Chronic vascular ulcer of the lateral leg

History

This patient is a 67-year-old African American male who had a chronic vascular ulcer of his right lateral leg with an exposed tendon. The VERSAJET™ was used for the debridement of the necrotic portion of the tendon on two separate occasions. Between the VERSAJET debridements, negative pressure therapy was applied to the wound. Following the preparation of a surgically clean wound bed, the ulceration was successfully closed with an application of a split thickness skin graft. One year later he is fully ambulatory and remains closed.

Summary

In this patient, the VERSAJET was used to remove only the necrotic portions of an exposed tendon. The residual viable tissue was preserved during the debridement with VERSAJET. In combination with the negative pressure therapy, a surgically clean wound was obtained. The wound was then successfully closed with a skin graft. The patient has had long term maintenance of the epithelialized wound and is fully ambulatory and free of pain.
Open wound of arm

History
This 22-year-old male fell through a glass window and sliced skin off of his left medial elbow area. He was first evaluated four days after visiting the emergency room. He was using saline moistened dressings. The wound was full thickness, partially granulating and covered with fibrinous debris measuring 80 cm². The patient was treated in the outpatient surgery suite under LMA anesthesia. The wound was painted with methylene blue as a marker and then the VERSAJET™ was used to remove the outer layer of granulation tissue. Note the smooth and precise removal of the methylene blue along with the granulation tissue. There are no gouges or exposed fat in the wound bed. A split thickness skin graft 12,000th of an inch was meshed at 1½:1 and placed over the wound. Fibrin glue was used to adhere the graft to the wound bed. A foam bolster was applied. The wound closed with 100% graft take and full return of function. During the 45-minute surgery, the only instruments used were an Incision and Drainage tray with minimal equipment, a dermatome, a mesher and the VERSAJET.

Summary
In this case the VERSAJET allowed for the precise removal of granulation tissue, providing a smooth wound bed for skin grafting. Minimal equipment was used. The surgery was quick and efficient with an excellent outcome.
Skin graft defatting

History
This 46-year-old fair skin woman presented with an advanced melanoma of her left cheek. The patient had a negative sentinel node biopsy and metastatic workup. The surgical oncologist removed the tumor leaving a large left preauricular defect. A full thickness skin graft was performed. The skin was harvested from her lower abdominal area just above a preexisting Ceasarian section scar. A wedge of subcutaneous tissue was excised to facilitate closure of the donor site. The graft was rapidly and accurately defatted with the VERSAJET™ and the defect was successfully repaired.

![Advanced melanoma of the left cheek.](image)
![The defect following the excision of the melanoma.](image)
![Abdominal donor site. Skin and subcutaneous tissue were excised to facilitate closure of the donor site.](image)

The VERSAJET was used to clean the fat off of the skin graft. The upper half of the graft has had all of the fat removed by the VERSAJET. Clean dermis is visible. The lower half of the graft has not yet been defatted.

![The VERSAJET was used to clean the fat off of the skin graft.](image)
![Fully defatted, full thickness skin graft.](image)
![Full thickness skin graft inset into the tumor defect.](image)

Conclusion
The VERSAJET very effectively defats skin grafts and avulsed skin flaps. Low settings of 3 to 4 are recommended. A setting of 5 or higher can damage the skin graft. After all of the fat has been removed, there will be some residual strands of fibrous tissue that can be rapidly cut off with a scissors.

![The skin graft was secured in place with a foam bolster.](image)
Perineal debridement

History
This 45-year-old male was treated for Fournier’s gangrene with aggressive surgical debridement and was referred to plastic surgery for reconstruction after the wound started to granulate. The VERSAJET® was used to prepare the wound bed for surgical closure. This involved precise removal of a thin layer of granulation tissue and some residual necrosis while protecting the underlying testes and spermatic cord. A split thickness skin graft was successfully used to obtain healing.

The wound involved both testicles and was partially granulating with a small area of necrosis. Following debridement with the VERSAJET, the cleaned testes were covered with a split thickness skin graft.

The graft had a 100% take after the removal of the negative pressure bolster that held it in place for five days. After two-weeks the perineum was fully reepithelialized. The patient will have the option for scrotal reconstruction in the future.

Conclusion
The use of the VERSAJET provided absolute precision in removing the residual necrosis and granulation tissue covering the testes and spermatic cord. An excellent wound bed was achieved as evidenced by the 100% skin graft take. Following full healing and scar maturation, there will be opportunities for further reconstruction of the perineum. Although the VERSAJET was not used by the surgeons who treated the Fournier’s gangrene, it has been our experience that the VERSAJET is more effective in debriding all types of necrotizing fasciitis. A clean wound bed is achieved with fewer operations and control of the disease is more rapidly achieved.
Chronic lower extremity ulcer

History
This 45-year-old female had a two year history of chronic ulceration of her left distal leg. The patient initially underwent an open reduction internal fixation of an ankle fracture and the surgical wound failed to heal. The operating surgeon attempted skin grafting, compression therapy and multiple topical therapies which all failed to resolve the wound. After consultation, it was determined that the wound bed could be improved by means of VERSAJET® debridement and that an advanced therapy could then progress the wound to full healing. The patient underwent debridement of the ulcer using the VERSAJET and placement of a DERMAGRAFT®. After a second application of DERMAGRAFT two-weeks later, the patient went on to full healing within one month of the initial surgery. The patient remains healed at six month follow up.

Summary
This patient’s chronic ulcer failed to heal with two years of local therapy. A combination of the VERSAJET debridement to obtain a surgically prepared wound bed, along with the advanced technology of DERMAGRAFT skin substitute, allowed for the patient’s successful healing.
Open fracture of ankle

History
The patient is a 12-year-old girl who sustained an avulsion injury of her left medial ankle with exposed medial malleolus. Debridement of the wound using VERSAJET™ was followed by the placement of Integra™. After three-weeks, the Integra and the remaining wound were skin grafted. The patient healed without further complications.

Summary
The VERSAJET was used in combination with other advanced therapies to achieve healing in this complex wound with exposed bone. The VERSAJET allowed for a precise debridement with minimal injury to the adjacent normal tissue. This successful combination of advanced therapies proved to be an alternative to a micro-vascular procedure.
Flap necrosis

History
This 44-year-old patient underwent a left breast reconstruction with a right Transverse Rectus Abdominous Myocutaneous (TRAM) flap. The patient was a smoker who claimed to have quit smoking. However, she later admitted to smoking heavily in the postoperative period. The patient developed necrosis of the distal abdominal flap. She underwent a wound debridement using VERSAJET™ along with a sharp debridement of the skin. Patient was then treated with a negative pressure therapy and healed without further surgery.

![Necrotic abdominal flap in a smoker following a TRAM breast reconstruction.](image1)

![The wound after a sharp debridement of necrotic skin and removal of necrotic tissue using VERSAJET. The right rectus sheath had been reconstructed with acellular dermal matrix. A negative pressure dressing was then applied to the wound. No additional surgery was performed.](image2)

![Closed abdominal wound, not requiring further surgery.](image3)

Summary
This patient had a necrotic flap which is a significant complication following a TRAM surgery. The VERSAJET allowed us to obtain a clean wound of minimal size in one operative sitting. The wound subsequently healed with negative pressure therapy and local wound care. The acellular dermal matrix remained in the wound and healed without infection, slough or other complications. The patient’s scars fully matured. A local flap reconstruction of the scared lower abdomen is now planned to improve the appearance of this area. At the time, a nipple reconstruction and contralateral breast reduction will be performed.
Necrotic open wound of the left hand

History
The patient is a 51-year-old Hispanic female who was found in her apartment lying down on the left side of her body for two days. The patient has a history of long-term drug abuse, Hepatitis C and advanced liver disease. She was transferred to the Plastic Service of the University Hospital with a necrotic open wound of the left hand, which involved the entire radial aspect of the hand. Upon examination, the thumb was absent and the thenar eminence contained some necrotic muscle. In addition, a necrotic film and fibrinous exudates were noted on the dorsal surface of the wound. Moreover, her index finger of the left hand had several areas of necrosis. Salvage of the patient’s left hand required meticulous debridement of all nonviable tissues with preservation of tendon, nerve and vessels. This was accomplished by two VERSAJET® debridements. After adequate wound bed preparation, a scapulofascial microvascular tissue transfer was performed along with a skin graft. The patient healed without further complications and retains prehension.

Summary
Successful removal of necrotic tissue from the left hand using the VERSAJET allowed for an adequate wound bed preparation of this complex and difficult wound. The VERSAJET allowed for precise removal of necrosis and debris while preserving the delicate and functionally significant underlying structures. Once the wound bed was adequately prepared, the wound required a sophisticated microvascular reconstruction in order to preserve the exposed structures and create a functional resulting hand.
Supramalleolar ulcer of the left leg

History
This is a 74-year-old African-American male with a history of peripheral vascular disease, hypertension and depression. The patient presented with an ischemic left leg and underwent iliopopliteal bypass. In the immediate postoperative period, he developed an extensive ischemic soft tissue slough of the left lower extremity. The left heel had exposed bone and the anterior leg and dorsum of the foot had exposed tendon. A large eschar wrapped circumferentially around the distal leg. Plastic surgery was consulted prior to the planned, below the knee, amputation in spite of the otherwise successful revascularization. The initial treatment was to sharply peel off the eschar and to use the VERSAJET™ on the underlying soft tissue. The intention was to precisely remove devitalized tissue while preserving peritenon and periosteum. Negative pressure therapy was performed between debridements and the patient was discharged.

As an outpatient he was treated with additional debridements using VERSAJET in conjunction with intervening negative pressure therapy. After satisfactory wound bed preparation, split thickness skin grafts were applied to the left lower leg and foot wound. The skin graft measured greater than 225 sq cm and there was a 100% take. The patient went on to recover without any further complications. He remains ambulatory and the wound closed one year postoperatively.

Summary
With the use of VERSAJET, the supramalleolar ulcer of the left leg was successfully prepared for a skin graft. This challenging wound was managed with serial VERSAJET debridements removing only thin layers of obviously necrotic material, but preserving the deeper viable tissues including periosteum and paratenon. A surgically clean wound bed was created by meticulous care, which could not have been performed with standard debridement techniques. The use of the VERSAJET in this patient permitted leg salvage.
Third degree abrasions to the right chest and breast area

History
The patient is a 17-year-old female who was struck by a motor vehicle as a pedestrian and dragged along the road. As a result, the patient sustained severe and deep abrasions of her right breast and chest area, including the upper abdomen. Abrasions of the chest area were excised with the VERSAJET™ by tangentially excising very thin layers down to healthy bleeding tissue. This process also removed the tattooed road debris. The areas were then covered with meshed acellular dermal matrix. Negative pressure therapy was then applied. Five days after the excision of the wounds and placement of the allograft, a thin split thickness skin graft was performed. The patient healed uneventfully and the resulting scar was minimally deforming.

Summary
Through the use of VERSAJET, a healthy wound bed was obtained with minimal injury to collateral tissue and complete removal of road dirt. Sharp tangential excision is difficult to perform with accuracy over curved surfaces such as the breast. The debridement had to remove road dirt as well as remain superficial enough to preserve the areolar pigment. The addition of advanced therapies, such as negative pressure therapy and acellular dermal matrix, facilitated a rapid and successful recovery with minimal scar deformity.
Crush injury of the left foot with large area of skin and soft tissue necrosis

History
This 43-year-old male sustained a crush injury to his left foot and ankle area under a forklift. The crush resulted in a comminuted foot and ankle fracture. Additionally, the left foot had a 4 cm by 2 cm area of full thickness loss over the dorsum of the foot with surrounding crush injury of the soft tissues and significant edema. The patient underwent open reduction internal fixation of his orthopedic injuries and serial VERSAJET® debridements of his left foot and ankle to remove the crushed devitalized tissue, while causing minimal injury to the residual viable tissue. When a surgically clean wound bed was obtained, meshed split thickness skin grafts were used to cover the wound. The foot and ankle healed without further complication.

Summary
Successful removal of devitalized and crushed soft tissues using the VERSAJET prevented injury to the underlying tendons, bone, and other critical structures of the foot and ankle. The VERSAJET prepared the wound bed so that the skin graft had a 100% take and progressed to full healing. Traditional debridement techniques could have damaged viable collateral tissue leaving exposed bone, hardware, or tendon which would then have required a free flap reconstruction.
Avulsion injury of the anterior abdominal wall

History

The patient is a 48-year-old white male who suffered an avulsion injury during a motorcycle accident, which resulted in the loss of his entire anterior abdominal wall. Initially his survival was doubted. However, with supportive care, the patient survived and trauma surgeons covered his exposed abdominal viscera with Vicryl mesh. Three-weeks later the Plastic Surgery team was consulted to treat the wound. The VERSAJET™ was used to remove all residual necrosis and to clean the fibrinous debris off of the viscera. The patient was then treated with TRANSCYTE™. The TRANSCYTE was gradually removed and the residual areas of the open wound were sequentially skin grafted. The patient recovered completely, resumed ambulating and was discharged home.

Summary

In this case the VERSAJET allowed for the precise removal of all residual necrosis and fibrinous debris off of the viscera, providing a surgically clean wound bed for TRANSCYTE application and skin grafting. The VERSAJET permitted such complete control during the debridement that fibrinous material was cleaned from the bowel surface without injuring the bowels. The patient had an excellent wound bed preparation and there was a 100% take of the skin graft and TRANSCYTE. There were no enteric fistulae or complications of any sort. The TRANSCYTE stabilized the wound so that the skin graft reconstruction could be performed in an orderly staged fashion. This successful combination of advanced therapies allowed for the patient's complete healing: he is ambulatory and lives at home.
Open-wound of the right thigh and the left leg

History
The patient is a 41-year-old male who was struck by a car and dragged for approximately half a mile. The patient sustained multiple avulsion injuries of the right lower extremity in addition to open comminuted tibia and fibular fractures of the left lower leg. The open wounds of the right posterior thigh were significantly contaminated with asphalt and dirt, and were debrided using VERSAJET®. Negative pressure therapy was applied between debridements. The distal posterior wound of the right thigh extended over the entire posterior surface, starting from above the gluteal crease and involving the entire diameter of the posterior aspect of the right thigh. The open wounds of his legs required several VERSAJET debridements to remove necrotic debris and develop a surgically clean wound bed. The left leg had a severely contaminated and comminuted tibia/fibular fracture with loss of overlying skin. This injury was cleaned with the VERSAJET on multiple occasions and treated with negative pressure therapy. After the wound bed was adequately prepared, a latissimus free flap and skin graft were utilized to obtain wound healing.
Closure of the left leg wound with a latissimus free flap and skin graft.

Illustration of the healed right thigh wound.

Summary
Debridements with the VERSAJET® of a heavily contaminated and extensively traumatized wound allowed for the complete removal of dirt, asphalt and necrosis. The intervening periods involved negative pressure therapy. By using the VERSAJET, precise removal of the unwanted materials with maximal preservation of viable collateral tissue was possible. This ultimately resulted in bilateral limb salvage in a situation where alternative approaches would likely have resulted in amputations.
Credentials

All of the included cases were performed by the faculty of the Division of Plastic Surgery, Department of Surgery, New Jersey Medical School-UMDNJ at The University Hospital in Newark NJ.

Mark S. Granick, M.D., Professor of Surgery and Chief of the Division of Plastic Surgery
Ramazi O. Datashvili, M.D., Assistant Professor of Surgery and Chief of Microsurgery
Parham A. Ganchi, M.D., Ph.D., Assistant Professor of Surgery