32 Management of Knee Cartilage Injuries in Basketball

Hailey P. Huddleston, Jorge Chahla, Brian Cole, and Adam B. Yanke

32.1 Introduction

Treatment of articular cartilage defects of the knee remains a challenging entity, particularly in young high-demand patients. Damaged articular cartilage has limited potential for self-healing and therefore has an increased propensity to progress to osteoarthritis [1, 2]. The prevalence of cartilage lesions in the general population ranges from 13% to 60% and affects an estimated 900,000 patients in the United States [3–6]. However, the prevalence in athletes has been reported to be on average 36% (range 2.4–75%), with 14% of these athletes being asymptomatic at diagnosis and with the patellofemoral compartment (37%) and femoral condyle (35%) being the locations most likely to be affected [7, 8]. In professional basketball athletes, this number is even higher. Three prior studies have reported that the prevalence of focal chondral defects (FCDs) in the national basketball association (NBA) is between 41% and 50% of players and most commonly affects the patellofemoral joint (70–77% of defects) [9, 10]. Magnetic resonance imaging (MRI) has shown that basketball players have a similar level of undiagnosed, and generally asymptomatic FCDs compared to athletes of other sports [11]. In the general population, the number of surgical procedures to address these cartilage defects is estimated to be approximately 200,000 cases annually [4, 12].

Treatment options for focal chondral defects include non-operative and surgical options. Non-operative treatments are generally considered first-line, especially when no mechanical symptoms are present. A variety of surgical procedures are available; the choice of which surgery to choose is individualized based on the athlete and his or her risk factors and the patient's current time in the season. If conservative measures, such as physical therapy or an intra-articular injection fail, a less-invasive procedure such as a chondral debridement can provide significant symptomatic relief, with minimal down time without altering the opportunity for a more definitive procedure. Other surgical interventions include microfracture, osteochondral autograft transplantation (OCA), osteochondral allograft transplantation (OAT), autologous chondrocyte implantation (ACI), and its newer iterations (matrix ACI) and newer procedures including minced cartilage procedures (DeNovo Natural Tissue (NT), Zimmer Inc., Warsaw, IN), cryopreserved osteochondral allografts (Cartiform, Athrex Inc., Naples, FL; Chondrofix, JRF, Centennial, CO; Prochondrix, AlloSource,

H. P. Huddleston · J. Chahla · B. Cole
A. B. Yanke (✉)
Department of Orthopaedic Surgery, Division of Sports Medicine, Rush University Medical Center, Chicago, IL, USA
e-mail: Jorge.chahla@rushortho.com; Brian.Cole@rushortho.com

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Centennial, CO), and extracellular matrix scaffolds (BioCartilage, Arthrex Inc., Naplex, FL).

The purpose of this chapter is to review focal chondral defects of the knee and their treatment, with special attention on the use and impact of these procedures in basketball players. Initially, this chapter assesses how FCDs are diagnosed using patient history, physical examination, and imaging. Then, non-operative treatments, various surgical techniques and their indications, and postoperative rehabilitation process are investigated. Finally, outcomes of these procedures and their return to sport data and basketball, specifically, are analyzed.

32.2 Diagnosis

FCDs in basketball players are diagnosed through a combination of patient history, physical examination, radiographs, and MRI. An early diagnosis of FCDs is critical, especially in a young basketball player, as increased time from diagnosis to intervention has been shown to increase the risk of worsening cartilage damage and development of osteoarthritis [13].

32.2.1 Patient History

The initial step of diagnosis, as with most sport injuries, is a comprehensive patient history. A typical presentation of an FCD would be a basketball player who presents with continued knee pain and swelling. The symptoms of cartilage injury are generally non-specific, and pain is the most common chief complaint. A high degree of suspicion is important in those who have acute patellar dislocation, ligament injury, or hemarthrosis [12]. Often the pain develops insidiously without an inciting event and presents as intermittent pain that may be worse during specific activity and sports play. This association should be further explored because multiple knee pathologies can present with knee pain. For example, patellar tendonitis which commonly occurs in male basketball players and affects up to 11% of players can present with anterior knee pain localized over the patella, with swelling and stiffness [14]. However, acute pain in association with injury can also occur as approximately half of patellofemoral FCD occurs in the setting of traumatic injury [15]. The location of pain can depend on the location of the FCD, and it can also be diffuse in nature. Pain can be present in addition to intermittent effusion, crepitus, catching, and locking.

A full past medical history is also essential in diagnosing and creating a treatment plan. An understanding of a patient's comorbidities, past surgical history, and history of physical injury is essential. Previous injury, such as ACL injury, is associated with chondral injury [16]. In addition, any prior treatment such as medications, physical therapy, or injections should be noted.

32.2.2 Physical Examination

Aspects of the physical examination can suggest the diagnosis of an FCD. On inspection, one should look for evidence of effusion, deformity, patellar maltracking, and malalignment that may be present. In patients with patellofemoral FCD, the most common type seen in basketball players, in-toeing, valgus alignment, or hip abductor weakness is often observed. On palpation of the joint, tenderness is common over the femoral condyle or tibial plateau, depending on the location of the lesion. Patients usually retain full range of motion. A full knee examination is essential in ruling out other diagnoses such as meniscal tears, ligamentous injury, or extensor mechanism pathologies. While a physical examination must be conducted when evaluating a patient with cartilage injury, the findings are generally non-specific and provide little concrete evidence of the underlying diagnosis.

32.2.3 Radiographic Imaging

Due to the lack of specificity in patient history and on physical examination, both radiographic and MR imaging are necessary in successfully diagnosing a patient with an FCD. When obtaining X-rays, four views are suggested: bilateral standing anterior posterior (AP), 45° of flexion weight-bearing posterior anterior (PA "Rosenburg"), non-weight-bearing 30° of flexion true laterals, and patella sunrise view ("Merchant"). In addition, physicians should obtain a mechanical axis X-ray. Specifically, long-leg alignment views allow for the determination of the mechanical axis and to evaluate for alignment. These images are necessary to rule out bony defects and determine the alignment of the joint. Radiographs should be evaluated for multiple findings such as radiolucencies, subchondral cysts, sclerosis, fragmentation, loose bodies, joint space narrowing, and physeal status as these can affect the treatment plan.

32.2.4 MRI

MRI can provide more information, and is the most sensitive modality, to evaluate cartilage defects. However, diagnostic accuracy based on MRI compared to arthroscopy has been shown to be in part dependent on the severity of the cartilage defect (e.g., Outerbridge grade 3–4) [17]. Conventional MRI methods include T1-weighted and T2-weighted imaging and can provide morphological and physiological information about a patient's knee. However, fat-suppressed sequences such as T2-weighted fast spin echo (FSE), and T1-weighted spoiled gradient-echo that allow for enhanced contrast between fluid and cartilage provide improved sequences producing images with intermediate cartilage signal and bright fluid signal [18]. Newer 3D FSE and 3D multi-echo gradient-echo sequences further improve this distinction [19]. Other novel technologies include delayed gadolinium-enhanced MRI for cartilage (dGEMRIC). dGEMRIC is sensitive to glycosaminoglycan distribution in cartilage and allows visualization of areas of glycosaminoglycan depletion; however, it requires a double-dose IV contrast injection. Other techniques include T2 relaxation time mapping, which is sensitive to the cartilage–collagen matrix and water distribution within the articular cartilage, and T1rho mapping which is sensitive to cartilage proteoglycan depletion [20, 21]. However, whether symptoms correlate with imaging findings should always be considered. A study in basketball players found that 47.5% of the 40 knees included in the study had asymptomatic cartilage lesions on MRI.

32.2.5 Diagnostic Arthroscopy

The most accurate test for diagnosis and grading of an FCD is diagnostic arthroscopy. This allows for visualization of the cartilage defect and allows for determination of lesion size, grade, and location. There are two main grading systems for cartilage defects. The first is the International Cartilage Repair Society grading system (ICRS) [22]. This cartilage grading system ranges from a score of 0 to 4 based on the depth of the defect from nearly normal to penetration beyond the subchondral bone. The other commonly utilized grading system is the Outerbridge cartilage score, which is based on the appearance of the cartilage defect, including the presence of swelling, fragmentation, and erosion [23]. The findings on diagnostic arthroscopy including the severity, size, depth, and location of the lesion will dictate next steps in treatment.

32.3 Conservative Management

Conservative management is generally the initial approach and is used in patients with mild symptoms or small lesions as its goal is to reduce symptoms instead of reversing or fixing the underlying lesion [24]. Types of conservative treatment include analgesics, chondroprotective agents (glucosamine, chondroitin), steroid injections, physical therapy, and knee bracing, and these are especially useful mid-season to allow for players to return to play with symptomatic relief [25]. However, activity modification is also recommended as part of conservative management, which may be a challenge in basketball players. Studies on the role of conservative management in athletes is limited, with one study showing that 22 of 28 athletes had successful results of conservative treatment but continued to have radiographic chondral abnormalities at follow-up 14 years later [25]. Therefore, depending on the size of the defect, surgery, where return to sport has been studied, may be preferred in high-level athletes when conservative treatment fails.

32.4 Surgical Treatment

Limited literature is available regarding a treatment algorithm specific to basketball players or even athletes in general. Thus, the best way to treat these injuries in this patient population is to treat them the same as in the general population, while managing expectations. Special attention should be given to data showing return to sport after the various cartilage procedures in both basketball players and other professional athletes, although understanding of the sport and season timing is necessary to determine the aggressiveness of treatment at that time. Surgical treatment is generally utilized in patients who are symptomatic, have an acute injury, have loose bodies, and those who fail conservative treatment. There are three main categories of surgical treatment: palliative (debridement and chondroplasty), reparative (microfracture and other bone marrow stimulating techniques), and restorative (MACI, OCA, OAT). The main considerations in deciding on the proper surgical procedure for a cartilage lesion depend on the lesion size, age, and activity level. However, other specific patient factors such as comorbidities and past surgical history also play a role in this decision. In athletes in particular, activity and return to sport ability must be considered. A systematic review analyzing the return-to-sport rates in 1469 athletes found that return-to-sport rates range from 68% in microfracture to 91% in OAT, 74% in ACI, and 84% in OCA. This data is crucial in considering surgical procedural type in a basketball player [26].

The first consideration for the indication of the surgical procedure is cartilage lesion size. Lesions less than 2 cm are typically first addressed with debridement (abrasion chondroplasty) and potentially bone marrow-stimulating techniques, such as microfracture (which can be augmented with other biological treatments or scaffolds). OAT is also often used for this subset of patients where the chondral lesion is small, especially in those with higher activity levels [27]. As lesions become greater than 2.5 cm, these can be treated with OCA and MACI. Debridement is generally the first-line treatment, especially in lesions <2 cm and if there are flaps or loose tissue [28]. If a rapid return to basketball is necessary, players can undergo a less aggressive procedure such as chondroplasty with a potentially more aggressive procedure, as needed, during off-season. However, this choice greatly depends on the time of the season. If the initial treatment fails, then a more aggressive procedure may be considered. MACI is also more appropriate in those with shallow lesions, especially in the patellofemoral joint (as it is easier to match the shape of the patellofemoral joint) and is thus particularly relevant to basketball players. Newer ACI techniques such as matrix-induced ACI (MACI) can also be used. In addition, OAT or OCA are the suggested treatment in patients with damage to subchondral bone, as these procedures replace the whole osteochondral unit. Osteochondral treatment also gives the benefit of structurally normal cartilage placed immediately for faster return to sport and time to weight-bearing.

The second consideration is defect location. In basketball players, lesions in the patellofemoral area have been reported to be the most common [9]. However, lesions can also occur on the femoral condyles and tibia. OCA has been shown to provide successful results when used for lesions of the femoral condyles or trochlea [28, 29]. In addressing patellofemoral joint lesions and isolated lesions of the patella, ACI, MACI, and OCA have been found to have successful results in numerous studies [30–33]. The most difficult location to adequately treat is lesions on the tibia. Microfracture and local biological augmentation can be used; otherwise, OATs placed in a retrograde manner can be utilized with caution.

Other concurrent issues that must be taken into consideration include ligament pathology, malalignment, and meniscus deficiency. In cases of ligament pathology or meniscus deficiency, a ligament reconstruction or meniscal excision or repair can occur concomitantly with the cartilage procedure. In patients with malalignment, an osteotomy should be considered. An osteotomy, such as a high tibial osteotomy or a distal femoral osteotomy, can be utilized in patients with varus or valgus malalignment, respectively. Furthermore, an anteromedialization, an osteotomy of the tibial tubercle, can be utilized in patients with patellofemoral chondral defects [34].

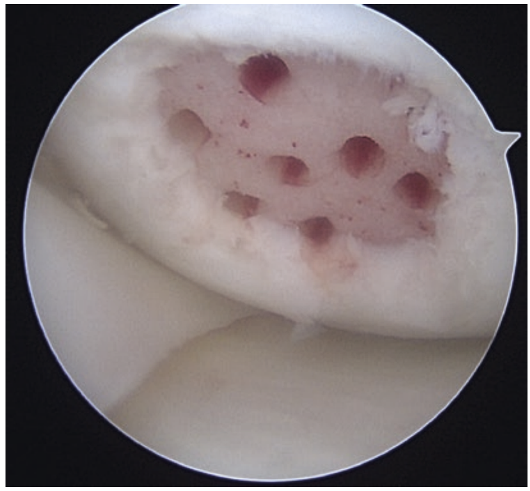

Fig. 32.1 Intraoperative image illustrating marrow stimulation to medial femoral condyle

32.5 Surgical Techniques

32.5.1 Abrasion Chondroplasty

Chondroplasty is one of the most frequently performed arthroscopic procedures. The goal of chondroplasty is to smooth over areas of fragmented and damaged cartilage. This can be performed with a curved shaver that allows for the ability to reach most areas of the knee. The tip of the shaver is then used to gently remove unstable cartilage and the calcified cartilage layer within the cartilage defect while care is taken to not disturb healthy cartilage and underlying subchondral bone [35]. Specialized curettes, such as a D-curette or ring curette, can also be utilized in this situation.

32.5.2 Marrow Stimulation

Microfracture was originally developed by Steadman et al. over 20 years ago to treat small chondral defects [36]. The goal of marrow stimulation is to stimulate cartilage defect healing with pluripotent progenitor cells, cytokine, growth factors, and proteins from within the bone marrow. During this procedure, multiple small holes are made in the subchondral bone to stimulate the cartilage (Fig. 32.1). When performing this procedure, the first step is an examination under anesthesia followed by a 10-point arthroscopy to examine all surfaces of the knee joint and to ensure that only a localized lesion is present. Then the next step is to prepare the osteochondral defect, removing any flaps, and debriding the surrounding area the same way as in an abrasion chondroplasty down to the subchondral bone including the calcified cartilage layer. Once this is removed, a microfracture drill using Kirschner wires, fluted drill, wires, or angulated awl is used to create holes 2–4 mm apart, releasing the underlying bone marrow cells into the cartilage defect which can be observed [37, 38]. In addition, nanofracture techniques, which utilize a smaller diameter drill are still being investigated [39].

Newer iterations of marrow stimulation are still being investigated. These newer procedures augment the same microfracture procedure with additional biologics, such as bone marrow aspirate concentrate (BMAC) or platelet-rich plasma (PRP). However, whether these additions provide any long-term benefit in patient outcomes still remains unclear [40, 41].

32.5.3 Osteochondral Autograft Transplantation (OAT)

OAT is generally indicated for patients who have smaller higher-grade lesions and are younger and more active. OAT is performed by removing a small area of healthy cartilage in an area of the joint that is mainly non-load-bearing and placing it into the chondral defect, which can be performed either open or arthroscopically. In surgery, the patient is positioned supine or the limb can be placed in a leg holder with a tourniquet and an examination under anesthesia is performed. A small parapatellar vertical portal incision is then made, and a diagnostic arthroscopy is performed to examine the cartilage surface. During diagnostic arthroscopy, the cartilage defect area is surveyed with a probe to determine defect size and confirm no other cartilage injuries are present.

At the cartilage defect location, a guide pin is placed in the center of the cartilage defect, perpendicularly. A cannulated reamer is then placed over the guide pin, and the guide pin is subsequently removed. The depth of the lesion is measured with a cannulated dilator.

The area of which to harvest the healthy cartilage from is predetermined using MRI. Graft harvest sizes are 6, 8, or 10 mm. Commonly, the harvest graft is taken from the lateral trochlea and lateral femoral condyle. An appropriately sized harvester is then placed perpendicular to the graft harvest location and is inserted into the subchondral bone to a depth of 10–15 mm with a mallet. The harvester is then axially loaded and turned 90° clockwise, then counterclockwise before being removed. A mallet is then used to fragment the graft from the surrounding cartilage, and the plug is removed. The graft is then inspected, with any bony debris removed, and shaved so that it is 1 mm shallower than the cartilage defect. The graft is then replaced into the joint and is gently tapped into place.

32.5.4 Osteochondral Allograft Transplantation (OCA)

OCA is often used in patients with larger (>2 cm) lesions. In the operating room, the patient is positioned supine with a tourniquet. The procedure begins with a knee examination under anesthesia. A lateral or medial parapatellar incision is then made to access the FCD. There are two general techniques that exist for OCA: cylindrical press-fit plugs or free-shell grafts. Whichever technique is used, donor tissue must be size matched to individual patients based on X-ray, CT, or MRI measurement.

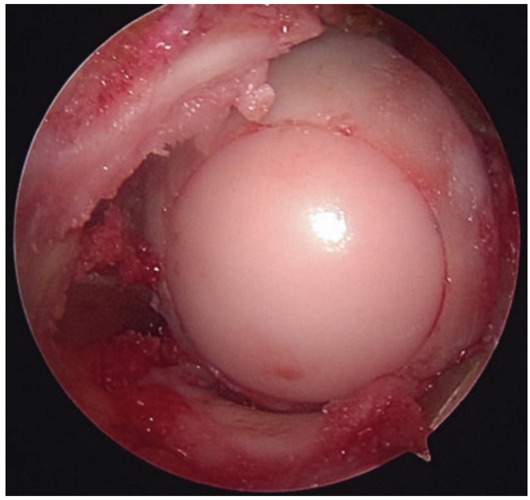

Fig. 32.2 Intraoperative image illustrating an osteochondral allograft transplantation to lateral femoral condyle

In the dowel grafting technique, a dowel of similar size to the cartilage lesion is selected. A guidewire is positioned using sizers into the center of the cartilage defect, and the dowel and the socket are drilled to a depth between 5 and 6 mm. The allograft is harvested to the desired size using a reamer from a matching zone and is inserted into the defect [42, 43]. This press-fit technique is often preferred as it eliminates the need for additional fixation (Fig. 32.2). In contrast, in the free-shell technique, a donor graft is matched to the defect site, inserted, and fixed with screws.

Larger defects often require the use of multiple plugs in what is termed “snowman technique” or “mastercard technique.” This involves placing and fixing the first plug, then drilling a second recipient site adjacent to, or partially over the first defect. However, based on prior studies, the snowman technique has been shown to provide inferior results compared to a one-plug technique [43, 44].

32.5.5 Autologous Chondrocyte Implantation (ACI)

Autologous chondrocyte implantation occurs over the course of two procedures with ex vivo chondrocyte expansion between procedures.

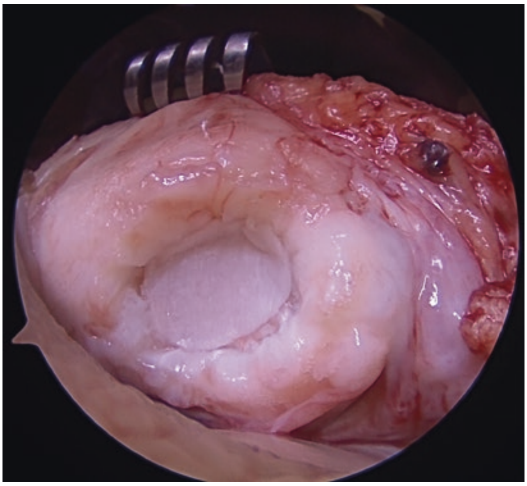

Fig. 32.3 Intraoperative image illustrating an autologous chondrocyte implantation on the patella

The initial procedure is a diagnostic arthroscopy with cartilage biopsy. During this procedure, the lesion size and grade are examined, and 200–300 mg of articular cartilage is harvested from a non-loading bearing surface of the knee. The collected cartilage is then processed via an enzymatic digestion process and is then cultured for 3–6 weeks.

In the second procedure, the harvested chondrocytes are reimplanted into the defect site (Fig. 32.3). It begins with the patient supine with a tourniquet applied. The defect is then debrided with a round-eyed sharp curette to expose subchondral bone. The original ACI technique involves a periosteal flap being sewn over the defect, followed by the injection of cultures chondrocytes underneath the flap (ACI-P), where the flap is harvested from the proximal-medial tibia [45–47]. In contrast, in ACI-C, a synthetic collagen membrane is used. In either case, the flap is positioned over the cartilage defect and sutured into place using 6-0 Vicryl. After the flap is checked to ensure a watertight seal, the cultured cartilage cells are then injected into lesion. In addition, a newer "sandwich" technique with autologous bone grafting can also be utilized, especially in patients with OCD [48].

A newer iteration of the ACI is an alternative technique called matrix ACI (MACI), which is when a preformed biodegradable porcine type I/III matrix is utilized as a scaffold for the collected and cultured chondrocyte cells. In this procedure, the matrix is inserted into the defect and then fixated to the surrounding cartilage with fibrin glue without the need for suturing.

32.5.6 Novel Techniques

Newer techniques include autologous and allogenic minced cartilage (such as De Novo, biocartilage, and cartiform), which are similar to an MACI in that a collagen-chondrotoin scaffold is used to model cultured chondrocytes [49, 50]. Minced cartilage can be utilized instead of cultured chondrocytes. In this case, only one procedure is needed as the cartilage is harvested and reimplanted in the same procedure [50]. In addition, fibrin glue is used to attach the minced pieces of cartilage together and attach the flap in addition to sutures to ensure fixation to the underlying subchondral bone [51]. A cartiform allograft is a cryopreserved osteochondral allograft scaffold that can be used as an alternative to ACI and, similarly to minced cartilage, can be implanted with fibrin glue. Biocartilage is a cartilage scaffold that is hydrated with PRP and can be used to fill defects after a microfracture procedure. All of these newer techniques have limited data supporting their superiority compared to traditional techniques. Future studies are needed to evaluate the benefits and shortcomings of these newer technologies.

32.6 Rehabilitation

32.6.1 Patellofemoral

Rehabilitation for patients who undergo patellofemoral cartilage procedures varies by institution. However, it often includes cryotherapy, elevation, and a brace immediately after surgery. Progressive passive motion and weight-bearing as tolerated can be implemented in the first few days after surgery. Range of motion is then increased with a goal of 90 degrees of flexion in the first 2 or 3 weeks [52].

32.6.2 Tibiofemoral

Patients who undergo cartilage repair of the tibiofemoral joint undergo multiple phases of postoperative rehabilitation. During the first phase, until 1 week postoperative, weight-bearing is restricted to less than 20% of body weight, range of motion (ROM) is restricted from 0 to 30°, and a protective knee brace is used at all times. Patients can progress to full passive motion within 1 week of surgery and then full active range of motion by 3 months post operatively. At 3 weeks patients are allowed to be fully weight-bearing while a brace is utilized until around 3 months postoperatively [53].

32.7 Clinical Outcomes

When deciding on which surgical procedure to use in a basketball player with a chondral defect, outcomes and ability and time to return to sport are of critical importance. Patient understanding and expectations should also be formed by providing all available data on outcomes of cartilage procedures in basketball players and other athletes as outcomes specific to basketball players remain limited. An individual approach should be taken when evaluating return to play as multiple factors influence it beyond surgical choice such as age (>30 years) and BMI (>27 kg/m^2) [54]. Furthermore, as elite jumping athlete basketball players are unique from athletes in non-jumping sports, and this should be considered.

32.7.1 Microfracture

Microfracture in basketball players is the most well-studied cartilage procedure with no prior reports on outcomes of isolated chondroplasty in basketball players. Outcomes of microfracture in the general population have been positive. For example, Weber et al. found a statistically significant increase in all patient-reported outcomes (PROs) after a mean follow-up of 5.7 years. Furthermore, similar results have been shown in patients who undergo microfracture compared to those who undergo ACI at 5- and 10-years postoperatively [55, 56]. In comparison to other sports, basketball players have been shown to have inferior results after microfracture [57].

Three studies have evaluated the success of microfracture in basketball players. The first study evaluated 24 NBA players who underwent microfracture surgery [58]. Sixty-seven percent of the players returned to play after the microfracture procedure. However, abilities after return to sport were found to be decreased compared to preoperatively in terms of both points scored and minutes played. In addition, the study found that patients were 8.15 times less likely to remain in the NBA after the index year. In the second study, 41 NBA players were evaluated after microfracture procedure [59]. Eighty-three percent of these players returned to professional basketball after an average of 9.2 months (4.32–14.08 months). Compared to their preoperative abilities, those who did return to sport had a significantly decreased points scored and steals per game. Furthermore, compared to other NBA players at a similar time point in their career, microfracture patients had significantly fewer points scored per game, games played per season, and free throw percentages. The third study of 24 professional basketball players found that 79% of patients returned to sport and mean time to returning was 30 weeks. However, on average their player efficiency rating deceased by 2.7 and their minutes per game decreased by 3 after surgery [60].

32.7.2 Osteochondral Autograft Transplantation

Osteochondral autograft transplantation has shown success, especially in terms of percentage of players who return to sport. In the general population, OATs has been shown to provide significant benefit in 72% of patients at a mean of 10.2 years of follow-up [61]. An additional study evaluated short- to mid-term outcomes in 112 patients who underwent OAT and found that both the VAS pain (7.14 ± 0.19 vs. 3.74 ± 0.26) and WOMAC (134.88 ± 5.84 vs. 65.92 ± 5.34) significantly improved at a mean follow-up of 26.2 ± 0.24 months [62]. In comparison to microfracture, a meta-analysis showed that OAT results in a lower risk of failure (11% vs. 32%) and a higher level of patients who return to activity [63].

Furthermore, OAT has been shown to have a higher rate of patients who returned to sport when comparing procedure type: between 89% and 94% [27, 64, 65]. A systematic review found that based on seven articles, the mean time for return to competition after OAT was 5.6 months (3–14 months) [65, 66]. No study specifically investigated the return-to-sport rate and time in basketball players.

32.7.3 Osteochondral Allograft Transplantation

Osteochondral allograft transplantation has been demonstrated to be a successful procedure in both the general population and among athletes. After a mean of 12.3 years of follow-up 75% of patients demonstrated significant improvement in clinical outcomes [66]. A systematic review demonstrated that survivorship was 86.7% at 5 years and 78.7% at 10 years [67–69]. In the general athletic population, return to sport was seen in 72–82% of patients at a mean of 11 months [64, 69–71]. One study evaluated the return to sport in basketball players. The study consisted of 11 basketball players with a total of 14 chondral lesions, the overall rate of return to sport 80%, and the average time to return to play 14 months (6–26 months). The average lesion size was 509 mm^2 [2] and the location of the lesion varied and included the femoral condyle, trochlea, and patella. Furthermore, this study found that there was no significant decline in athletic performance after return to sport [72].

32.7.4 Autologous Chondrocyte Implantation

Autologous chondrocyte implantation has been shown to have successful outcomes. One study evaluated a cohort of patients at a mean 6.2 years follow-up, and all patients demonstrated significant improvements in pain and function [73]. Kaplan–Meier survival analysis revealed that the survival rate was 78.2% at 5 years and 50.7% at 10 years.

In terms of return-to-sport outcomes, two systematic reviews have found that return to sport ranges from 82% and 84%, respectively [27, 64]. An additional study found a rate of 73%; however, they found that duration and frequency of exercise significantly decreased postoperatively. An additional study found that 64.5% of patients were able to return to sport at a competitive level [74]. They also showed that previous surgery was the biggest factor that dictated return to sport level in their cohort. No studies investigated the return to play after ACI in basketball players.

32.8 Conclusion

Focal chondral defects are common in athletes, especially basketball players. Symptomatic lesions can be addressed with conservative measures initially, but often surgical intervention is necessary but will depend on where the player is in the season. A range of surgical procedures are used based on chondral size and location, including abrasion chondroplasty, microfracture, OCA, OAT, and ACI. While microfracture has been the most studied technique in basketball players, OAT has been shown to have the highest rate of return to sport in all athletes, although the literature remains limited. Future studies are needed to evaluate other cartilage procedures specifically in basketball players.

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