Using low-frequency contact ultrasound for debridement in the burn population

Case Series: **Burns**

Analysis

These cases show that ultrasonic debridement may improve controlled debridement by selectively removing tissue that is nonviable while having no effect on tissue that could heal, which is of critical importance in the treatment of burns.

Another challenge in the management of burns is to determine quickly if a deep second-degree burn will require skin grafts or can heal on its own. This unique technology could help answer that question early on and potentially reduce healing time and patient length of stay.

Given the results of these case reports, it seems likely that many burn patients could benefit from ultrasonic debridement. Further research on the burn patient is warranted.

44-year-old female patient without significant past medical history other than depression presented with burns to the index and middle fingers of the left hand caused by hot grease. These injuries resulted in deep second-degree burns that were difficult to assess pre-operatively due to the patient’s pain. On day 4 post-injury the patient was taken to the OR. The wounds measured 8 cm x 2 cm on her index finger and 2 cm x 3 cm on the middle finger. The wounds were likely colonized with probable presence of biofilm. Debridement was accomplished with the SonicOne® O.R. ultrasonic debridement system to preserve as much viable tissue as possible. Given that the injury was not full thickness, a decision was made to place xenograft on the index finger. By day 7 after injury (post-op day 3) the xenograft is well attached to the debrided area, indicating adequate depth of debridement. No further debridement was required. On post-op day 17 wound is healed and no further intervention needed other than to moisturize as indicated. The SonicOne O.R. was an effective tool to disrupt the biofilm that was likely present over the wounds.
26-year-old male without any significant past medical history presented with burn wounds to bilateral upper extremities and face caused by a gunpowder explosion when attempting to ignite a furnace. Two days later, the patient was taken to the OR for debridement with the SonicOne® O.R. ultrasonic debridement system. The area debrided was approximately 210 cm². My intent was to use ultrasonic debridement to minimize viable tissue loss. I found the SonicOne an effective tool to accomplish this goal with no viable tissue loss. The treatment plan was daily applications of Medihoney® dressings. The patient only needed one debridement and went on to heal in 10 days.

**Case 1. Facial flash burn**

![Day 2 post-injury OR pre-debridement](image)

![After debridement with SonicOne O.R.](image)

![Patient healed after 10 days](image)

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**Case 2. Chest and neck flash burn**

8-year-old male patient experienced a scald burn on January 1st, 2015 which caused a third-degree burn to the right forearm. The wound measured 7.5 cm x 6 cm. He was managed by his pediatrician and eventually sent to us for management. On January 12th the patient was taken to the OR for debridement. The eschar had recently sloughed off. The goal of this procedure was to debride non-viable tissue while minimizing tissue loss. The wound was colonized with no clinical signs of infection with the possible presence of biofilm. I found the SonicOne O.R. effective in debriding this wound without the need for more aggressive debridement techniques. Following debridement I was able to place an autograft on this wound. There was minimal blood loss during the procedure. To improve cosmesis, a sheet graft was used instead of a meshed graft. On post operative day 3, the skin graft take was excellent and has continued to heal nicely.

![Day 3 post injury, OR pre-debridement](image)

![Right forearm post debridement – pre graft application](image)

![Post operative day 14 - xenograft healed](image)

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**Case 3. Torso and upper extremity scalding burn**

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**Case 4. Right arm scalding burn**

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SonicOne O.R. Ultrasonic Debridement System
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Day 2 post-injury OR pre-debridement
After debridement with SonicOne O.R.

Patient healed after 10 days
Case 1.
Facial flash burn

12-year-old male without significant previous medical history presented with burns to the chest, abdomen and neck caused by hot coffee. The injuries included areas of first-, second-, and third-degree burns. Deep burns were located on the patient’s left anterior shoulder (measuring 110 cm²) and right upper extremity. After debridement, we decided to place an autograft on the right forearm and left shoulder and to place xenograft on the right upper extremity based on the different depths of the wounds. There is a learning curve in assessing the post-debridement appearance of tissues treated with ultrasonic debridement. The wound appearance is considerably different compared to what is expected with standard methods of debridement (Weck knife or hydrosurgical debridement). Based on the healing and graft take, the debridement with SonicOne® O.R. appears to be an effective treatment for wound bed preparation in the burn patient prior to grafting.

Day 3 post injury, left shoulder, OR pre-debridement
Day 3 post injury, OR pre-debridement of right forearm

Right forearm post debridement – pre graft application
This photo shows the xenograft well attached to the wound during the dressing change on post-op day 3

The left upper extremity shoulder wound measured 110 cm². This photo shows the autograft appearance on the left shoulder during the dressing change, on post-op day 3

Post operative day 14 - xenograft healed

Post-op day 14, right forearm, autograft healing well
Healed left anterior shoulder after skin graft (post-op day 14)

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On further follow-up, the graft has minimum hypertrophy and overall good appearance.
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Cases provided courtesy of Ariel M. Aballay, M.D., FACS. Director, Allegheny Health Networks West, Penn Burn Center-Assistant Professor of Surgery at Temple University Medical Center. Cover photo: Cavitation bubble created by low frequency ultrasound.

If you would like further information or would like to evaluate the SonicOne® O.R. please contact us at +1.631.694.9555