41 Minimally Invasive Management of Osteochondral Defects to the Talus

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41.1 Introduction

An osteochondral defect (OCD) to the talus or, alternatively, osteochondral fracture of the talus represents a pathologic lesion of the articular cartilage and its subchondral bone. These lesions can occur in up to 70% of acute ankle fractures and sprains (Alexander and Lichtman 1980; Draper and Fallat 2000; Hintermann et al. 2000; Saxena and Eakin 2007). The quality of life of patients suffering from an OCD of the talar dome can be severely deteriorated, and an extensive diversity of interventions exists to treat these defects. Controversy remains amongst orthopaedic surgeons with reference to identifying *the* golden standard for primary defects and those defects that had failed prior surgical intervention(s). In order to aspire to identify optimal treatment protocols, multiple review articles and current concept studies have been published (van Bergen et al. 2008; Giannini and Vannini 2004; Hannon et al. 2014; McGahan and Pinney 2010; Murawski and Kennedy 2013; O'Loughlin et al. 2010; Savage-Elliott et al. 2014; Vannini et al. 2014; Wodicka et al. 2016; Zengerink et al. 2006). Moreover, a number of systematic reviews have been conducted over the course of the past 10 years (Donnenwerth and Roukis 2012; Loveday et al. 2010; Zengerink et al. 2010). More recently, the first systematic review investigating solely primary talar OCDs by Dahmen et al. (2018) concluded that due to the heterogeneity of the literature and the low level of methodological evidence of the included studies, none of the surgical procedures were identified to be superior to others. This indicates that since the systematic review of Zengerink et al. (2010) which included articles up to 2006, we still have not advanced significantly further 10 years later, illustrating that establishing a definite recognition of the clinically most effective treatment strategy for talar OCDs remains open to debate. Although it is clear that substantial debate persists with reference to the treatment of talar OCDs, one aspect orthopaedic surgeons do acknowledge is that the treatment of talar OCDs requires a minimally invasive management protocol. In this chapter, we will therefore present a historical perspective on talar OCDs, provide a critical insight into current conservative management and minimally invasive surgical treatment for primary defects

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M. N. Doral et al. (eds.), *Intraarticular Fractures*, https://doi.org/10.1007/978-3-319-97602-0_41

and those that had failed prior surgical intervention(s) and describe a promising arthroscopic internal fixation technique, known as the Lift, Drill, Fill and Fix (LDFF) technique.

41.2 Historical Perspective

The current rationale for treating talar OCDs commenced when Hunter (1743) stated that "From Hippocrates down to the present age, ulcerated cartilage is a troublesome disease; when destroyed, it is not recovered". In 1558 Ambroise Pare identified loose bodies in the knee joint, and it was almost 200 years later when Monro (1856) reported the presence of cartilaginous bodies in the talocrural joint. Paget (1870) further described the lesions investigating patients with knee pain, but Franz König (1887) was the first to coin the term *osteochondritis dissecans*, as he suggested that corpora libera originating from the articular surfaces of varying joints, amongst them the elbow and knee joint, were a consequence of necrosis accompanied by dissecting inflammation. Kappis (1922) noticed great similarity between lesions of the talocrural joint and the ones recognized in the knee, which led to the first referral of osteochondritis dissecans of the ankle. Ten years later, a talar intra-articular fracture was reported by Rendu (1932) having found resemblances to the osteochondritis dissecans as described by Kappis. Partially due to a publication by Rödén et al. (1953) which concluded that the great majority of the lesions presenting laterally on the talus were secondary to trauma, the definition of osteochondritis appeared to be a misnomer as inflammation was not considered to be the main contributing determinant for the development of a talar OCD. The scientific contribution of Berndt and Harty (1959) was of clinical significance in concluding that in addition to the lateral defects, medial osteochondral lesions were also caused by trauma. It has been accepted that a traumatic event appeared to be *the* major etiological factor. Berndt and Harty (1959) designated the lesion as a transchondral fracture to the talus. Frequently utilized descriptive diagnoses include talar dome fracture, flake fracture and osteochondral lesions, defects and fractures. Their classic article formed the clinical basis of our contemporary indications for surgery, and since 1959 an extensive range of treatment modalities have been developed and subsequently practiced thereafter.

41.3 Non-surgical Management

Non-surgical treatment of a symptomatic OCD can consist of a combination of the following options: cast immobilization, physiotherapy, restriction of sporting or working activities and administration of non-steroidal anti-inflammatory drugs (NSAIDs). The objective is to unload the damaged articular cartilage, thereby aiming at prevention of necrosis and reduction of joint oedema. Partially detached fragments might have the possibility to heal to the underlying bone when undergoing non-surgical management. It has been reported that skeletally immature patients show greater intrinsic healing capacity of immature articular cartilage. However, human and animal investigations are contradictory (Bauer et al. 1987; DePalma et al. 1966; Kim et al. 1991; McCullough and Venugopal 1979; Vasara et al. 2006; Wei et al. 1997; Wei and Messner 1999). A study by Reilingh et al. (2014) including only skeletally immature children with a chronic talar OCD concluded that eventually 92% of initially non-surgically treated children were dissatisfied with the treatment results and consequently were scheduled to undergo surgery. Despite success percentages of non-surgical treatment alone being reported to be substantially below 50%, it should in all cases be considered as the initial treatment option (Dahmen et al. 2018; Zengerink et al. 2010). More recently, Klammer et al. (2015) identified that 86% of the non-surgically treated minimally symptomatic talar OCDs were pain-free or less painful at the final follow-up at 2 years, and radiological assessment (MRI) revealed that 88% of the patients remained unchanged or even showed remission in terms of staging or lesion size. This might indicate that minimally symptomatic lesions corresponding to the lower Berndt and Harty (1959) grades, such as the grade I and II lesions, could potentially benefit to a greater clinical extent from non-surgical management than previously suspected.

41.4 Surgical Management

41.4.1 Arthroscopic Bone Marrow Stimulation (BMS)

O'Driscoll (1998) postulated that treatment options for damaged or lost articular cartilage can be grouped into four principles. It can be restored, replaced, relieved or resected. First-line, that is, primary surgical treatment for talar OCDs generally incorporates restoration of the articular cartilage and repose on the intrinsic capacity of the articular cartilage and the subchondral bone to heal itself. In line with this clinical train of thought is the management of talar OCDs by arthroscopic bone marrow stimulation (BMS). Preoperatively, a computed tomography (CT) scan can be taken (Fig. 41.1a). During arthroscopy the surgeon executes curettage of all the unstable cartilage as well as the present necrotic subchondral bone—in the case of the presence of subchondral cysts, these are opened and curetted—after which the subchondral bone is perforated by means of drilling or microfracturing. This allows intraosseous blood vessels to disrupt so that multipotent mesenchymal cells can migrate into the defect thereby inducing the formation of a fibrin clot, which will subsequently transform into fibrocartilage—articular cartilage/collagen type (O'Driscoll 1998). At follow-up, a postoperative CT scan can be taken (Fig. 41.1b). The most important advantages of BMS procedures are the relative ease and minimal invasiveness of the technique, the quick recovery and thus the fast return to sports or work. Therefore, this particular technique is currently regarded as the golden standard for primary talar osteochondral defects. There are, however, a number of concerns when critically analysing BMS. Firstly, a number of systematic reviews on the outcomes of BMS have been conducted, and the success rates for primary talar OCDs are reported around 79–80%, according to Dahmen et al. (2018) and Donnenwerth and Roukis (2012). This shows that yet there is substantial room for improvement, which could be related to a number of other elements to be considered associated with the arthroscopic BMS technique. Firstly, microfracturing does not aim at the preservation of a hyaline cartilage layer, but rather promotes the formation of fibrocartilage which decreases in quality over time, resulting in osteoarthritic

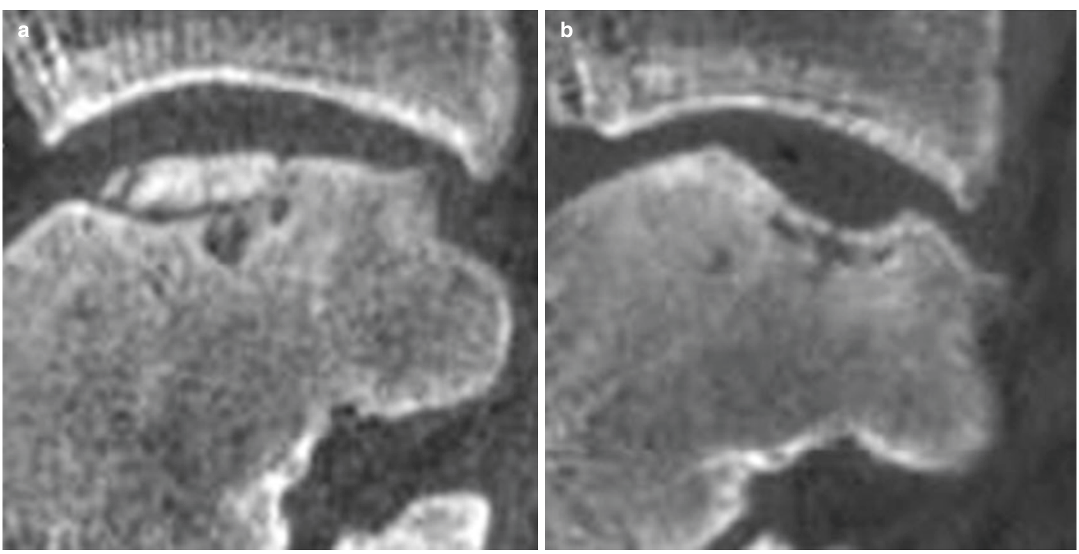

Fig. 41.1 Sagittal CT scans of a talar osteochondral defect of the medial dome (right ankle). **(a)** Preoperative CT scan. **(b)** One-year postoperative CT scan after arthroscopic debridement and bone marrow stimulation (same ankle)

changes (Lynn et al. 2004). This is supported by evidence from several studies (Ferkel et al. 2008; Lee et al. 2009; van Bergen et al. 2013). Progression of ankle osteoarthritis was observed in 33–34% of the patients after arthroscopic debridement and bone marrow stimulation of the talar osteochondral defects at mean follow-up terms of 71 and 141 months, in the studies of van Bergen et al. (2013) and Ferkel et al. (2008), respectively. Moreover, Reilingh et al. (2016) found that the subchondral bone plate was depressed in 74% of the cases at 1-year follow-up on computed tomography analysis, and second-look arthroscopy revealed that 12 months postoperatively, 40% of the defects had incompletely healed with fibrocartilage (Lee et al. 2009). Additionally, since type I articular cartilage demonstrates inferior wear characteristics, deterioration of the natural ankle joint congruency is associated with repaired articular surface degradation. This poses the subsequent question as to what extent natural ankle joint congruency can be mirrored after using a BMS procedure (Marsh et al. 2002; Qiu et al. 2003; Stufkens et al. 2010). Another question arising is to what extent it is feasible to perform BMS for defects with sizes larger than 1.5 cm in diameter—alternatively 150 mm^2 or 1.5 cm^3. This question has interested clinical researchers, and initially it was postulated that the cut-off point for performing a BMS procedure was 15 mm (in diameter), as studies by Choi et al. (2009) and Chuckpaiwong et al. (2008) indicated that beyond this size, inferior clinical outcomes were observed. Moreover, in a more recent study, a systematic review by Ramponi et al. (2016) shows that the cut-off point might be even lower, around the size of 107.4 mm^2 in area or 10.2 mm in diameter which offers novel insight into the critical defect size for performing BMS procedures in order to assure successful clinical outcome.

41.5 Retrograde Drilling

Another form of minimally invasive surgery to treat osteochondral defects of the talus is performing a retrograde drilling procedure. Similarly to the BMS procedures, it aims to stimulate the intrinsic restoration of the articular cartilage, and it is executed under radiographic control, thereby avoiding injury to the articular cartilage as it is performed in a retrograde, transtalar manner. No articular cartilage is removed, and via a posterolateral approach or through the sinus tarsi, the talar OCD can be reached after which a Kirschner wire is advanced toward the lesion and subchondral drilling will occur. A major indication for a retrograde drilling procedure is the presence of intact intra-articular talar hyaline cartilage and/or the presence of a large subchondral cyst. Another indication for performing this non-transarticular procedure is when the osteochondral defect cannot be reached via the common anteromedial and anterolateral arthroscopic portals (van Dijk and van Bergen 2008). Additional insertion of cancellous bone grafts into the defect may be a valid option, should subchondral cysts of extensive nature be existent. In a case control study by Kono et al. (2006), retrograde drilling in 30 patients showed promising results in terms of arthroscopic assessment 1 year postoperatively due to the fact that the retrograde drilling group achieved greater improvement in the articular cartilage condition in comparison with 19 patients that were treated with a transmalleolar (antegrade) drilling approach.

41.6 Osteochondral Fragment Fixation

41.6.1 Surgical Technique: Arthrotomy

In order to tackle the limitations of the BMS technique, such as osteoarthritic advancement, an irregular subchondral bone plate, the transformation of a fibrin clot into fibrocartilage instead of hyaline cartilage and a cut-off point for maximum lesion size, internal fixation of the osteochondral defect fragment has been described as an alternative surgical technique for treating talar OCDs. The ideal indication for internal fixation is a primary, large (anterior-posterior or medial-lateral diameter > 10 mm on computed tomography) symptomatic osteochondral defect of the talus in patients with persistent complaints for more than 1 year without presence of osteoarthritis (van Dijk et al. 1997). For both the open and arthroscopic technique, a preoperative sagittal CT scan is taken (Fig. 41.2a). We have developed an open surgical fixation technique, in which a medial or lateral arthrotomy is utilized with optional malleolar osteotomy in order to allow for an appropriate visibility of the osteochondral defect and to create optimal working access. Thereafter, the talar OCD is exposed, in order to create an osteochondral flap with the use of a knife. It is essential that the posterior side of the osteochondral flap is in all times left intact, as this acts as a lever. By means of a chisel, the flap will be lifted (like the hood of a car), and after this the attached bone of the fragment is debrided, and the osteosclerotic area of the bed and the bone flake of the osteochondral fragment are drilled in order to induce revascularization. In case of the presence of (a) subchondral cyst(s), its contents must be curetted and the circumference of its sclerotic wall drilled. In order to fill the debrided and drilled fragment, one harvests cancellous bone from the distal tibial metaphysis or, alternatively, from the medial malleolus. Prior to fixating the fragment, one must pay close attention to correctly aligning the osteochondral fragment. The fixation of the fragment procedure can be executed by means of a permanent screw or an absorbable screw. The screws should be positioned under the articular surface.

41.7 Surgical Technique: Arthroscopic Lift, Drill, Fill and Fix (LDFF) Procedure

Evidently, the open internal fixation technique as described above does not, to a great extent, follow the principles of minimally invasive surgery. We therefore developed an arthroscopic procedure in order to achieve a lower complication rate and a faster rehabilitation course (Zengerink and van Dijk 2012). The arthroscopic procedure consists of the following steps which will be elaborated further below: Lift, Drill, Fill and Fix (LDFF) (Kerkhoffs et al. 2016). The operation is carried out as an outpatient procedure either under general or spinal anaesthesia, and the patients are placed in a supine position with slight elevation of the ipsilateral buttock. A support is placed at the contralateral side of the pelvis of the patient. The heel of the affected foot rests on the very end of the operating table so that the orthopaedic

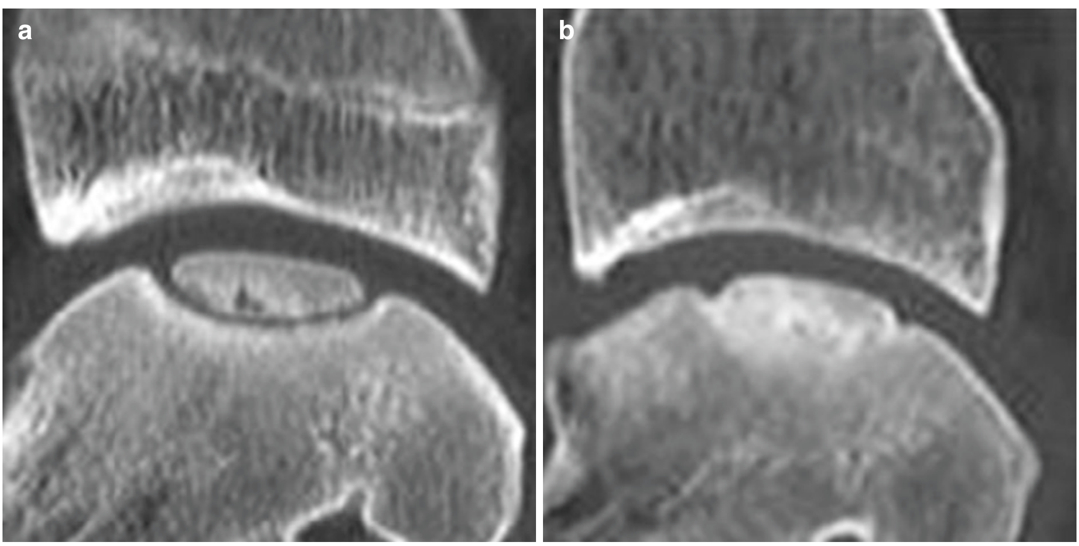

Fig. 41.2 Sagittal CT scans of a talar osteochondral defect of the medial dome (right ankle). (**a**) Preoperative CT scan. (**b**) One-year postoperative CT scan after arthroscopic Lift, Drill, Fill and Fix (LDFF) (same ankle)

surgeon has the ability to dorsiflex the ankle to the full extent by leaning against the foot sole, and because of this particular position, the table can be utilized as a lever when maximal plantar flexion is necessary. When required, the surgeon will use a non-invasive soft-tissue distraction device. The talocrural joint is visualized by means of the common anteromedial and anterolateral arthroscopic portals. Subsequent to this, the distal tibial rim is removed in order to facilitate optimal ankle joint access, and with a probe, the exact location of the talar OCD is identified. In order to prepare for the first step of the LDFF technique, a beaver knife is used to create a sharp osteochondral flap (Fig. 41.3a, b)**.** Just as for the open arthrotomy procedure described above, the posterior side of the flap should be left intact and can then be used as a lever, allowing for an anterior lift with use of a chisel (*lift*) (Fig. 41.3c). The second step of the procedure which aims at the promotion of revascularization, *drill*, consists of debriding and drilling the attached bone of the osteochondral flap and the osteosclerotic area of the bed (Fig. 41.3d). It must be stated that, as with the open procedure, it is important that any subchondral cysts present should also be debrided and punctured. In the third step (*fill*), the debrided and drilled defect is filled with cancellous bone harvested from the distal tibial metaphysis by a chisel. Bony flakes are then transported into the defect using a grasper (Fig. 41.3e, f). The ultimate step (*fix*) is fixating the fragment, and this is only performed after having achieved a correctly aligned osteochondral flap. For fixation, Bio-Compression Screw(s) (Arthrex Inc., Naples, USA) or multiple chondral darts (Arthrex Inc., Naples, USA) are utilized (Fig. 41.3g, h). Darts and screws can also be combined in order to create a sufficient fixation method.

41.8 Osteochondral Fragment Fixation: Postoperative Management

Subsequent to finishing the arthroscopic LDFF technique as well as the open fixation procedure, a short-leg, non-weight-bearing cast is applied for a period of 4 weeks postoperatively. After this 4-week period of immobilization, the foot is placed in a short-leg walking cast in a neutral flexion and neutral hindfoot position, with full

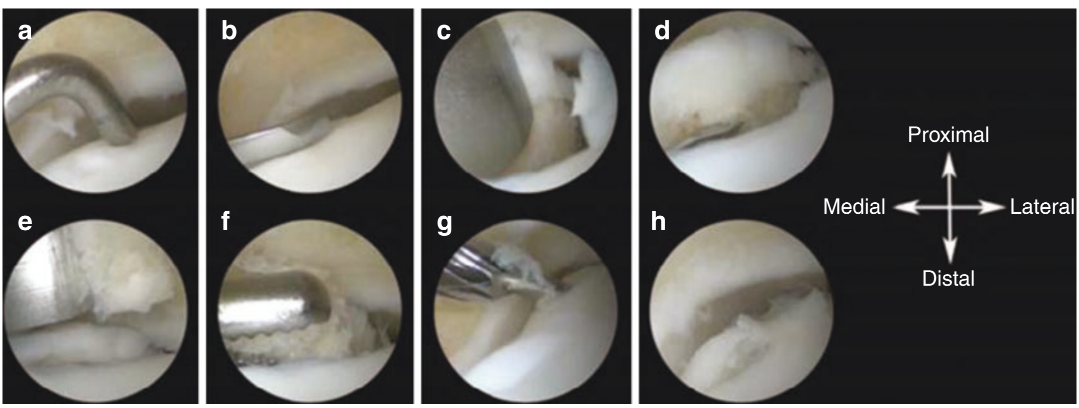

Fig. 41.3 Arthroscopic images of the lift, drill, fill and fix (LDFF) procedure performed on a medial osteochondral lesion of the left talus. **(a)** The cartilage is palpated with a probe to identify the exact location of the talar OCD, while the ankle is in plantarflexion. **(b)** By means of the beaver knife, the orthopaedic surgeon creates an osteochondral flap. **(c)** The flap is lifted by a chisel (lift). **(d)** While taking care not to loosen the iatrogenically created osteochondral fragment at its posterior side, the bony flake of the fragment is drilled with a Kirschner wire and a shaver blade in order to promote revascularization (drill). **(e)** A 4 mm chisel is used to harvest cancellous bone from the distal tibial metaphysis. **(f)** Subsequently, the cancellous bone harvest is transported into the defect by means of an arthroscopic grasper until one achieves adequate filling (fill). **(g)** To prepare for the fixation step, a cannulated system is used to allow a predrilling and tapping of a compression screw. **(h)** The orthopaedic surgeon places an absorbable screw 1 to 2 mm recessed relative to the surrounding hyaline cartilage surface. Because of its diameter and substantial compression strength, a noncannulated screw is of preference (Figure reproduced from Reilingh and Kerkhoffs (2015))

weight bearing allowed. At 8 weeks postoperatively, the cast is removed. Physical therapy is started to assist in functional recovery and extend to full weight-bearing in approximately 2 weeks. The objective is to adhere to an appropriate personalized after-treatment in which it is key to focus on proprioception, balance, ankle functionality, in order to work towards a normal ambulation pattern, achieve full strength and, then optionally, depending on the patient, running, and sport-specific training. Subsequent to this, return to sport can be planned.

41.9 Osteochondral Fragment Fixation: Results

In 2014, a retrospective case series was published on nine children after an internal open fixation with a median follow-up of 4 years (Reilingh et al. 2014). A good outcome score was reported in 78% of the cases, and the median postoperative American Orthopaedic Foot and Ankle Society (AOFAS) score was 95 (Berndt and Harty 1959; Kitaoka et al. 1994). No progressive degenerative changes on final follow-up radiographs were observed. Other studies have reported on the outcome after an open fixation procedure in adults (Kumai et al. 2002; Schuh et al. 2004). Kumai et al. (2002) reported an excellent success rate of 89% for the fixation with bone pegs of large, loose fragments in 27 patients with a mean follow-up of 7 years. Thirteen of the fourteen patients (93%) engaged in sporting activities prior to surgery were able to resume these activities postoperatively. In a retrospective case series of 20 patients, Schuh et al. (2004) reported a 100% success rate after a mean follow-up of 46 months.

When analysing the results of the arthroscopic LDFF procedure, a recent publication reports the short-term clinical outcomes for seven patients with primary talar OCDs at a mean follow-up of 12 months (Kerkhoffs et al. 2016). In all patients LDFF led to significant improvements in the AOFAS and numeric rating scales (NRS) of pain at rest and during walking (Salaffi et al. 2007). All seven patients indicated that they were satisfied and that they would undergo the same surgery again. Radiologically, it became clear that on the final radiographs at 12 months postoperatively, five of the seven patients showed remodelling and progressive bone ingrowth (Fig. 41.2b). Although these clinical and radiological results indicate that a minimally invasive arthroscopic “Lift, Drill, Fill and Fix” procedure for primary talar OCDs is a promising intervention, longer follow-up times are needed. Additionally, more patients need to be included for a larger statistical power, and it is of paramount importance to investigate the arthroscopic LDFF procedure in a prospective comparative randomized manner. Nonetheless, it is of clinical relevance to realize that in case of failure after an open or arthroscopic fixation procedure, other surgical procedures, such as BMS, are still to be regarded as options of choice.

41.10 Minimally Invasive Replacement Surgery for Talar OCDs after Failed Primary Surgery

Arthroscopic BMS and fixation techniques are considered to be optimal for treating primary osteochondral defects of the talus. However, if the desired restoration of the articular cartilage and its subchondral bone fail in combination with persisting ankle symptoms, more extensive surgical procedures should be considered. For treating these challenging defects, one can, again, adhere to one of the other four postulations of O’Driscoll (1998), namely, that damaged or lost articular cartilage can be replaced, instead of restored. An adequate shared decision-making process should be initiated to determine an appropriate surgical intervention (Lambers et al. 2018). Surgery after failed prior surgical treatment is generally less minimally invasive as more aggressive types of surgical interventions are administered, such as osteochondral autologous transplantation systems (OATS), mosaicplasty, osteochondral allograft transplantations and matrix-induced autologous chondrocyte implantation (MACI) techniques. These treatment strategies except for the latter are conventionally performed in an open manner, as the talar OCD is reached via medial or lateral osteotomies and plafondplasties.

41.11 Arthroscopic Cartilage Transplantation: Technique and Results

Matrix-associated autologous chondrocyte implantation (MACI) techniques and autologous chondrocyte implantation (ACI) techniques are similar cartilage transplantation techniques. However, when explaining the general technique, it should be mentioned that the arthroscopic MACI procedure differs slightly from the classic arthroscopic ACI procedure in terms of surgical technical details. Both techniques consist of two steps, and during the first stage, the surgeon assesses the talar OCD via the anterolateral and anteromedial portals and evaluates the status of the articular cartilage and its underlying bone. The lesion is accurately shaved and the diseased tissue removed, after which the chondrocytes are either harvested from the margin of the lesion, from the anterior margin of the tibia or from a potentially detached osteochondral fragment. The harvested chondrocytes are then expanded in a laboratory, and subsequent to this, these are seeded on a hyaluronic acid scaffold. When performing the second-generation autologous chondrocyte implantation technique (MACI), the harvested chondrocytes will be cultured and seeded on a bioabsorbable, porcine type I/III collagen scaffold for 1–3 days. After the expansion, the second-step arthroscopic procedure occurs. In the ACI procedure as described by Giannini et al. (2008), the second-step arthroscopy consists of ACI implantation via specifically designed instrumentation (Citieffe, Calderara di Reno, Bologna, Italy). Inserted via the same arthroscopic portals is a stainless steel cannula with a window on one side and a positioner on the other side so that the scaffold can be delivered to the lesion. After having filled the defect with the engineered biomaterial consisting of the harvested chondrocytes, the scaffold was made to fill the lesion. For the second step of the arthroscopic MACI procedure, as described by Aurich et al. (2011), the matrix is inserted with arthroscopic forceps and subsequently placed onto the defect, after which it is sealed with fibrin glue.

The first report was a prospective case series describing a completely arthroscopic autologous chondrocyte implantation procedure in the ankle joint, published by Giannini et al. (2008). In this study, 46 patients underwent surgery, of which 16 were previously operated on with treatments such as BMS or mosaicplasty. At a mean follow-up of 36 months, the mean AOFAS score was 87, and the histological evaluations of the biopsies highlighted the presence of all the components of hyaline cartilage. A more recent study on arthroscopic ACI by the same author group showed similar clinical results at midterm follow-up of 87 months, and it was observed that the failed implants included in this patient group demonstrated fibrocartilaginous tissue (Giannini et al. 2014). However, this study might have included the same patients as were analysed in the publication of 2008. The arthroscopic MACI procedure was researched in a publication by Aurich et al. (2011), and of the 18 patients that were included, there were 19 talar OCDs, of which 11 cases had had prior surgical treatment consisting of either (arthroscopic) BMS, prior ACI or an open reduction internal fixation due to an ankle fracture. The arthroscopic MACI yielded a success rate of 64% according to the AOFAS scale, and at a mean follow-up of 25 months, 56% of the patients were able to return to sports at the same level as preoperatively. Although it appears that successful results are achieved by means of an arthroscopic first- or second-generation autologous chondrocyte implantation technique, it should be noted that disadvantages of the MACI are the high costs, the complexity of the technique, and, in most cases, the need for two surgical procedures.

41.12 Minimally Invasive Osteochondral Transplantation Procedures

Earlier in the chapter, we described the procedure of retrograde drilling. However, in case of advanced subchondral lesions with or without the existence of a (large) subchondral cyst, the surgeon may choose to insert a retrograde autologous cancellous bone plug in addition to retrograde drilling. A study of nine patients who underwent arthroscopic retrograde cancellous bone plug transplantation (harvested from the ipsilateral iliac crest) revealed that all patients had nearly normal International Cartilage Repair Society (ICRS) scores at 1-year post-surgery as assessed by second-look ankle arthroscopy (Smith et al. 2005).

Osteochondral autograft transfer systems (OATS) are also performed when treating large, cystic lesions, after failed prior surgical treatment. When performing the classic OATS procedure, the talar OCDs are reached after having arthroscopically assessed the talar lesion either via malleolar osteotomies or via plafondplasties. In order to perform this open treatment less invasively, different surgical techniques have been developed (Largey et al. 2009; Sasaki et al. 2003). The studies reported here utilize an OATS procedure using a transmalleolar approach. The technique consists of harvesting the osteocartilaginous grafts from the ipsilateral femoral condyle or the lateral trochlear edge, after which they are inserted into the posteriorly located defects via a transmalleolar bone tunnel subsequent to the completion of transmalleolar drilling guided by a pin. From the study of Largey et al. (2009) including limited numbers of patients and Sasaki et al. (2003), it can be concluded that an osteochondral autograft procedure with a transmalleolar approach is technically feasible. Three out of five patients showed good to very good results, while the other two patients complained of donor-site morbidity or functional deterioration of the ankle (Largey et al. 2009). The advantages of this surgical approach are that it is less invasive than a lateral or medial malleolar osteotomy and that compared with the classic OATS procedure, earlier range of motion exercises and weight-bearing is permitted. The disadvantages are the secondary donor-site morbidity associated with the harvesting procedure and the complexity of the procedure due to the positioning of the transmalleolar bone tunnel. Comparative studies are of paramount importance to assess the clinical advantage and efficacy of this new surgical technique.

41.13 Conclusion

Adequate management of OCDs of the talus is still a challenging concern and raises daily questions in the clinics. Current practice consists of non-surgical management and/or a surgical modality. Determining the most appropriate surgical modality for the individual patient depends on a high number of (prognostic) factors such as lesion size, location and stage, primary surgical management or failed previous surgery, age of the patient and acute or chronic nature and displacement, and therefore, a high number of surgical treatment strategies are currently practiced in order to tackle the (combination of) individual factors. In this chapter, an insight into the historical perspective of talar OCDs was provided, and a critical update on the non-surgical management and minimally invasive surgical treatment for primary osteochondral defects and those that had failed prior surgical treatment was presented. Additionally, a promising minimally invasive internal fixation treatment strategy, the arthroscopic “Lift, Drill, Fill and Fix” (LDFF) procedure was described.

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