Original Article

"Push and Park" Microdrilling Technique for Chondral Lesions of the Patella: A Technical Note

Santosh Sahanand[1], Girinivasan Chellamuthu[2,3,4], David V. Rajan[1]

[1]Department of Arthroscopy and Sports Medicine, Ortho One Orthopaedic Specialty Centre, [2]Faculty of Research, Department of Biotechnology, Karpagam Academy of Higher Education, [3]Department of Orthopaedics, Orthopaedic Research Group, Coimbatore, [4]Department of Orthopaedics, Saveetha Medical College and Hospital, Saveetha Institute of Medical and Technical Sciences, Chennai, Tamil Nadu, India

Abstract

Background: The most used treatment modality for chondral lesions of the patella, particularly when the lesion is <2 cm^2, is microdrilling. However, reduced working space and mobility of the patella make this procedure technically difficult. To bypass this technical difficulty, we describe a simple technique of "Push and park" for microdrilling of the chondral lesions of the patella. **Materials and Methods:** Patients operated on by this technique in 2021 were followed for 1 year. Patients operated for magnetic resonance imaging-proven International Cartilage Repair Society grade III and IV patellofemoral chondral lesions (PFCLs) that are localized and <2 cm^2 with or without other concomitant knee pathologies were included. The functional outcomes were evaluated using the Tegner Lysholm score and Kujala score. **Results:** Twenty-one patients were included in the study. Of these, 7 cases had isolated PFCL, 8 cases had associated medial meniscal posterior horn root tears, and the remaining 6 cases had anterior cruciate ligament injuries. The mean follow-up period was 14 (±2) months. The average age was 41 (±7) years. We had 12 female and 9 male patients. The Tegner Lysholm and Kujala scores improved significantly in all the patients at 1-year postsurgery (P = 0.035 and P = 0.026, respectively). **Conclusion:** We have described a simple and reproducible technique for microdrilling of difficult-to-access patellar lesions. When used appropriately, the technique can be a cost-effective method of managing the chondral lesions of the patella.

Keywords: Chondral lesions, knee arthroscopy, micro drilling, microfracture, patella

Introduction

Cartilage lesions of the knee are one of the most common conditions encountered in clinical practice. They present as knee pain causing limitation of day-to-day activities. They commonly involve the medial femoral condyle and patellofemoral joint.[1] In an analysis of 25,124 knees, 60% of them had cartilage lesions, of which 36% were patellofemoral chondral lesions (PFCLs) and 34% were medial femoral condylar lesions.[2] In athletes, PFCLs account for 18%–37% of the chondral lesions.[3]

The management options for chondral defects include arthroscopic microdrilling, microfracture (MF), autologous chondrocyte implantation, osteochondral autograft transplantation, and osteochondral allograft transplantation.[1] When compared to the management of tibiofemoral chondral defects, the management of PFCL is quite challenging because of the peculiar anatomy of the patellofemoral joint. There is a high shear force in this joint. Furthermore, the joint space is relatively less, and patellar mobility is limited for arthroscopic management.[4] The most used treatment modality for chondral lesions of the patella, particularly when the lesion is < 2 cm^2, is an MF or microdrilling (MD).[5,6]

However, reduced working space makes this procedure technically difficult. Special instruments such as angled awls or flexible drills are needed or a retrograde approach can be attempted.[7] To bypass this technical difficulty, we developed a simple "Push and park" microdrilling technique for the chondral lesions of the patella. In this article, we have

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Address for correspondence: Dr. Girinivasan Chellamuthu, Orthopaedic Research Group, Coimbatore, Tamil Nadu, India.
E-mail: giri.c.nivasan@gmail.com

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described the technique and the results of MD of the patella using the technique.

Materials and Methods

This is a retrospective single-center study from January 2020 to December 2020. Institutional ethical committee approval was obtained for the study. The inclusion criteria are patients in the age group between 18 and 65 years, operated for magnetic resonance imaging-proven PFCL with or without other concomitant knee pathologies such as anterior cruciate ligament (ACL) injury, medial meniscal posterior horn root (MMPHR) tear, and posterior cruciate ligament injury. Only patients who consented to the study were included. Patients with International Cartilage Repair Society (ICRS) classification - grade III and IV cartilage lesions (acute and chronic defects) of the patella that are localized and < 2 cm^2 were included in the study. Patients with larger defects or lesser ICRS grades were excluded from the study. Professional sports people were also excluded from the study. Patients were followed up the next year. The functional outcomes were evaluated using the Tegner Lysholm score[8] and Kujala score[9] for patellofemoral symptoms.

Surgical technique

No special instrument is needed for this technique. Surgeries were performed under spinal anesthesia. The patient was placed in a supine position with a leg support on the side. Parts were prepped with povidone-iodine solution and draped in a sterile manner. Through standard anterolateral and anteromedial portals, the patellofemoral joint is inspected with the knee in extension. Other intra-articular pathologies, if any, are addressed before this procedure. The facet with the chondral defect is identified. The patella is *pushed* to the same side of the lesion by applying digital pressure as we do in the patellar glide test. The unaffected facet of the patella is then *parked* on the femoral condyle on the affected side, with the patella in a tilted position, by the assistant [Figures 1 and 2]. Under arthroscopic visualization, the defect is prepared. This involves the debridement of unstable cartilage. The base is curetted using a ring curette. The rim of the defect is made perpendicular so that it wells the clot formed after MD. MD is then carried out using 1.2 mm K wires introduced percutaneously perpendicular to the defect through the corresponding gutter under arthroscopic visualization. During drilling, to avoid the inconvenience of the drill hitting the operating table, while drilling the lateral facet, the leg can be placed on a bolster [Figure 2] or held high by an assistant, whereas while drilling the medial facet, the leg should be held high by the surgeon against the abdomen [Figure 3]. Drill holes are limited to a depth of 4 mm. Drill holes are made from the periphery to the center of the defect at an interval of 3–4 mm. Saline is then drained out and the portals are sutured without drain. K wires can be marked at 4 mm to accurately drill to 4-mm depth. Central patellar lesions can be difficult to manage – each half should be drilled by gliding the patella to the corresponding side.

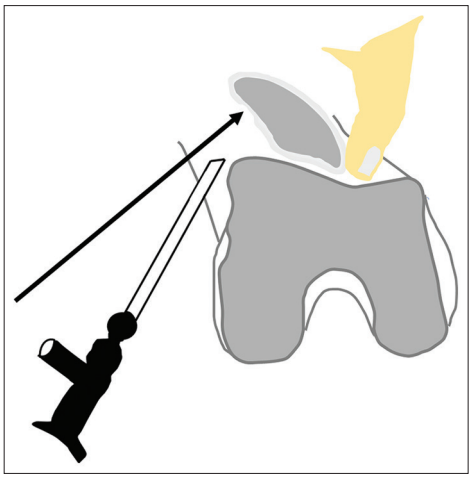

Figure 1: Line diagram explaining the Push and Park micro drilling technique

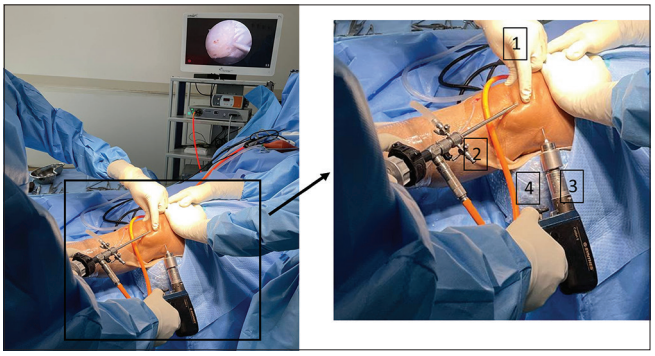

Figure 2: Intraoperative picture showing Push and Park micro drilling technique for the lateral facet of the patella: (1) Assistant pushing and parking the patella. (2 and 3) Surgeon arthroscopically visualizing and microdrilling the lateral patellar facet with the knee in extension, (4) Bolster under knee, helps in positioning the drill

Figure 3: Intraoperative picture showing Push and Park micro drilling technique for the medial facet of the patella - the leg is held high by the surgeon. The assistant is pushing and parking the patella while the surgeon drills under arthroscopic visualization

Statistical analysis

The data were analyzed using SPSS versioin 26 (IBM, Chicago, Illinois, USA). Categorical variables were presented as frequency and percentages, continuous variables were presented as mean ± standard deviation. An independent sample *t*-test was used to measure the association between the Variables at different times. The association between the categorical variables was measured using Chi-square/Fisher's exact test. $P < 0.05$ was considered statistically significant.

Results

Twenty-four patients were operated on during 1 year. Three patients were lost to follow-up. The remaining 21 patients were included in the study. Of these, 7 cases had isolated PFCL, 8 cases had associated MMPHR tears, and the remaining 6 cases had ACL injuries. The mean follow-up period was 14 (±2) months. Eight patients had lesions in the lateral facet, one had a central lesion, and the remaining five had medial patellar facet lesions. The average age was 41 (±7) years. We had 12 female and 9 male patients. The mean preoperative Tegner Lysholm score was 56 (±5). The mean preoperative Kujala score was 53.6 (±8). The postoperative mean Tegner Lysholm and Kujala scores are 94 (±3) and 92.4 (±4), respectively. The Tegner Lysholm and Kujala scores improved significantly in all the patients at 1-year postsurgery ($P = 0.035$ and $P = 0.026$, respectively). The demographic details are listed in Table 1. The outcome scores are *P* values are listed in Table 2.

Discussion

We have described a simple reproducible technique for managing patellar chondral lesions of <2 cm in size. The Kujala scores at the end of 1 year are encouraging. The challenges in MF for patellar lesions are 1. Mobility of the patella compromising the accuracy of the technique and 2. Limited working space of the patellofemoral joint. We have addressed these two challenges by pushing the patella, parking the opposite facet on the femoral condyle, and using percutaneous K wires to drill.

Table 1: Demographic details of patients

Demographics	Numbers
Included patients	21
Male/female	9/12
Distribution of lesions	
Lateral patellar facet	8
Central	1
Medial patellar facet	5
Associated lesions	
ACL tear	6
Medial meniscal root tear	8
Mean age (years)	41±7

Table 2: Outcome scores of included patients

	Tegner Lysholm score	Kujala score
Preoperative	56±5	53.6±8
Final follow-up	94±3	92.4±4
P	0.035	0.026

Kenneth Pridie described the technique of MD as early as 1959 when arthroscopy was not prevalent.[10] His 11-line publication was the start of marrow stimulation methods to treat chondral lesions. Steadman *et al*.[11,12] were one of the earliest to describe the technique of MF for chondral lesions of the knee. They proposed the use of angulated awls (Steadman awls) to create MF in the patella. Even with the use of angulated awls, the procedure is difficult and the accuracy of making Micro fractures can be compromised leading to injury to the chondral base plate and subsequent poor outcomes.

Yip *et al*.[13] described the House on Stilts technique wherein the patella is fixed on the femoral condyles using transarticular K wires in the periphery of the chondral defect. Although this technique solves the problem of patellar mobility, the working space is further cramped by adding transarticular K wires. The femoral chondral damage also cannot be ignored.

There has been a recent increase in the practice of MD when compared to MF. MD was attributed to creating thermal necrosis which led to its decreased popularity. However, in a recent systematic review, Kraeutler *et al*.[14] have concluded that drilling increased the access to the marrow and resulted in higher volumes of repair tissue when compared to MF. Drilling has been found to cause less damage to the subchondral bone when compared to the MF technique. MF causes impaction fracture which obscures the release of marrow.

The place of MD in the treatment algorithm of chondral injuries is limited to correct indications that are described above.[15] The technique is cost-effective and simple. This technique induces the formation of only fibrocartilage. The durability of this tissue for longer periods has been doubtful, particularly when the size of the lesion is larger than 2 cm^2. There are some limitations to our study. This is a retrospective study. The power of the study was not calculated to determine the sample size. The sample size was small, and we did not have a control arm. However, since our study describes only an easier technical modification for MD and did not aim to validate MD as such these limitations could be ignored. Furthermore, in this study, we have had patients only with acute traumatic and degenerative chondral defects of the patella with no considerable malalignments. In young patients with malalignment, correction of malalignment should be considered along with management of chondral defects.

Conclusion

We have described a simple and reproducible technique for microdrilling of difficult-to-access patellar lesions. When used

appropriately, the technique can be a cost-effective method of managing the chondral lesions of the patella.

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Conflicts of interest

There are no conflicts of interest.

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