The Sonicision™ Cordless Ultrasonic Dissection Device:

Improving Visualization and Precision With Greater Mobility

Introduction

Energy-based devices have evolved significantly to meet the clinical demands of the operating room. As part of the armamentarium of technology-driven solutions, ultrasonic devices, which derive their dissecting and sealing capabilities from high-frequency vibration, have been found to improve outcomes including operating time and blood loss.1

Recently, Covidien expanded its portfolio of energy-based surgical instruments to include the Sonicision™ cordless ultrasonic dissection device—the industry's first cordless ultrasonic dissection device—indicated for soft tissue dissection and vessel occlusion of up to 5 mm in diameter (Figure 1).1-3 The Sonicision™ device is a hand-held dissection instrument with a cordless design that simplifies the surgical setup, while enabling greater mobility for the surgical team. With possible applications in general, bariatric, colorectal, gynecologic, and urologic procedures, as well as its simplified reusable capabilities, the Sonicision™ device may reduce the costs associated with the capital investment of several devices and their respective upgrades through technology standardization.

Design Improvements Enhance Mobility

The Sonicision™ device offers a unique advantage, particularly in the multiple tool–dependent environment of laparoscopic surgery, by allowing freedom of movement among the surgical team members. With the cordless design of the Sonicision™ device, it is possible to infinitely rotate the instrument shaft based on directional preference without cord entanglements.3

Samuel Szomstein, MD, a bariatric surgeon with Cleveland Clinic Florida, has been using the Sonicision™ device since the instrument was first introduced. He finds the device to be most advantageous in his advanced laparoscopic cases. "The cordless quality is a significant advance," said Dr. Szomstein. "To be in control of the instrument and to not have to worry about wires, generators, and other devices that are not in your control—that's what I like about it. It's very easy to maneuver, and it provides continuing energy without interruptions."

James Connaughton, MD, whose practice consists of general and colorectal surgery at the San Antonio Colorectal Clinic in San Antonio, Texas, agrees. "During laparoscopic cases, you've got cords running all over the table, and having one less is definitely a significant benefit," he said. "If I could have no cords, that would be perfection—not having it tethered to something is very helpful."

The Sonicision™ device is easy to assemble without requiring a lot of setup time which can improve overall efficiency. "I think it's pretty easy for the technicians to set up. It doesn't require the testing that the Harmonic™ does, so it hasn't slowed me down," said Dr. Connaughton.

The Sonicision™ device possesses an intuitive dual mode energy activation control that facilitates the transition between minimum and maximum power modes.3 Thus, surgeons are able to optimize control and focus more on the patient and procedure without looking at the device during the procedure.

Rather than having a cord connect to a bulky generator outside the surgical field, the Sonicision™ device draws ultrasonic energy from a hand-held generator that can be reused for up to 100 uses, is easy to assemble, and can be sterilized. The system also comes with a battery charger that can charge 4 batteries simultaneously.

"The less apparatus in the OR, the fewer wires across the OR table, the easier it is to use, and this gives more control to the surgeon handling the instrument, rather than needing 3 or 4 people to work around an instrument," noted Dr. Szomstein. "With other ultrasonic devices, I have to switch back and forth rapidly between it and a suction device, and if there is a cord attached, it contributes to the
devices in mean vessel burst pressure, thermal spread, peak active blade temperature, and seal time.4

“For all of the reasons I like ultrasonic energy, the Sonicision™ device is just better; for one thing, it’s significantly faster,” said Dr. Connaughton. “It’s noticeably quicker than the Harmonic ACE™*. It cuts and seals more quickly, and I can move freely without feeling like I’m waiting for the device to perform. I notice when I put the Harmonic ACE™* across something I have to sit and wait for it to cut through, whereas with the Sonicision™ device, I close it, start using it, and it moves along.”

“Plume is a huge issue, because the more you have to take the camera out and clean it, the more time you add,” said Dr. Connaughton. “The less time someone spends on the operating table, the better. So if there’s less plume, there’s less cleaning of the scopes, and the better off you are.”

Clinical Performance

Dr. Connaughton has long been a fan of ultrasonic energy devices for dissection for laparoscopic cases, which comprise about 90% of his caseload, because of the ease of use and speed. “That’s always what’s motivated me as far as laparoscopic procedures,” said Dr. Connaughton. “I don’t want to be limited by the equipment I’m using. That seems to be the thing with all of these technologies—the speed of use.”

Several pre-clinical studies were conducted comparing the Sonicision™ device with the other leading ultrasonic device on a variety of performance standards, including dissection speed. Both devices were evaluated by dividing 15 cm of porcine mesentery at maximum power. Results showed that the dissection time was significantly faster with Sonicision™ than with the other leading ultrasonic device (26.1 ± 4.0 vs 33.2 ± 5.1 seconds, respectively; P<0.001). Additionally, the Sonicision™ device has a faster active blade cool down time to 60 degrees (41.2 ± 1.3 vs 50.4 ± 7.5 seconds, respectively) (Table 1).4 The studies also demonstrated comparable results for both devices in mean vessel burst pressure, thermal spread, peak active blade temperature, and seal time.4

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In addition to having faster dissection speed, Dr. Connaughton recognizes the benefits of Sonicision™ in generating minimal mist (Figure 2).2,4 “[Plume] is a huge issue, because the more you have to take the camera out and clean it, the more time you add,” said Dr. Connaughton. “The less time someone spends on the operating table, the better. So if there’s less plume, there’s less cleaning of the scopes, and the better off you are.”

Table 1. Pre-clinical Performance Results For the Sonicision™ Device and the Harmonic ACE™*

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<tr>
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<th>Mean Dissection Speed, sec ± SD</th>
<th>Mean Activation Blade Cool Down Time, sec ± SD</th>
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<tbody>
<tr>
<td>Sonicision™</td>
<td>26.1 ± 4.0</td>
<td>41.2 ± 1.3</td>
</tr>
<tr>
<td>Harmonic ACE™*</td>
<td>33.2 ± 5.1</td>
<td>50.4 ± 7.5</td>
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<td></td>
<td>P&lt;0.001</td>
<td>P=0.006</td>
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Based on reference 4.
Using a digital quantification technique, Kim and colleagues measured plume generated by different ultrasonic devices at maximum and minimum modes. At minimum mode, the Sonicision™ device plume obscured 5 times less than the other market-leading ultrasonic device (Table 2).

Surgical plume obscures visualization which may increase operating time. Dr. Connaughton routinely ventilates access ports during surgical procedures to deal with plume issues and finds this adds considerably to case time. “It creates the potential to lose the pneumoperitoneum, having to wait to resume the pneumoperitoneum. All those pauses stall operations, whether you’re cleaning the instruments or waiting for the pneumoperitoneum to come back up,” he said. Although Dr. Connaughton has not determined whether the use of the Sonicision™ device has reduced his need to ventilate access ports, Dr. Szomstein has seen a difference. “I do that in general, but I haven’t needed to do it with the Sonicision™ device. It does create less mist,” he said.

The reduced plume may be attributable to the shape of the blade, but it may also have to do with the fact that the Sonicision™ device moves faster, explained Dr. Connaughton. “I don’t know if the straight blade is directly related, though it could be,” he said. “But because it seals and cuts faster, you’re not sitting there generating that plume.”

**Economic Considerations for Standardization**

Rechargeable and cordless, the Sonicision™ device minimizes the surgical setup time while enhancing mobility during surgery. Additionally, the device has built-in upgrade capability (with natural replacement) that prevent the generators from becoming outdated quickly. Because it can be integrated into a number of surgical procedures, the Sonicision™ device offers hospitals an opportunity to save money by standardizing to a technology that does not require a non-upgradeable capital investment.

“Anything that saves money to the hospital without compromising patient safety is beneficial,” Dr. Szomstein said. “So if there is no capital investment, that will save money. With the wireless technology and fewer devices in the OR, [Sonicision™] is time-saving, and there will probably be fewer problems.” The speed of the instrument also may be economically beneficial. “In the grand scheme of things, anything that speeds up the operation will reduce cost, because there’s less OR time involved,” noted Dr. Connaughton.

**A Leveled Learning Curve**

Based on his experience, Dr. Szomstein believes any surgeon who performs laparoscopic procedures would benefit from using the Sonicision™ device. Dr. Connaughton recommends the use of the Sonicision™ device in intra-abdominal procedures, bariatric procedures, obstetric/gynecologic procedures, and minimally invasive procedures. In particular, he recognizes the benefits in using this device for colectomies and complex ventral hernias. “Those are the big ones where it really makes a difference as far as time, because there’s a significant amount of dissection that needs to be done,” he said. “[Sonicision™] just makes things go smoother, and those are big issues when you’re doing a lot of cases in a single day. Anything that makes your life a little easier is greatly appreciated.”

**Figure 2. The Sonicision™ device offers faster dissection and up to 5x less mist than Ethicon’s Harmonic ACE™.**

**Table 2. Maximum Plume Obstruction**

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<thead>
<tr>
<th></th>
<th>Sonicision™ Device</th>
<th>Harmonic ACE™*</th>
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<tbody>
<tr>
<td><strong>Average Obstruction on Minimum Power Setting</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Obstruction, %</td>
<td>4.80 ± 0.86</td>
<td>26.63 ± 3.70; P&lt;0.001</td>
</tr>
<tr>
<td>Range, %</td>
<td>0.24-19.83</td>
<td>8.12-73.50</td>
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<tr>
<td><strong>Average Obstruction on Maximum Power Setting</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Obstruction, %</td>
<td>8.76 ±1.49</td>
<td>12.65 ± 0.97; P=0.026</td>
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<tr>
<td>Range, %</td>
<td>4.32-17.41</td>
<td>0.07-18.15</td>
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Adapted from reference 5.
According to Dr. Szomstein, the transition to the Sonicision™ device will be fairly seamless for any surgeon experienced in using ultrasonic dissectors, and is one step toward reducing the clutter in the OR and increasing mobility during surgery. “The wireless technology does provide some relief. If surgeons feel they have too many things in their surgical field, this is one way to start getting rid of some of them,” he said.

References

3. Internal testing and the Sonicision Launch Book; 2013 M130236a and R0015050.
4. When compared to the Harmonic ACE™ as part of a 2010 pre-clinical analysis evaluating the performance of the Sonicision™ device versus the Harmonic ACE™ Covidien internal test report No. 2-105-10.