Chondral Disease of the Knee
Chondral Disease of the Knee

A Case-Based Approach

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Contents

Introduction to Case Studies ........................................ vii

1 Osteochondritis dissecans of the medial femoral condyle with documented long-term natural history .......... 1

2 Avascular necrosis .................................................. 4

3 Unstable in situ osteochondritis dissecans of the medial femoral condyle .............................................. 6

4 Unstable in situ osteochondritis dissecans of the medial femoral condyle .............................................. 10

5 Concomitant medial meniscus tear and focal chondral defect of the medial femoral condyle ...................... 14

6 Isolated focal chondral defect of the medial femoral condyle ................................................................. 17

7 Symptomatic focal chondral defect of lateral femoral condyle ................................................................. 20

8 Isolated small grade IV medial femoral condyle chondral lesion .............................................................. 23

9 Isolated medial compartment osteoarthritis ..................... 25

10 Unicompartmental bipolar disease ................................. 28

11 Medial femoral condyle focal chondral defect .................. 31

12 Lateral femoral condyle focal chondral defect .................. 35
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Focal chondral defect of the medial femoral condyle and patella</td>
<td>38</td>
</tr>
<tr>
<td>14</td>
<td>Lateral femoral condyle osteochondritis dissecans</td>
<td>42</td>
</tr>
<tr>
<td>15</td>
<td>Focal chondral defect of the lateral femoral condyle</td>
<td>46</td>
</tr>
<tr>
<td>16</td>
<td>Contained focal chondral defect of the medial femoral condyle</td>
<td>50</td>
</tr>
<tr>
<td>17</td>
<td>Contained focal chondral defect of the medial femoral condyle</td>
<td>55</td>
</tr>
<tr>
<td>18</td>
<td>Osteochondritis dissecans of the medial femoral condyle</td>
<td>58</td>
</tr>
<tr>
<td>19</td>
<td>Osteochondritis dissecans of the lateral femoral condyle</td>
<td>62</td>
</tr>
<tr>
<td>20</td>
<td>Uncontained focal chondral defect of the lateral trochlea</td>
<td>66</td>
</tr>
<tr>
<td>21</td>
<td>Failed prior fresh osteochondral allograft of the medial femoral condyle</td>
<td>70</td>
</tr>
<tr>
<td>22</td>
<td>Lateral meniscus deficiency</td>
<td>73</td>
</tr>
<tr>
<td>23</td>
<td>Prior medial meniscectomy and focal chondral defect medial femoral condyle</td>
<td>76</td>
</tr>
<tr>
<td>24</td>
<td>Failed anterior cruciate ligament reconstruction with medial meniscus deficit</td>
<td>80</td>
</tr>
<tr>
<td>25</td>
<td>Advanced patellofemoral arthritis</td>
<td>84</td>
</tr>
<tr>
<td>26</td>
<td>Multiple chondral defects</td>
<td>87</td>
</tr>
<tr>
<td>27</td>
<td>Traumatic patellar instability with focal chondral defect of the patella</td>
<td>91</td>
</tr>
<tr>
<td>28</td>
<td>Focal chondral defect patella</td>
<td>95</td>
</tr>
<tr>
<td>29</td>
<td>Focal chondral defect medial femoral condyle and varus alignment</td>
<td>98</td>
</tr>
<tr>
<td>30</td>
<td>ACL deficiency with symptomatic trochlear and medial femoral condyle chondral lesions</td>
<td>102</td>
</tr>
<tr>
<td>31</td>
<td>Focal chondral defect of the medial femoral condyle in a previously meniscectomized knee</td>
<td>107</td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>32 Focal chondral defect lateral femoral condyle, prior lateral meniscectomy, and small focal chondral defect lateral tibial plateau</td>
<td>111</td>
<td></td>
</tr>
<tr>
<td>33 Bipolar focal chondral defects of the patellofemoral joint with patellar instability</td>
<td>116</td>
<td></td>
</tr>
<tr>
<td>34 Bipolar focal chondral defects of the patellofemoral joint</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>35 Lateral compartment tibiofemoral degenerative arthrosis</td>
<td>124</td>
<td></td>
</tr>
<tr>
<td>36 Isolated patellofemoral arthritis</td>
<td>128</td>
<td></td>
</tr>
<tr>
<td>37 Posttraumatic medial femoral condyle defect, varus instability, and deformity with significant motion loss</td>
<td>132</td>
<td></td>
</tr>
<tr>
<td>38 Chondral defects with prior medial and lateral meniscectomy and varus alignment</td>
<td>138</td>
<td></td>
</tr>
<tr>
<td>Index</td>
<td>143</td>
<td></td>
</tr>
</tbody>
</table>
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Introduction to Case Studies

The illustrated case studies were prepared to help solidify the decision-making required for patients who are diagnosed with chondral disease of the knee. The cases are organized by level of complexity, taking into consideration substantial comorbidities such as tibiofemoral and patellofemoral malalignment, ligament disruption, and meniscal deficiency. The cases are presented in increasing level of difficulty based upon the defect- and patient-specific factors considered in the final treatment recommendation. Similar to the way a downhill ski run is graded for its level of difficulty, the cases are rated using green circles (easiest decision-making), blue squares (intermediate decision-making), black diamonds (advanced decision-making), and double black diamonds (expert decision-making). Within each category, the cases are organized by increasing complexity as well. Based upon the reader’s practice experience, some may feel more comfortable with the decisions made in one category versus another. We believe, however, that this is the best way to convey the implicit level of complexity, thereby allowing the reader to better understand how these cases fall within the treatment algorithm. When off-label usage of technology was implemented, it is clearly indicated within the body of the case. While mastering the techniques and performing a thorough evaluation of all patient- and defect-specific factors is a prerequisite to sound judgment, the bullet points at the end of each case that emphasize the final rationale for the treatment chosen will be of particular interest and value to the reader.

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Genzyme Biosurgery is proud to have collaborated with Springer to support the publication of this book. We are committed to improving patient care through education, research and advancing the field of cartilage repair. We applaud the efforts of the book’s contributors and believe this text will be a valuable reference for clinicians seeking expert guidance in this emerging field.

Genzyme Biosurgery
A division of Genzyme Corporation
Cambridge, MA
PATHOLOGY
Osteochondritis dissecans of the medial femoral condyle with documented long-term natural history

TREATMENT
Nonoperative treatment

SUBMITTED BY
Brian J. Cole, MD, MBA, Rush Cartilage Restoration Center, Rush University Medical Center, Chicago, Illinois, USA

CHIEF COMPLAINT AND HISTORY OF PRESENT ILLNESS

The patient is currently a 39-year-old male orthopedic surgeon who was diagnosed with symptomatic osteochondritis dissecans of his medial femoral condyle of his left knee at the age of 14. At that time, he complained of weight-bearing pain and discomfort on the medial aspect of his left knee with activity-related swelling. When initially diagnosed as having osteochondritis dissecans, he was treated with 8 weeks of nonweight bearing with crutches and asked to refrain from sports or impact activities thereafter. He remained asymptomatic, but was followed up regularly for radiographic evaluation to assess for evidence of instability.

PHYSICAL EXAMINATION

He ambulates with a nonantalgic gait and stands in symmetric physiologic varus. He has no effusion and full range of motion. He has no tenderness over his medial femoral condyle. His entire knee examination is normal.

RADIOGRAPHIC EVALUATION

A series of radiographs obtained from the age of 14 to the present demonstrate persistence of the osteochondritis dissecans lesion with no progression or evidence of instability. Radiographs demonstrate a lesion of osteochondritis dissecans of the medial femoral condyle of his left knee (Figures C1.1 through C1.3).

FOLLOW-UP

The patient remains completely asymptomatic and active in several high-level sports including skiing and running. Serial radiographs demonstrate persistence of the lesion.

DECISION-MAKING FACTORS

1. Diagnosed early at a time when growth plates remained open.
2. Initial attempt at nonoperative treatment with protected weight bearing was successful in rendering him asymptomatic.
3. Despite persistence of the lesion demonstrated on plain radiographs and magnetic resonance imaging (MRI), he remains asymptomatic and highly active.
4. An identified target lesion that can be reliably followed clinically and radiographically for evidence of progression or instability.
Case 1

**FIGURE C1.1.** Initial radiographs of a 14-year-old male with symptomatic osteochondritis dissecans of the left knee. Anteroposterior (**A**) and lateral (**B**) radiographs demonstrate an in situ lesion of osteochondritis dissecans of the medial femoral condyle.

**FIGURE C1.2.** Radiographs obtained 24 years later. Anteroposterior (**A**) and lateral (**B**) radiographs demonstrate no evidence of fragmentation or collapse. (**C**) Coronal MRI demonstrates no fragmentation or evidence of significant instability.
Case 1

**Figure C1.3.** Radiographs obtained 29 years later. Anteroposterior (A) and lateral (B) radiographs demonstrate no evidence of fragmentation or collapse. (C) Coronal MRI demonstrates no fragmentation or evidence of significant instability. No significant interval change is seen compared to Figure C1.2.
PATHOLOGY
Avascular necrosis

PROCEDURE
Total knee replacement

SUBMITTED BY
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CHIEF COMPLAINT AND HISTORY OF PRESENT ILLNESS

The patient is a 55-year-old man with a long-standing history of ulcerative colitis. His acute episodes have been treated with high-dose steroids. Recently, he has developed severe right knee weight-bearing discomfort. He also has pain at rest and at night. The joint pain is confined to his right knee only. He denies generalized malaise, fever, or erythema of the knee joint. Antiinflammatory medications and corticosteroid injections have not helped. He is unable to walk without the use of a cane.

PHYSICAL EXAMINATION

Height, 5 ft, 11 in.; weight, 185 lb. Clinical examination demonstrates a severe antalgic gait without the use of a cane. He has a large joint effusion that limits his range of motion to 95 degrees of flexion. He has a 30-degree fixed flexion deformity. Tricompartmental crepitus is present with generalized tenderness. Ligament examination is unremarkable.

RADIOGRAPHIC EVALUATION

Plain radiographs demonstrate diffuse patchy osteopenia of the distal femur, patella, and proximal tibia with well-maintained joint spaces and some early flattening to the medial femoral condyle consistent with multifocal avascular necrosis (Figure C2.1). A magnetic resonance imaging (MRI) scan demonstrates diffuse distal femoral avascular necrosis (not shown), with an osteochondral fragment of the medial femoral condyle.

SURGICAL INTERVENTION

A cruciate-retaining total knee arthroplasty was performed (Figure C2.2). Aggressive physical therapy was required to restore full extension that was obtained at the time of surgery. A Dyasplint™ was utilized to assist in regaining extension and for stretching of the hamstrings and joint capsule.

FOLLOW-UP

Three months postoperatively, the patient regained 0 to 110 degrees of flexion. He walks with no gait disturbance and is painfree. Two years postoperatively his result remains excellent.
**Case 2**

**FIGURE C2.1.** Standing anteroposterior radiograph demonstrates normal tibiofemoral joint space, osteochondral defect of medial femoral condyle, early peripheral lateral osteophytes, and patchy sclerosis and lucency of the distal femur compatible with avascular necrosis.

**DECISION-MAKING FACTORS**

1. Low-demand, 55-year-old male with severely symptomatic multifocal avascular necrosis.

2. Ongoing use of oral steroids.

3. Global nature of avascular necrosis and ongoing steroid insult contraindicates the implementation of cartilage restoration.

**FIGURE C2.2.** (A) Clinical photograph at the time of arthrotomy reveals discolored articular cartilage that is easily peeled off the distal femur. (B) Intraoperative appearance of total knee prosthesis.
PATHOLOGY
Unstable in situ osteochondritis dissecans of the medial femoral condyle

TREATMENT
Arthroscopic fixation of osteochondral fragment followed by hardware removal

SUBMITTED BY
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CHIEF COMPLAINT AND HISTORY OF PRESENT ILLNESS
The patient is a 14-year-old girl with a 1-year history of weight-bearing pain and discomfort on the medial aspect of her right knee with activity-related swelling and mechanical symptoms. When initially diagnosed as having osteochondritis dissecans, she was treated with 8 weeks of nonweight bearing with crutches and asked to refrain from sports or impact activities thereafter. Despite these efforts, she remained symptomatic and was referred for definitive treatment.

PHYSICAL EXAMINATION
Height, 5 ft, 3 in.; weight, 115 lb. She ambulates with a slightly antalgic gait and stands in symmetric physiologic valgus. Her right knee has a moderate-sized effusion. Her range of motion is 0 to 130 degrees. She is tender to palpation over the medial femoral condyle. Meniscal findings are absent. Her patellofemoral joint demonstrates normal tracking with no evidence of crepitus or apprehension. Her ligament examination is within normal limits.

RADIOGRAPHIC EVALUATION
Radiographs demonstrate an unstable lesion of osteochondritis dissecans of the medial femoral condyle of her right knee (Figure C3.1).

SURGICAL INTERVENTION
Because of persistent symptoms, she was indicated for arthroscopic reduction and internal fixation using a headless titanium screw. At arthroscopy, a lesion approximately 20 mm by 20 mm was found to be in situ, but unstable, with two palpably loose fragments. The fragments were elevated from the bed while leaving it hinged on an intact portion of the articular cartilage, and the base was debrided and microfractured. The fragments were repaired with two titanium headless screws (Acutrak, Mansfield, MA, USA) (Figure C3.2). Postoperatively, the patient was made nonweight bearing for approximately 8 weeks and utilized a continuous passive motion machine. At 8 weeks, she returned for hardware removal whereby the defect was believed to be stable and fully healed (Figures C3.3, C3.4). She was permitted to return to all activities at 4 months following her hardware removal.
FIGURE C3.1. Anteroposterior (A) and lateral (B) radiographs demonstrate in situ lesion of osteochondritis dissecans of the medial femoral condyle in the right knee of a skeletally immature adolescent. Note the fragmentation best seen on the lateral radiograph.

FIGURE C3.2. (A) An unstable lesion of osteochondritis dissecans seen arthroscopically along the medial femoral condyle. (B) The lesion bed has been prepared with debridement and microfracture followed by arthroscopic fixation using headless titanium screws for compression.
FIGURE C3.3. Anteroposterior (A) and lateral (B) radiographs obtained 8 weeks postoperatively demonstrate excellent healing of the fragment with no evidence of displacement.

FIGURE C3.4. Eight-week arthroscopic view immediately following screw removal demonstrates clinical evidence of union of the osteochondral fragment.