



## Realignment Procedures

	Indications	Contraindications	Other	Outcomes
<b>Lateral Release</b>	<ul style="list-style-type: none"> <li>• Intact medial patellar cartilage</li> <li>• Lateral tilt</li> <li>• Tight lateral retinaculum</li> <li>• Abnormal (<math>\leq 5</math> mm) patellar medial subluxation test</li> </ul>	<ul style="list-style-type: none"> <li>• Medial patellar chondrosis</li> <li>• Hypermobility patella</li> <li>• Patellar instability</li> </ul>	<ul style="list-style-type: none"> <li>• Must avoid cutting vastus lateralis tendon</li> </ul>	<ul style="list-style-type: none"> <li>• In patients with predominantly anterior knee pain, 80% with reduction in pain, 59% satisfied or very satisfied, average Oxford Knee Score = 27.<sup>5</sup></li> </ul>
<b>AMZ</b>	<ul style="list-style-type: none"> <li>• TT-TG &gt; 20 mm</li> <li>• Lateral patellar tilt and subluxation with lateral facet degeneration</li> <li>• Patellar arthrosis secondary to malalignment</li> <li>• Lateral and/or distal patellar chondrosis with good medial cartilage</li> </ul>	<ul style="list-style-type: none"> <li>• Skeletally immature</li> <li>• Medial or proximal patellar chondrosis</li> <li>• Complex regional pain syndrome</li> <li>• Crush injury to proximal patella</li> </ul>	<ul style="list-style-type: none"> <li>• May vary amount of anterior versus medial shift to accommodate specific location and degree of chondrosis</li> </ul>	<ul style="list-style-type: none"> <li>• 90% of patients with distal facet lesions and 85% with lateral facet lesions reported good/excellent outcomes. Only 56% of patients with medial facet lesions and 20% with proximal or diffuse lesions reported good/excellent outcomes. Overall, 63% satisfied with level of participation, 72% thought level of participation had improved after procedure and 92% would undergo procedure again.<sup>6</sup></li> </ul>
<b>Lateral Facetectomy with Lateral Release</b>	<ul style="list-style-type: none"> <li>• Isolated lateral stage 3 or 4 patellofemoral arthritis</li> <li>• Late-stage lateral patella compression syndrome (LPCS)</li> <li>• Lateral patellar facet tenderness</li> <li>• Negative passive patella tilt test</li> <li>• Excess lateral patella tilt on radiographs</li> <li>• Younger patients/not candidate for PFA/TKA yet</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate or advanced medial or lateral tibiofemoral DJD</li> <li>• Medial or diffuse patellar chondrosis</li> <li>• Patellar hypermobility</li> </ul>	<ul style="list-style-type: none"> <li>• Good intermediate procedure to delay TKA</li> </ul>	<ul style="list-style-type: none"> <li>• In 57 of 66 knees not progressing to TKA before follow-up, mean Kujala patellofemoral score increased from 45.6 to 72.0 after procedure with 56% very satisfied, 32% satisfied, and only 7% dissatisfied.<sup>7</sup></li> <li>• In 11 patients with minimum 3 year follow-up, average Knee Society Knee and Functional score significantly increased from 150 to 176.<sup>8</sup></li> </ul>

## Preservation Procedures

	Indications	Contraindications	Other	Outcomes
<b>Chondroplasty/ Debridement</b>	<ul style="list-style-type: none"> <li>• Small (&lt;1 cm) osteochondral fragments/flaps</li> <li>• Low grade chondrosis</li> <li>• Traumatic chondromalacia</li> <li>• Chondral fibrillation</li> </ul>	<ul style="list-style-type: none"> <li>• Untreated concomitant injuries/malalignment/instability</li> </ul>		<ul style="list-style-type: none"> <li>• In 36 patients undergoing arthroscopic debridement, mean Fulkerson-Shea Patellofemoral Joint Evaluation score increased from 51.9 to 75.3 and 58% of those with traumatic lesions and 41% with atraumatic lesions reported good or excellent results.<sup>9</sup></li> <li>• In a prospective analysis of 19 females undergoing mechanical debridement and 20 females undergoing non-ablative radiofrequency debridement for isolated patellar chondral lesions, both groups showed improvement on Fulkerson-Shea Patellofemoral Joint Evaluation Score postoperatively, but radiofrequency debridement was superior at 1 and 2 year follow-up.<sup>10</sup></li> </ul>
<b>Microfracture</b>	<ul style="list-style-type: none"> <li>• Full-thickness articular cartilage defect</li> <li>• Unstable cartilage overlying subchondral bone</li> <li>• Traumatic chondral defects</li> <li>• Satisfactory surrounding articular cartilage</li> </ul>	<ul style="list-style-type: none"> <li>• Axial malalignment</li> <li>• Partial-thickness articular defects</li> <li>• Diffuse chondral wear</li> <li>• Age &gt;60 (relative CI)</li> <li>• Disease-induced arthritis</li> </ul>	<ul style="list-style-type: none"> <li>• When combined with other procedures, microfracture should be performed last</li> <li>• No drains should be used</li> </ul>	<ul style="list-style-type: none"> <li>• After minimum 7 year followup in patients having microfracture for traumatic chondral defects, Lysholm score increased from 59 to 89, and 80% rated themselves as improved.<sup>11</sup></li> <li>• In 81 patients with Outerbridge grade 4 degenerative chondral lesions, at minimum 2 year follow-up, mean Lysholm score increased from 53.8 to 83.1 and mean Tegner Activity Scale scores increased from 2.9 to 4.5.<sup>12</sup></li> </ul>
<b>Grafting</b>				
<b>OATS</b>	<ul style="list-style-type: none"> <li>• Focal lesions <math>\leq 2 \text{ cm}^2</math></li> <li>• Outerbridge grade 3-4</li> <li>• Osteochondral defect</li> <li>• Age &lt;50</li> </ul>	<ul style="list-style-type: none"> <li>• Large (<math>&gt;2 \text{ cm}^2</math>) or irregularly shaped lesions</li> <li>• Moderate or advanced tibiofemoral DJD</li> <li>• Untreated concomitant injuries/malalignment/instability</li> </ul>	<ul style="list-style-type: none"> <li>• Limited by donor site availability and topography</li> </ul>	<ul style="list-style-type: none"> <li>• Of 118 patients treated for patellofemoral chondrosis, 79% had good/excellent results.<sup>13</sup></li> </ul>
<b>Allograft OATS (Fresh or Frozen)</b>	<ul style="list-style-type: none"> <li>• Focal lesions <math>&gt;2 \text{ cm}^2</math></li> <li>• Complex lesions</li> <li>• Lesions in topographically challenging areas</li> <li>• Lesions involving osseous component</li> <li>• Age &lt;55 years</li> </ul>	<ul style="list-style-type: none"> <li>• Untreated concomitant injuries/malalignment/instability</li> <li>• Moderate or advanced multicompartement DJD</li> </ul>	<ul style="list-style-type: none"> <li>• Fresh allograft transplant must be performed within 48-72 hours</li> <li>• Doesn't require tissue type matching</li> </ul>	<ul style="list-style-type: none"> <li>• Arthritic condition improved and TKA delayed for 8 of 11 patients (14 total grafts) with intact graft at last follow-up (4 &gt;10yrs, 2 &gt;5 yrs, 2 &gt;2 yrs) and 3 of 6 failed grafts lasted &gt;10 yrs. Mean Lysholm score increased from 27 to 80 and functional scores increased a mean of 30 points. 10 of 11 would have procedure again.<sup>14</sup></li> </ul>

<p><b>ACI and other Cartilage Regeneration Procedures</b></p>	<ul style="list-style-type: none"> <li>• Full-thickness chondral defects (Outerbridge grade 3 or 4 or ICRS grade 3 or higher)</li> <li>• Defect 2-16 cm<sup>2</sup> (ACI)</li> <li>• Defect 1-5 cm<sup>2</sup> (particulated cartilage grafts)</li> <li>• Age 15-55</li> </ul>	<ul style="list-style-type: none"> <li>• Untreated concomitant injuries/malalignment/instability</li> <li>• Bipolar lesion ICRS grade 2 or higher (particulated)</li> <li>• Significant subchondral bony edema (particulated)</li> <li>• Osteochondritis dissecans with &gt;6 mm subchondral bone loss (particulated)</li> </ul>	<ul style="list-style-type: none"> <li>• ACI may require multiple surgeries (harvest and implantation) with culture period between</li> <li>• DeNovo NT – particulated juvenile cartilage allograft mixed with fibrin glue</li> <li>• CAIS – Cartilage Autograft Implantation System – minced autograft place in biodegradable scaffold</li> </ul>	<ul style="list-style-type: none"> <li>• Median improvement in Lysholm score of 31 points, VAS maximum pain score of 3 points. In 22 patients undergoing later arthroscopy, median ICRS grade was 11 of 12 possible points.<sup>15</sup></li> <li>• 71% of patients rated outcomes good/excellent and only 7% poor. Postoperative improvement in SF-36, KSS, and modified Cincinnati scores.<sup>16</sup></li> <li>• In 4 patients treated with DeNovo with 2 year follow-up, significant improvement in KOOS, IKDC, and VAS pain scale scores was seen with most improvements seen by 12 months and maintained to 24 months.<sup>17</sup></li> <li>• Case report of DeNovo NT showed IKDC increased from 32 to 85, improvement in all KOOS measures, and MRI at 21 months showed complete filling of defect.<sup>18</sup></li> <li>• 20 patients with ICRS grade 3 or higher chondral lesion treated with CAIS mean IKDC score increased from 39.10 to 82.95, significantly improved KOOS measures, and all were significantly higher than matched control (microfracture) group at 24 months.<sup>19</sup></li> </ul>
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## Replacement Procedures

	Indications	Contraindications	Other	Outcomes
<b>PFA</b>	<ul style="list-style-type: none"> <li>• Isolated end-stage PF joint DJD</li> <li>• Post-traumatic degenerative arthritis</li> <li>• Advanced chondromalacia of patella, trochlea, or both</li> <li>• Patellar or trochlear dysplasia (h/o prior instability common)</li> <li>• Failed joint preservation (NSAIDS, weight loss, PT, and repair or realignment procedures)</li> <li>• Isolated anterior retropatellar pain</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate or advanced medial or lateral tibiofemoral DJD</li> <li>• Moderate to severe malalignment or maltracking</li> <li>• Inflammatory arthritis</li> <li>• Morbid obesity</li> <li>• Normal PF joint space on plain radiographs (even if MRI shows PF chondromalacia)</li> <li>• Idiopathic PF DJD (relative)</li> </ul>	<ul style="list-style-type: none"> <li>• May be converted to TKA if necessary later</li> </ul>	<ul style="list-style-type: none"> <li>• At mean follow-up of 7 years, 43 PFA in 37 patients showed 95% survival, mean Knee Society objective and functional scores increased from 64 to 87 and 48 to 80 respectively.<sup>20</sup></li> <li>• 5 year follow-up of PFA with the Avon prosthesis showed 96% survival, median Oxford score increased from 18 to 39, and 80% successful outcomes based on <math>\geq 20</math> points on the Bristol pain score. Main complication was radiographic progression of arthritis.<sup>21</sup></li> <li>• PFA yielded equivalent clinical outcomes to TKA for isolated PF DJD with mean KSS score 89 for PFA and 90 for TKA and mean Tegner score of 4.3 for PFA and 2.6 for TKA.<sup>22</sup></li> </ul>
<b>TKA</b>	<ul style="list-style-type: none"> <li>• End-stage, multi-compartment DJD</li> <li>• Failed non-operative management</li> <li>• Age &gt;55 years (relative)</li> </ul>	<ul style="list-style-type: none"> <li>• Active infection</li> <li>• Younger patients (relative)</li> <li>• High activity level (relative)</li> </ul>	<ul style="list-style-type: none"> <li>• Good outcomes, but controversy in younger patients.</li> </ul>	<ul style="list-style-type: none"> <li>• In 48 knees that underwent TKA for PF DJD, mean Knee score and Pain score increased from 71 to 96 and 25 to 47 respectively and had similar outcomes to patients undergoing TKA for multicompartament DJD.<sup>23</sup></li> <li>• At mean follow-up of 81 months, of 30 TKAs for PF DJD, there were 28 excellent, 1 good, and 1 poor result.<sup>24</sup></li> <li>• 33 TKAs in pts less than 60 with minimum 2 year follow-up showed mean Knee Society score increased from 49 to 88 postoperatively and mean Pain score increased from 5 to 44.<sup>25</sup></li> </ul>

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