Ablative Chondroplasty Technique Guide

Featuring the Paragon T2®
ArthroWand®
Traditional treatment of symptomatic chondral defects typically involves debridement using an arthroscopic mechanical shaver. While this approach allows for removal of unstable pieces of cartilage, published research has documented that mechanical shavers tend to rip and tear tissue. The technique often results in unstable and non-smooth surfaces, contributing to the propagation of fissures and cracks, ultimately making lesions larger1,2 (Figures 1 and 2).

Published research indicates that bipolar radiofrequency-based debridement techniques may be superior to the mechanical shaver for this application3. RF-based debridement is associated with better clinical outcomes including improved post-operative surfaces and less likelihood of causing damage to surrounding articular cartilage 4,5 (Figures 3-6). The use of bRF-based energy devices in chondroplasty applications has gained popularity for several reasons:

- low cost of the device
- diversity of devices available
- ease of access provided by device for working in confined spaces
- precision device offers a focused application debridement6,7,8

Proper use of RF-based techniques requires understanding important clinical concepts. It is well known that inappropriate application is associated with excessive cell death9,10,11, most likely as a result of critically elevated thermal stress12,13. Thus, careful control of the device during the debridement procedure is crucial for maintaining optimal chondral tissue health. Research shows that exceeding a critical temperature threshold has adverse effects on chondrocyte viability14,15. However, when appropriately used, RF has shown to safely provide controlled ablation of articular cartilage, resulting in desired surfaces, better or equal to those produced by the mechanical shaver16.

With ablative chondroplasty, two principal factors affect tissue temperature—exposure dose and mode of action.
Exposure Dose

Exposure dose is most commonly a result of operator-directed activities and is mainly dependent on the distance to the source and length of exposure. More specifically, exposure dose is affected by distance maintained between the device tip and tissue surface, device pass rate during energy delivery and in situ flow rate.

Mode of Action

Mode of action is determined by hardware configuration (e.g. bipolar vs. monopolar and ablative vs. thermal). All ArthroCare ArthroWands are bipolar and perform fine tissue excision through a highly controlled ablative process called Coblation®. This controlled plasma-mediated process results in the excision of target tissue at relatively low temperatures. The precision and control of this device allows for the creation of a smooth and stable surface, with less than 150 microns of damage to residual articular cartilage tissue while maintaining metabolic activity similar to that of controls (*Figures 7 and 8,*).

Clinical Application

Articular cartilage defects are typically characterized using either the Outerbridge Classification System or the ICRS Clinical Cartilage Injury Evaluation System 2000.

The Paragon T2 ArthroWand is recommended for chondroplasty (*Figures 9 and 10,*).

The goal of surgery is to stabilize the edges of the cartilage. This is accomplished by removing tissue layer by layer until a stable cartilage rim is reached, thus preserving the maximum amount of healthy tissue.
Paragon T2 (AC5531-01)

Use a mechanical shaver to remove larger pieces of fibrillated, damaged and unstable tissue. To stabilize the cartilage and complete the chondroplasty safely, switch to Paragon for fine-tuning work and smoothing of rough edges.

Flow Rate
- Ensure proper fluid flow through the joint space

Controller Setting
- For Paragon use settings 5-7 (Figure 11)
- During operation, the T2 – Temperature Technology band will transition from blue to white if the incorrect setting is used (Figure 12)

Tissue Contact
- Activate the device away from tissue (Figure 13)
- With Paragon, bring the device into the tissue, while keeping it moving
- During operation, the T2 – Temperature Technology band will transition from blue to white if the temperature exceeds 50°C (+/-5°) (Figure 12)
- The orange glow indicates desired plasma formation (Figure 14)

Pass Rate
- The device should be passed over affected cartilage at a rate of 4mm per second
- During operation, the T2 – Temperature Technology band will transition from blue to white if the device is not passed at the appropriate speed (Figure 12)

Additional Instructions
- ALWAYS maintain constant movement
- DO NOT stop or dwell
- DO NOT use the “C” or coagulation function
- DO NOT pulse the system – keep the device on for a few seconds at a time
- DO NOT use ArthroWands for mechanical displacement of tissue through applied force, which may result in bent or detached electrodes
Standard ArthroWands

Suction: CoVac® 50 (AS2530-01 or ASC2530-01) and CoVac 70 (AS3730-01 or ASC3730-01)
Dome: Dome 30 (A3625-01), Dome 60 (A3530-01) and Dome 60 (A3525-01 or AC3525-01)
Bevel: Bevel 30 (A2630-01), Bevel 45 (A2430-01 or AC2430-01) and Bevel 60 (A2530-01)

Use a mechanical shaver to remove larger pieces of fibrillated, damaged and unstable tissue. To stabilize the cartilage and complete the chondroplasty safely, switch to a Standard ArthroWand for fine-tuning work and smoothing of rough edges.

Flow Rate
- Ensure proper fluid flow through the joint space

Controller Setting
- For standard wands use settings 4-6

Tissue Contact
- Activate the device away from tissue (Figure 15)
- With standard wands, keep the device 1mm away from the tissue while activated and maintain constant movement. Use a hovering or off contact technique (Figure 16)
- The orange glow indicates desired plasma formation (Figure 17)

Pass Rate
- Device should be passed over affected cartilage at a rate of 4mm per second

Additional Instructions
- ALWAYS maintain constant movement
- AVOID direct contact with the fronds of the fibrillated cartilage
- DO NOT stop or dwell
- DO NOT use the “C” or coagulation function
- DO NOT pulse the system – keep the device on for a few seconds at a time
- DO NOT use ArthroWands for mechanical displacement of tissue through applied force, which may result in bent or detached electrodes

Figure 15. Off tissue activation
Figure 16. Off contact technique
Figure 17. Plasma formation
Paragon T2 ArthroWand®

Paragon T2 ArthroWand is designed to achieve the goals of successful debridement through the exclusive use of ArthroCare Coblation technology:

- Works by molecular dissociation, not heat, to ablate tissue
- Low temperature plasma excision (between 40-70°C)
- Less than 150 microns of damage to residual articular cartilage tissue
- Coblation has been utilized in more than 5 million surgical procedures

Paragon T2 ArthroWand, the only RF Wand clinically designed to outperform the mechanical shaver for arthroscopic chondral debridement

- Venturi Effect – circular tip uses this principle to passively remove bubbles from the electrode tissue interface by taking advantage of a natural decrease in relative pressure
- Circular electrode design provides multidirectional excision – ultra-fine tungsten electrode requires lower power for plasma formation
- Wand based on 6 years of research on the application of bRF-based energy on articular cartilage
- Design proven in numerous pre-clinical and clinical studies

Paragon T2 ArthroWand provides clean debridement through exclusive use of T2 - Temperature Technology

- T2 provides a real-time visual indicator when the temperature exceeds the recommended 50°C
- Band of temperature-sensitive material is a leuco-dye or thermo-chromic compound
- Color transitions from blue to white at 50°C (+/-5°C)
- T2 band is located 0.014” or 0.35 mm away from the tissue surface

Technical Specifications

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<th>Catalog Number</th>
<th>AC5531-01</th>
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