ambulating without assistive devices and bearing full weight to his knee. He had a noticeable limp to his left leg when ambulating. Bill's incisions were clean and healing, with noticeable swelling around his knee joint, mainly inferior and lateral. His lower extremity joints ranges of motion (ROM) were all within normal limits (WNL), except left knee flexion,
which was 112 degrees. Bill had good overall lower extremity strength, but he was lacking left lower extremity strength as compared to his right, which we attributed to his recent surgery. Bill’s lower extremity strength measures can be seen in Table 1 below. Dermatomes, myotomes, and reflexes were normal and equal bilaterally. Bill demonstrated weakness during manual muscle testing to both lower extremities, but more so on his left, which we attributed to the recent surgery. During single leg balance testing on a stable surface, Bill was able to stand for 1 minute on his right lower extremity, compared to only 17 seconds on his left. No vitals, special tests, outcomes assessment, or joint mobilizations were performed. He has no prior family history of systemic disease or other issues concerning for PT that would affect his treatment, even though did have the same meniscus repaired the previous year.

Prognosis and Plan of Care

The plan for Bill was to be seen 3 times a week for a total of 8 weeks. The initial plan was to increase his range of motion and decrease the swelling within his knee, while slowly introducing a strength program. Interventions to be implemented were neuromuscular rehabilitation, therapeutic activity, manual therapy, and patient education about the injury and the recovery process. Bill was educated to perform range of motion activities at home, along with elevation and ice to reduce inflammation. Due to Bill being well conditioned, motivated, and without an overly concerning prior medical history that would adversely affect recovery, his prognosis was determined to be good. Bill’s goals can be seen in Table 2 below. In order to be discharged from PT, Bill had to meet all his goals.
and be determined safe to resume football activities, specifically cutting and
taking on contact.

Since Bill was sent to us following surgery from his orthopedic surgeon.
We had to collaborate with his physician on his progress. Documentation was
completed after every therapy session, with progress notes completed every
tenth visit, to track his goals and progress. His goals can be seen below in table 2.
### Table 1. Lower Extremity Strength

<table>
<thead>
<tr>
<th></th>
<th>Left</th>
<th>Right</th>
</tr>
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<tbody>
<tr>
<td>Hip Flexion</td>
<td>4+/5</td>
<td>5-/5</td>
</tr>
<tr>
<td>Hip Extension</td>
<td>5/5</td>
<td>5/5</td>
</tr>
<tr>
<td>Hip Abduction</td>
<td>4+/5</td>
<td>5-/5</td>
</tr>
<tr>
<td>Hip Adduction</td>
<td>5/5</td>
<td>5/5</td>
</tr>
<tr>
<td>Hip Internal Rotation</td>
<td>5-/5</td>
<td>5/5</td>
</tr>
<tr>
<td>Hip External Rotation</td>
<td>5-/5</td>
<td>5-/5</td>
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<tr>
<td>Knee Extension</td>
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</tr>
<tr>
<td>Knee Flexion</td>
<td>5-/5</td>
<td>5-/5</td>
</tr>
<tr>
<td>Ankle Dorsiflexion</td>
<td>5/5</td>
<td>5/5</td>
</tr>
<tr>
<td>Ankle Plantarflexion</td>
<td>5/5</td>
<td>5/5</td>
</tr>
<tr>
<td>Ankle Inversion</td>
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<td>5/5</td>
</tr>
<tr>
<td>Ankle Eversion</td>
<td>5/5</td>
<td>5/5</td>
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### Table 2. Goals

<table>
<thead>
<tr>
<th>Weeks</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>no swelling in knee</td>
</tr>
<tr>
<td>2</td>
<td>range of motion WNL</td>
</tr>
<tr>
<td>3</td>
<td>normal gait pattern</td>
</tr>
<tr>
<td>6</td>
<td>strength 5/5 bilateral</td>
</tr>
<tr>
<td>6</td>
<td>jogging/running without pain</td>
</tr>
</tbody>
</table>
CHAPTER III
INTERVENTION

There is no generally accepted protocol or consistent evidence to support the use of accelerated or conservative rehabilitation programs. However, due to Bill being an athlete, we decided to follow an accelerated program as he tolerated, focusing on early range of motion (ROM) and weight bearing. Bill received interventions individually from a physical therapist every session. Each therapy session had specific intentions focused on Bill's main impairments at the time. It has been found that joint range of motion exercises following orthopedic surgery play a key role in recovery. Therefore, interventions began with range of motion and pain/inflammation control, and later progressed to strength and conditioning activities to prepare him for his sport. Bill's therapeutic activity was gradually progressed each week. He was still attending team workouts to retain his upper body and core strength, so the main focus of PT was to regain lower extremity strength and ROM. The first week was focused on regaining range of motion and decreasing the amount of swelling. He performed straight leg raises, quad sets, and ankle strengthening exercises with a theraband. He finished therapy with either ice and electrical stimulation or iontophoresis applied to his left thigh/knee area for pain and inflammation control. The second week Bill resumed many of the same exercises, but also added in lower body ergometer
and weighted resistance activities instead of bodyweight. Soft tissue mobilizations were added to his scar, quadriceps, and patella to assist with ROM and reducing swelling. Weeks three and four progressively added weight bearing activities such as heel/toe raises, multihip machine, hamstring continuum, lateral step ups, monster walks, and side stepping. He would also perform stretches for his piriformis by lying supine and crossing his leg over the other, calf stretches standing on the edge of a step, and hamstring stretches while supine, sitting, or standing. These stretches were performed due to him either having tightness from compensating for his lack of knee ROM and strength, or from having tightness due to overall muscle imbalance. In week four Bill also began pool therapy to begin light jogging, karaoke, and side stepping activities. Aquatic therapy has been proven to be beneficial in meniscal repairs. It is a safe progression from knee ROM and neuromuscular activities to more aggressive muscular strengthening and endurance challenges. This was also another way for Bill to regain confidence in his knee, while decreasing the stress through his joints, especially in his knee. Weeks five and six progressed to more load bearing activities focusing on gaining strength and power. We added squats, leg press, cleans, deadlift, Romanian deadlift, along with light jogging and shuffling drills. These were performed in the weight room or basketball gymnasium. The lifting exercises helped him to regain strength and explosiveness needed for his sport. The jogging and shuffling drills were necessary for his sport due to him needing to quickly change direction and explode out of that position. During the last two weeks Bill rejoined the football team for lower extremity strength training.
activities. As for physical therapy, we focused regaining agility, speed, and overall conditioning by performing dynamic agility drills and sprints. Progressions were made each day such as distance and time, while decreasing rest breaks.
Chapter IV
OUTCOMES AND DISCHARGE

Bill was seen by a skilled physical therapist for 33 visits for a total of eight weeks. Bill noticed gradual improvement throughout his involvement with therapy. In the beginning it was slower, due to the amount of swelling and discomfort he was experiencing around his knee joint. Once the swelling and discomfort decreased, Bill was able to increase his tolerance for exercises. By the third week he was performing weighted resistance exercises with therabands with no pain. After week four, Bill did not report any pain in his knee during or outside of therapy. Bill’s strength was reassessed prior to discharge; the only limitation was his left hip abduction at 5-/5, with the rest being 5/5 bilaterally. His ROM was WNL bilateral prior to discharge. Throughout therapy Bill seemed to be adherent to his home exercise program and instructions to limit weight bearing and stress on his left knee. Many menisci protocol to return to sport require the patient reveal a non-tender joint line, absence of pain or swelling, full ROM, and restored muscle strength. Bill was discharged from physical therapy and was approved to resume full football activities after he met all his goals and met all the previously mentioned criteria. He was satisfied with his overall level of care and treatment throughout his duration with therapy.
CHAPTER V

DISCUSSION

This case focused on the outcome of physical therapy interventions following a lateral meniscectomy. The main focus of therapy early on was controlling pain and inflammation, eventually followed by regaining strength and stability in his left lower extremity. After 33 therapy sessions, Bill was discharged with no pain, full ROM, and 5/5 strength in his lower extremities, except for his left abductors maintaining at 5-/5.

Due to the menisci bearing 40% to 70% of the load through the knees, we had to be sure Bill was ready to begin full activity.\textsuperscript{4,5} Because much of the menisci is avascular, the recovery time generally takes many weeks to regain full activity, which was true in this case with Bill taking a total of 8 weeks. With many of the population not being in as good a physical shape as Bill was before surgery, recover may take longer than the 8 weeks experienced in this case study. Research has shown that 85% of patients have resumed their pre-injury level of activity at 2 years after surgery.\textsuperscript{14} Factoring in Bill's age, wellness, and overall conditioning, he was predicted to return to pre-injury level within a year.

One limitation of the study was the minimal use of functional outcomes assessments. The only one used was single leg balance assessment. Other ones that could have been used are possibly the Lower Extremity Functional
Scale (LEFS) or Knee Injury and Osteoarthritis Outcome Score (KOOS). Using these assessments would have helped us to better determine the functional outcomes of the patient and helped to direct out treatment based on his reported limitations. They may have provided a better idea of his satisfaction with our therapy services rather than verbally communicating with him and performing objective tests such as ROM and strength to assess his improvement.

Future directions of research should focus on the development of osteoarthritis in the knee following a meniscal injury in an athlete versus a general community patient. Since a lateral meniscectomy has been shown to have greater probability of developing osteoarthritis as compared to a medial meniscus. Studies can be performed to compare the effects of surgery and their predictability of developing osteoarthritis in that knee, and also if there is a differing time frame of when symptoms begin to appear. Another area of research should be whether there is a difference between the use of aquatic therapy against those that are not able to utilize a pool for therapy. The pool will assist the patient to reduce load bearing through their joints and should allow more weight bearing activities earlier in treatment, so should therefore provide better recovery results.

Reflective Practice

For this case study, there aren’t many changes I would have made during the treatment of Bill. The patient was discharged from therapy having met all his goals and able to fully participate in football activities. He was a direct referral from an orthopedic surgeon, so his diagnosis and immediate protocol was given
to us. One area I would have changed is aquatic therapy up to three times a week, instead of just the one time that he was doing. This would have allowed him to begin weight bearing activities sooner to gain strength, balance, and confidence within his knee. It would also provide less stress through the knee joint compared to land activities. Another area I would have looked at changing was having him perform more aerobic conditioning activities to maintain those levels as best we could. We did have him use a lower body ergometer, but they were for warm up purposes, not for aerobic conditioning. I would not have referred this patient out, unless he was having chronic issues following the surgery, which he was not.

Due to Bill being an athlete and his insurance providing full coverage, his overall was nothing. For a general patient the cost would have been between $40 and $70, depending on the specific treatment given that day. The only real cost to the patient was his time. He was seen for a total of 33 visits, which seems like a lot, but due to the clinical setting he was required to be seen five times a week. I believe he benefitted from attending therapy more often due the ability to track his progress more closely. Due to the money cost being nothing, and the time only being an hour a day at a maximum, the overall cost/benefit for the patient is very good and beneficial.
REFERENCES


