

Comparison of Volumetric Removal Rate Between Arthrex Apollo^{RF} i90 Aspirating Ablator and Leading Market Competitors

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Introduction

During radiofrequency (RF) ablation procedures, effective and efficient tissue removal is critical to limit operation time. One key factor in overall ablation performance is the ability of a given probe to remove tissue. This testing aimed to evaluate the volume of tissue removed between the Apollo^{RF} i90 aspirating ablator and the leading ablation devices, including Smith and Nephew Flow 90™, Smith and Nephew Super TURBOVAC® 90, Stryker 90-S Cruise, DePuy Synthes CoolPulse 90®, and DePuy Synthes VAPR® TRIPOLAR 90°.

Methods

Each probe was secured in a fixture so the electrode was parallel to the rawhide, which was used to ensure a flat, reliable ablation surface. The RF probe was ablated in the fixture tank filled with a 0.9% saline solution. Each probe was connected to its respective console at default settings and run in a 3 × 4 grid where each strike consisted of dragging in tissue for 9 seconds at a speed of 2.3 in/min on the rawhide (Figure 1). After testing was complete, each zone was evaluated by the Keyence VR-3200, which uses a top-down optical 3D scan to determine the total volume of the indentation (Figures 2 and 3).

Figure 1. Volumetric Ablation Test Setup

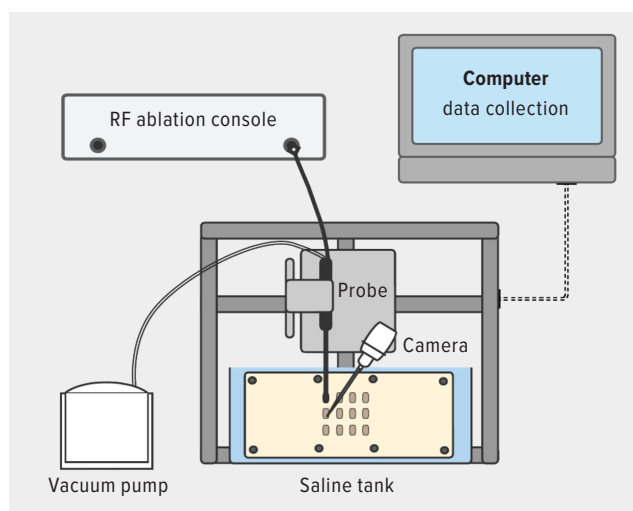
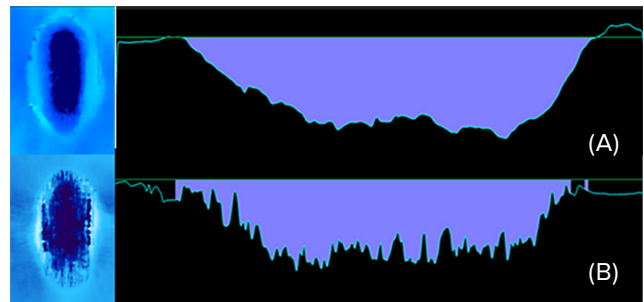


Figure 2. Outline of Ablation Zone to Be Analyzed



Figure 3. Example Topographical Scan (Left) and Sectioned View (Right) of Indentation Volume via Keyence VR-3200



(A) Arthrex Apollo^{RF} i90 aspirating ablator (B) Smith and Nephew Super TURBOVAC 90

Results

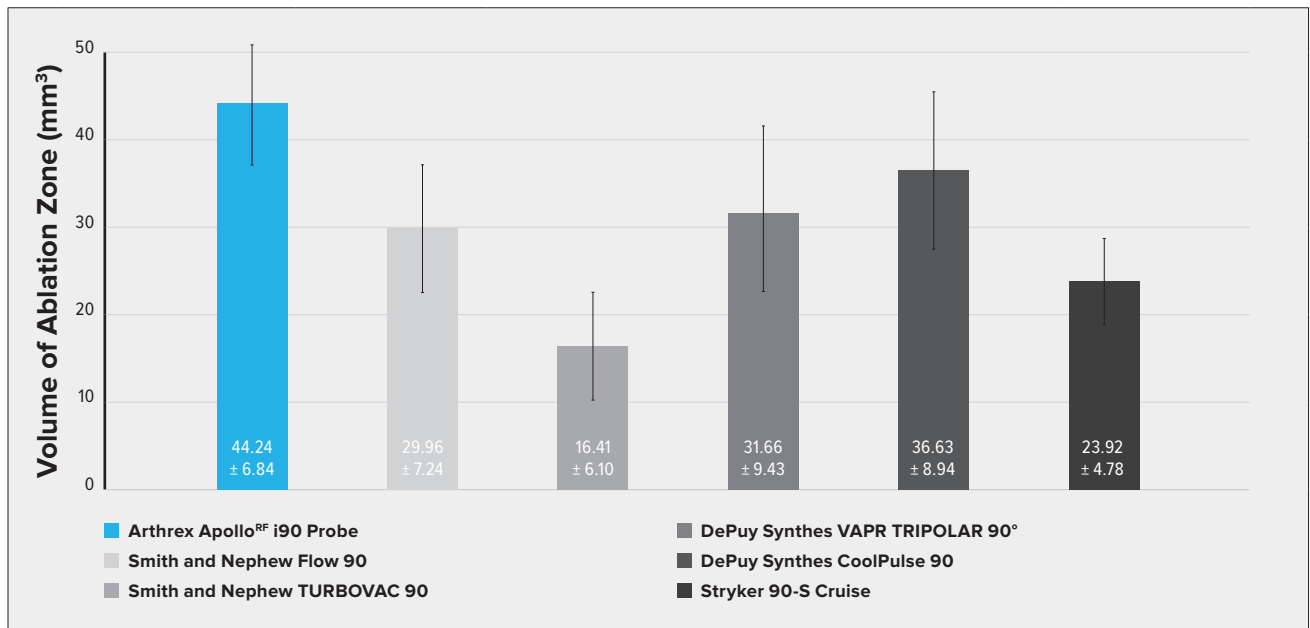
Table 1. Summary of Ablation Volume Testing

Sample	Total # of Ablations	Average Volume Ablated (mm ³)
Apollo ^{RF} i90 probe	60	44.24 ± 6.84
Smith and Nephew FLOW 90	60	29.96 ± 7.24*
Smith and Nephew Super TURBOVAC 90	60	16.41 ± 6.10*
Stryker 90-S Cruise	60	23.92 ± 4.78*
DePuy Synthes CoolPulse 90	60	36.63 ± 8.94*
DePuy Synthes VAPR TRIPOLAR 90°	60	31.66 ± 9.43*

*Statistically significant difference from Apollo^{RF} i90 probe ($P < .001$, $\alpha = .05$)

During the evaluation, each zone was considered an independent measurement. The Apollo^{RF} i90 probes outperformed the DePuy CoolPulse 90 probes by 18.8% and the Smith and Nephew Flow 90 probes by 38.5%. A one-way ANOVA was performed using Minitab to check for statistically significant differences between the groups. The results of this testing indicate that the Apollo^{RF} i90 probe has the greatest average volume ablated over a consistent pass compared to the competitor probes ($P < .001$).

Figure 4. Comparison of Average Ablated Volume Between Arthrex Apollo^{RF} i90 Probe, Smith and Nephew Super TURBOVAC 90, DePuy Synthes CoolPulse 90, Smith and Nephew Flow 90, DePuy Synthes VAPR TRIPOLAR 90°, and Stryker 90-S Cruise



Conclusion

At default settings, the Apollo^{RF} i90 probe has the greatest average tissue removal rate when compared to the leading market competitors. A high removal rate is not only critical for efficiency, but it reduces time in the joint space.¹ Decreased shoulder arthroscopy procedure time is associated with fewer adverse short-term outcomes.²

Reference

1. Arthrex, Inc. Data on file (PLM88807). Naples, FL; 2020.
2. Boddapati V, Fu MC, Schairer WW, et al. Increased shoulder arthroscopy time is associated with overnight hospital stay and surgical site infection. *Arthroscopy*. 2018;34(2):363-368. doi:10.1016/j.arthro.2017.08.243