



ULUSLARARASI HAKEMLİ ORTOPEDİ TRAVMATOLOJİ VE SPOR HEKİMLİĞİ DERGİSİ

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SPORCULARDA MENİSKÜS YIRTIKLARI

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Özet: Günümüzde sporun öneminin kavranması ve spora aktif katılımın toplum içinde artması nedeniyle, klinikte karşılaşılan sporcu menisküs yaralanma vakaları da hızla artmıştır. Menisküs yaralanmalarının başlıca şikâyet belirtileri; diz ekleminde ağrı, kilitlenme, diz ekleminde şişlik, dizi tam olarak bükememek veya doğrultamamaktır. Sporcuların kısa sürede spora dönmesini sağlamak önemli olduğundan, çalışmada sporcularda görülen menisküs yırtıklarının tedavi yöntemleri ve sonuçları anlatılmıştır. Çalışmada klinik uygulamalarda karşılaşılan ve tarafımızdan takip ve tedavi edilen 128 sporcunun menisküs yırtıklarındaki tedavi şekilleri ve sonuçlarının açıklanması amaçlanmıştır. Uygulamalarımıza göre; sporcularda en hızlı iyileşme ve kısa sürede spora dönme, artroskopik cerrahi sonrası elde edilmektedir.

Anahtar Kelimeler: Menisküs, Sporcu, Tedavi

MENISCUS TEARS IN ATHLETES

Abstract: Increasing importance of sports in today's world and increasing number of athletes within the society play an important role in the increased number of patients receiving treatment at our clinic for meniscus tear. The main symptoms of meniscus tear include pain or swelling in the knee joint, locking of the knee joint, inability to bend or straighten the knee fully. Since it is of utmost importance to ensure that athletes can return to sports before long, this study focused on the methods of treatment for meniscus tear and their results. We tried to explain the methods of treatments for meniscus tear cases we observed in 128 athletes that were kept under surveillance and treated in our clinic as well as the results we obtained. Among the methods we employed, arthroscopic surgery gave the best results, ensuring the quickest recovery and return to the sports within the shortest time possible.

Key Words: Meniscus, Athlete, Treatment



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INTRODUCTION

In today's world, sports activities become widespread, leading to increases in the injury rates. According to the literature, sports-related injuries constitute 10% of the patients admitted to the hospitals for injury treatment. 88% of these are related with lower extremity and 58% are localized in the knee. Among the sports branches causing meniscus tear, football is placed on the top. Injuries on the knees are the most time and power consuming cases for both the treatment facilities and sports clubs (www.mehmetbinnet.com).

Under the pathology caused by knee joint injuries the athletes suffer lies the anatomical structure of the knee joint. Knee joint is one of the most movable joints in the human body. The reason behind this is the relationship between the osseous structures forming a joint (www.mehmetbinnet.com) (Figure 4).

Small problems in the stabilization mechanism can be compensated to a certain extent in athletes with well-developed and strong muscles; however serious function losses will be inevitable in those without strong muscle structure. Developed muscle power gained through regular training has an active stabilizer effect on the knee, acting as a protective shield against the injuries during the sports competitions (www.mehmetbinnet.com).

During the sports activities, the knee joint usually faces overloads that push its physiological limits. Compared to other sports activities, occurrence of knee

injuries is five times higher in American football. The sports activity with the second highest rate of knee joint injury is football. Ice hockey is in the third and handball is in the fourth place. As it is understood, these are all contact sports. Traumatic injuries in contact sports like football mostly occur on a slightly bend knee, as a result of a force to twist the joint excessively. Mechanisms of injury, directly proportional to the severity and period of the injury, lead to various disabilities (www.mehmetbinnet.com).

All types of meniscus tears occur in sports like football (Figure 6, Figure 8, Figure 9, and Figure 10). These are mostly multiple tears such as lateral meniscus with an anterior horn tear or longitudinal tears in the white-white zone (Choi ve Victorof, 2006).

First symptom of meniscus tear, locking of the knee joint (locking with sudden flexion and unable to move) occurs suddenly as a result of a loose piece of meniscus getting stuck in the joint following the tear. Other symptoms include limited range of motion, pain and blister in the joint (Figure 7). In practice, pain exists in all meniscus cases, either in the joint spacing or on the whole joint, localized on the side of the tear. Pain is severe in the newly formed tears and can extend below the knee. Due to the pain, the athlete either does not lean over that knee or cannot continue the sports activity (www.mehmetbinnet.com).



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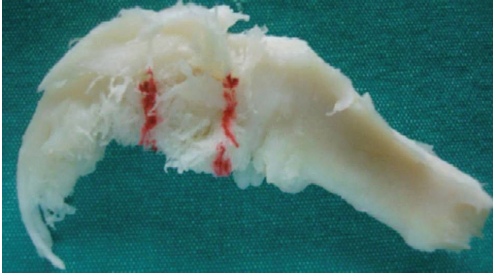


Figure 1. Macroscopic image of fibrillation and corrosion of meniscus

Tomography and magnetic resonance imaging (Figure 5) are the most preferred methods used for the diagnosis of meniscus tears. However, definitive diagnosis and treatment requires arthroscopy that allows for direct visualization of the internal joint structures. With arthroscopic surgery, views on meniscus have been based on certain criteria and problems the athletes experience become no longer life destroying for their sports life. Through a minor surgery, it becomes possible to return back to active sports life within a short time. Arthroscopy also provides precise information for the treatment of meniscus tear and it is only possible through arthroscopy to administer certain treatment methods. Although non-surgical treatments are suitable for people living a normal life, the need for arthroscopy arises when the symptoms observed in the highly active athletes constitute an impediment to the active sportive life. The basic advantage of arthroscopy as a minimally invasive surgical alternative is the chance to shorten the time it takes to return to sports activities considerably. Repair of meniscus tears through arthroscopic methods protects the athletes against

having knee problems in the long-term and prolongs active sports life. The latest technique used for meniscus tears is the “meniscus transplant” applied in people that previously had a meniscus removal operation for various reasons to prevent the negative course of the injury (www.mehmetbinnet.com).

MENISCUS TEARS

Menisci are anatomical fibro cartilage structures lying between the tibia and femur on the knee joint (Aşık ve Atalar, 2009). This structure is solid and flat with a rubbery texture. It covers the surface of the joint and supports it like a cushion. There are two menisci on the knee, one on the inner side (medial meniscus) and other on the outside (lateral meniscus) (Figure 11). Each meniscus is attached to the tibia, making contact with the femur. They serve as shock absorbers when excessive stress is put on the knee joint during weight lifting or doing exercises (<http://Sakur.Uludag.Edu>. Tr). The proximal surfaces of the menisci are concave and in contact with the condyles of the femur, their distal surfaces are flat or slightly convex, and rest on the tibial plateau (Alparslan ve Çullu, 2000; Davies ve Coupland, 1972). Tears on the peripheral or central portion show different healing response depending on their location on the meniscus. Peripheral 20-25% of the meniscus is called red-red zone due to its vascular structure and tears on this zone have high healing potential. Central 50% of the menisci is called white-white zone. This zone is avascular and has

a poor prognosis for healing even if the tears are repaired. The area between these zones comprising approximately 25% of the meniscus is called red-white zone due to its partially vascular structure and this zone also has partial healing potential (Arnoczky ve Warren, 1983; Arnoczky ve Warren, 1982'den akt: Aşık ve Atalar, 2009).

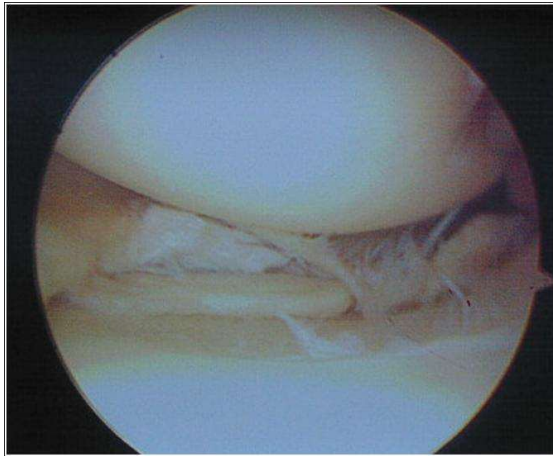


Figure 2. Degenerative Complex Meniscal Tear

Meniscus tears are one of the most commonly encountered problems (Aşık ve Atalar, 2009; Alturfan vd., 2006; Hede vd., 1990; Nielsen ve Yde, 1991; Poehling vd., 1990) (Figure 6, Figure 8, and Figure 9). Meniscus tears may occur when the body turns strongly with the body weight on the slightly bent knee during training or usually a competition. (body feint in football, ball fake when the feet stay still in basketball) (<http://Sakur.Uludag.Edu.Tr>). Main symptoms of meniscus injuries include: pain in the knee joint, swelling on the knee joint developing suddenly or gradually depending on the meniscus portion where the tear occur (Figure 7);

inability to bend or straighten the knee fully. The knee may get locked or stuck at a certain point. During the trauma, sound of a tear or a “popping” sound may be heard and a chronic meniscus tear can cause pain during the sports activity accompanied with or without swelling. The tear can cause a feeling of instability of the knees (<http://Sakur.Uludag.Edu.Tr>).

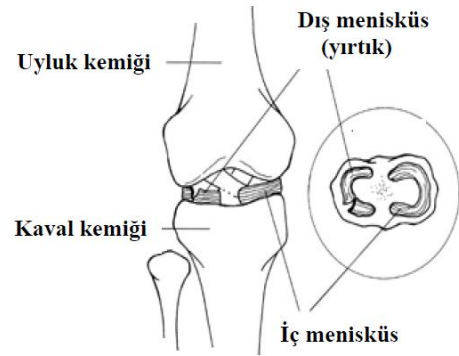


Figure 3. Meniscal Tear Knee Anatomical Structure

The meniscus tear is diagnosed when taking the history of the patient. In people of older ages, the symptoms like sneaky development, accompanying swellings as well as pain and clicking in the joint line point to the degenerative meniscus tear. Joint line tenderness observed during the physical examination, the McMurray test and the Appley grind test are the most frequently used techniques. Evaluating the tests not separately, but together with the medical history helps to get a more accurate diagnosis (Greis vd., 2002; Weinstabl vd., 1997; Medlar vd., 1980; Terry vd., 1995; Aşık ve Atalar, 2009).

In the diagnosis of the meniscal tears, plain radiography and magnetic resonance



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imaging give 95% accuracy (Muellner vd., 1997). There are certain factors that need to be taken into consideration before determining if surgical treatment is performed for the meniscus tear. Arthroscopic surgery become a requirement if the symptoms affect sports participation and daily activities of the patient; the examination findings are positive; there is no response to the conservative treatment or no other cause of the knee pain (Metcalf vd., 1996). However, bucket handle meniscal tears locking the knee must be urgently treated by arthroscopic surgery (Aşık ve Atalar, 2009).

As a treatment, the torn part of meniscus is usually removed. However, in today's world, repair of the meniscus is a more preferable treatment option especially for the athletes (Demirağ, 2003). Longitudinal tears which lie within the peripheral vascular zone heal with conservative treatment methods. In patients with minimal symptoms, NSAIDs and other conservative treatment methods should be used for the meniscal tears. However, tears accompanied with the symptoms of locking, severe pain or the feeling of instability are usually candidates for general surgery. Especially in the cases where the meniscal tear is accompanied by ligament injury on the knee and no reconstruction will be done, the tear should be treated using conservative methods as far as possible. If meniscectomy is performed on the knee without any ligament reconstruction, the existing instability will get worse (Yıldırım, 2007).

It becomes necessary to perform surgery if the symptoms affect the daily and sports life of the patient; the examination findings are positive; there is no response to the conservative treatment (restriction of activities, anti-inflammatories etc.) or no other cause of the knee pain (Metcalf vd., 1996).

The meniscal tears are basically classified during the arthroscopic surgery. Classification of the tears is important in terms of giving indications for resection and repair after the diagnostic operation (Yıldırım, 2007).

Meniscal tears are classified as follows:

- 1) Longitudinal tears
- 2) Horizontal tears
- 3) Oblique tears
- 4) Radial tears
- 5) Variations (flap, complex or degenerative tears)

Meniscus surgery consists of two basic groups. 1. Meniscectomy, 2. Meniscal Repair (Aşık ve Atalar, 2009).

Today, arthroscopy is usually performed as a surgical procedure for the treatment of meniscal tears. The primary factor affecting the surgical treatment method is the location of the meniscal tear. Indications for repair exist in the peripheral tears that lie in the zone of abundant blood supply. Meniscectomy is the treatment option for the tears in the centre of the meniscus where the blood supply is poor. The extent of meniscectomy depends on the size of the tear (Yıldırım, 2007).

Meniscectomy is categorized into three types depending on the amount of the



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meniscus removed (Steenbrugge vd., 2002).

- 1) Partial meniscectomy
- 2) Subtotal meniscectomy
- 3) Total meniscectomy

In general, longitudinal tears in the red-red zone are suitable for repair in young and athletic people. Meniscectomy is usually preferred as the age advances, the period from trauma to surgery prolongs, the torn meniscus begins to move to the centre or the tear is morphologically different from longitudinal tears. Meniscectomy is the surgical excision of the torn part from rest of the meniscus on the periphery. Total meniscectomy was heavily used especially during the time before arthroscopy was invented, causing many athletes to end their athletic career. Poor outcomes obtained after a long period of follow-up led to abandoning the use of this method in the young patients and athletes (Aşık ve Atalar, 2009). If partial excision will be performed on a tear: 1. All mobile fragments should be removed, 2. The remaining meniscal rim should be smoothed 3. Meniscocapsular joint should be protected (Metcalf vd., 1996). The studies showed that partial meniscectomy caused permanent damage on the joint cartilage in the long term (Bonneux ve Vandekerckhove, 2002; Jaureguito vd., 1995). Ligament stability and chondral lesions during the surgery are the most important factors having an influence on the status of the knee on which meniscectomy was performed (Burks vd., 1997; Schimmer vd., 1998).

In severe injuries like multiple ligament injuries, knee dislocation and tibia plateau fracture, menisci are also torn from their peripheral attachments. It is highly important in terms of the knee stability to perform open meniscal repair during the repair of medial and lateral ligament and capsular structures. During the surgery, the menisci are reached using the defects caused by the injury and respecting the tissue planes in a way to cause minimum damage to the already damaged tissues. After the lips of the tear are renewed, non-absorbable sutures are placed every 4 to 5 mm in a vertical plane and the peripheral attachment of the meniscus is repaired. Use of short and sharp-pointed suture needles will be in favour of the repair. When the menisco-tibial ligaments are totally avulsed, it might be necessary to attach them to the bone with suture anchors. Meniscus repair is not preferred in injuries other than the severe ones. In cases where the performance of arthroscopic repair is not possible, tears within 2-3 mm of the meniscocapsular junction located in the posterior horns of both menisci may be treated with open repair methods following postero-medial or postero-lateral dissection. Use of open approaches is highly difficult in more centrally located tears. Similarly, tears on the bucket handle are not suitable for open repair as they need both posterior and anterior arthrotomy. Arthroscopic methods should be used in such patients (Tandoğan, 2002).

Arthroscopic Repair; can be employed for all kinds of tears. After it is decided through arthroscopic examination



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that the meniscus is reparable, the tear is reduced. Both rims of the tear are refreshed and removed from fibrinosis by means of arthroscopic rasps, curettes and shavers. To stimulate the healing response, both femoral and tibial sides of the synovia are rasped and refreshed with the same tools. This procedure called synovial abrasion must be performed with great care during all meniscal repairs. Then repair materials (suture or fixer) are placed every 4 to 5 mm on both inferior and superior surfaces of the meniscus. If sutures are used, 2-0 non-absorbable ones must be preferred. Various studies demonstrated that vertical suture techniques give the strongest results. Since it is vertical to the circumferential fibres of the meniscus, vertical sutures should be preferred as they have a better holding capacity. Vertical sutures are followed by horizontal sutures. The weakest point in a suture is at the knot. The wavy deformation occurring after the meniscal repair is not important and disappears over time (Tandoğan, 2002).

Many studies indicated that, when compared biomechanically, conventional sutures have highly superior strength over the meniscal fixation implants (Aşık ve Şener, 2002; Barber ve Herbert, 2000; Post vd., 1997; Aşık ve Atalar, 2009). During the repair with sutures, attention must be paid to perform posterolateral or posteromedial incision without damaging the peroneal and saphenous nerves. As a result, for a successful meniscal repair, longitudinal tears on highly vascularised areas must be preferred, the edges of the tear must be refreshed and the repair must be as stabile as osteosynthesis. The surgeon must always use a method he/she

is accustomed to and must be prepared in advance in a way to use suture fixer combinations depending on the location of the tear (Atalar ve Aşık, 2008).

Menisci play an important role in maintaining the functions of the knee joint. Especially the athletes experience meniscal tears. To make an accurate diagnosis, it is important to combine anamnesis, clinical examination and imaging. During the arthroscopic surgery, protection of the meniscal tissue should be prioritized. The accompanying lesions must be carefully evaluated and all problems must be solved together via a holistic approach (Aşık ve Atalar, 2009).

Sports rehabilitation aims to ensure that athletes can return to sports or activities as safely as possible. In general, the longer period of time the patient has the symptoms, the longer the recovery period is. An athlete can return back to sports after the treatment if:

- He/she can bend or straighten the knee fully without suffering any pain.
- His/her injured knee gained strength when compared to the other knee and leg.
- There is no swelling on the knee.
- He/she can do jogging without limping,
- He/she can run without limping,
- He/she can do 45° scissors move laterally
- He/she can do 90° scissors move laterally.
- He/she can jump on both legs and on the injured leg without pain



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If the athlete develops the muscles supporting the knee joint, increases their flexibility and develops his technical skills of the sport during the training period, the chance of experiencing meniscus tear can be minimized (www.mehmetbinnet.com; <http://Sakur.Uludag.Edu.Tr>).

PRACTICE

The study includes 128 cases of sports-related traumatic meniscal tears we treated on different dates. The study does not include the patients with additional traumas like single or multiple ligament injuries, fractures etc. Out of all the patients in our study, 96 were male and 32 were female. All the patients had meniscus injury on a single knee. Among the sports-related traumas included in our study, football is in the first place (82 patients), basketball in the second (21 patients), volleyball in the third (13 patients) and other sports in the fourth place (12 patients). The mean age of the patients is 33.6. All our patients were amateur athletes. 66% of the knees with meniscal tear were left knees (these patients dominantly use their right knees), and 62% were right knees (10% of these patients dominantly use their left knees).

All patients underwent detailed physical examination, plain two-way radiography (Figure 4) and knee magnetic resonance imaging (MRI). Patients other than those suffering locking of the knee due to acute meniscal tear and severe pain were subject to conservative treatment methods (knee

bracings, medical treatment etc.) and surgical operation was performed on those showing no response to the conservative methods. 33 patients (out of 128) showed response to the conservative treatment. 95 patients underwent arthroscopic surgery. 17 patients subject to arthroscopy are those treated with emergency intervention due to knee locking and severe pain. 34 patients had only anterior horn tears of lateral meniscus, 39 patients had central tears of medial meniscus, 17 had bucket handle tear of medial meniscus and 5 had both medial and lateral meniscal tears.

Following the detailed examination and imaging (plain radiographies and MRI), patients showing no response to conservative treatment methods and those suffering locking of the knee with severe pain were subject to surgery. After necessary surgical preparations were done, all the patients were administered spinal anaesthesia and some were administered additional sedatives, the lower extremity was exanguinated with esmarch bandage and a pneumatic tourniquet was used (250 mm Hg pressure). Following the sterilization of the surgical site, the joint was reached through medial and lateral portals. Physiological saline solution was used during the arthroscopic surgery. After detailed examination of the torn area of the meniscus, partial meniscectomy was performed properly. The remaining meniscus was checked in terms of stability. General arthroscopic examination was performed on the joint. Portal incisions were closed and the surgery was finished. All patients were discharged on the first post-operative day.



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Out of 95 patients that underwent surgical operation, 3 patients suffered from temporary swelling in the gastrocnemius muscle due to leakage of physiological saline solution and 10 patients had post-operative hemarthrosis which were drained later. All patients were mobilized on post-op day 1 and no brace or knee sleeve were used.

All patients we operated returned to sports actively within 3 months. No complication was observed in any of the patients during 3 years follow-up. In the patients treated with conservative methods, the period for returning to sports actively extended up to 6 months.

DISCUSSION

According to the common literature, sports-related injuries constitute 10% of the patients suffering with injury. 88% of these are related with lower extremity and 58% is localized in the knee. Sports-related injuries constitute 10% of the patients admitted to the hospitals for injury treatment. 88% of these are related with lower extremity and 58% is localized in the knee. Meniscus tears are one of the most commonly encountered problems (Aşık ve Atalar, 2009; Alturfan vd., 2006; Hede vd., 1990; Nielsen ve Yde, 1991; Poehling vd., 1990). Knee joint is one of the most movable joint in the human body. The reason behind this is the relationship between the osseous structures forming a joint (www.mehmetbinnet.com) (Figure 4). Therefore, among all kinds of sports-related injuries, meniscus tears and treatment approaches are particularly

important. Developed muscle power gained through regular training has an active stabilizer effect on the knee, acting as a protective shield against the injuries during the sports competitions (www.mehmetbinnet.com).

In our study, 33 patients out of 128 showed response to the conservative treatment. All of these patients were admitted to the hospital for acute injuries. 95 patients underwent arthroscopic surgery. The MRI results (Figure 6, Figure 8, and Figure 9) are in consistency with the arthroscopic diagnosis. During the arthroscopic surgery, all 95 patients underwent partial meniscectomy, which we thought became effective in disappearance of the symptoms within a short time. We performed this treatment method since our patients wanted to return to sports in a short time. This study is restricted as we did not perform a meniscal repair. Another restriction of the study is that the follow-up period is limited to 3 years. Meniscal repairs with arthroscopic methods provided protection for the athletes against having knee problems in the long term and prolonged the active sports life. The latest technique used for meniscus tears is “meniscus transplant” applied in people previously underwent a meniscus removal operation for various reasons to prevent the negative course of the injury (www.mehmetbinnet.com). It is possible for our patients treated with partial meniscectomy to have certain problems in the long term.

Small problems in the stabilization mechanism can be compensated to a



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certain extent in athletes with well-developed and strong muscles; however serious function losses will be inevitable in those without strong muscle structure. Developed muscle power gained through regular training has an active stabilizer effect on the knee, acting as a protective shield against the injuries during the sports competitions (www.mehmetbinnet.com). This study detected that sports-related meniscal tears occur mostly on the non-dominant limbs of the patients, which we thought could be related with the muscle strength. This study is restricted since all the patients involved were amateur athletes.

CONCLUSION

According to the common literature, sports-related injuries constitute 10% of the patients suffering with injury. 88% of these are related with lower extremity and 58% is localized in the knee. Among the sports branches causing meniscus tear, football is placed on the top. Injuries on the knees are the most time and power consuming cases for both the treatment facilities and sports clubs (www.mehmetbinnet.com).

As a result of the treatment of various types of meniscus tears (Figure 6, Figure 8, Figure 9) with both conservative methods and arthroscopic surgery, we concluded in this study that conservative methods are effective in acute injuries, however arthroscopic partial meniscectomy is much more effective in terms of the period of time it takes to return to sports.

We observed that most of the injuries occurred on the non-dominant limbs of the patients. Therefore, muscle strength is extremely important as it has significant protective function on the knees.

Sports activities have increasingly important place in the social life. Therefore, we are of the opinion that further studies are required to examine the efficiency of the treatment methods.

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APPENDICES:



Figure 4: Plain Radiographic image of the knee.



Figure 5: Magnetic resonance image of the knee structures.



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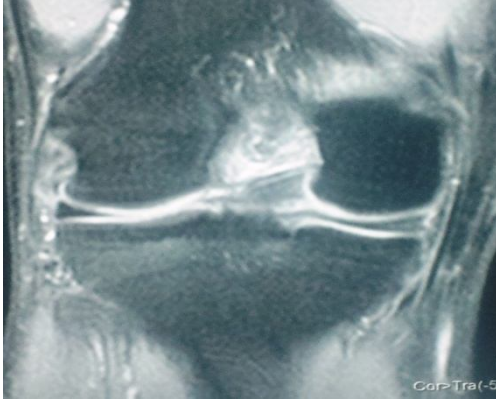


Figure 6: Magnetic resonance image of the meniscus tear.



Figure 8: Magnetic resonance image of the meniscus tear.

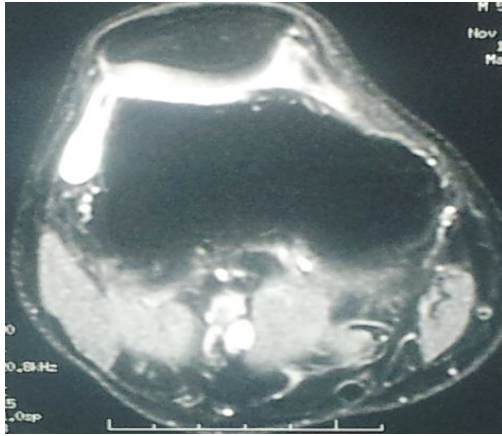


Figure 7: Magnetic resonance image of joint fluid following the traumatic meniscus tear.



Figure 9: Magnetic resonance image of the meniscus tear.



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Figure 10: Magnetic resonance image of the tear in the medial meniscus.



Figure 11: Magnetic resonance image of the medial and lateral meniscus.