

**PATIENT ARTICLE SUBMISSION FOR MEDIS, JAMA AND NEJM**

PATIENT COMMENTARY

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# HEALING CHRONIC VENOUS LEG ULCER COMPLICATED WITH MULTI-DRUG RESISTANT (MDR) *PSEUDOMONAS AERUGINOSA*

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## THE COMPLEXITY OF SOLVING PREVIOUS UNTREATABLE VENOUS STASIS ULCER

This case starts with a 55-year-old male patient with a small leg puncture wound in his right ankle. The right ankle had been fused and skin grafted from a much earlier automobile accident, and prior to the puncture incident was problem free. The puncture wound area became infected, and the wound began to increase in size with multiple failures of both topical and internal antibiotic applications, and surgical treatments including split thickness skin grafts, and free flap grafts. The patient is not diabetic and Oxygen extremity testing (tcPO<sub>2</sub>) showed adequate circulation to the foot and ankle area. Multiple hyperbaric oxygen treatments also showed that blood oxygen supply was not an issue.

Patient began treatment with an advanced wound care specialist at Baylor Comprehensive Wound Center in Dallas, TX after all the previous attempts did not close this venous stasis (slow blood flow) ankle ulcer. This open wound was a chronic (long duration) issue, increasing in size from the previous 6 years of conventional non-responsive treatment.

Remedies such as Ciprofloxacin powder, and other antibiotics including Gentamicin, Tobramycin, and even Meropenem administered by IV were ineffective with lab cultures showing a very resistant MDR *Pseudomonas Aeruginosa* organism dominant and increasing. Weekly debridement and wound dressing were prescribed and carried out as alternative treatments were evaluated, but the organism would rapidly re-colonize the wound area. *Pseudomonas* is extremely dangerous pathogen because it can not only create biofilms that act as a shield to protect itself, it can also use a combination of effects and sense what will protect itself and genetically morph to stabilize and grow a new dominant strain (1). This ability to overcome all antibiotics and genetically adapt to their environment is the basis for antibiotic resistance.

What types of infections does *Pseudomonas Aeruginosa* cause? *Pseudomonas* is in the top 5 (2) of infections that usually occur in patients in the hospital and/or with weakened immune systems. Infections of the blood, pneumonia, and infections following surgery can lead to severe illness and death in these people.

The medical procedure for the next 2 years was to painfully debride the now large (3 x 5 inch or 7.5 cm x 12.5 cm) wound and hope for in-situ healing – but increasing pain was causing poor quality of life due to pain, and opiate pain killers were causing patient gastrointestinal dysfunction, to the point that the patient needed to take medical absence/ leave of work.

MRI's showed no bone infection, but this organism seemed unshakable. Patient had resorted to treating wound with dilute sodium hypochlorite (bleach) known as Dakin's Solution to just stop the wound from getting larger than the current opening. Discussions on amputation were held if the infection continued to increase. See photo 1 below taken March 2017.



**Photo 1 March 2017**

In 2017 the wound care clinicians and doctors met for discussing/recommending alternative treatment, and who has had the best success in this type of non-treatable wound, and the patient was referred to a plastic surgeon at the Dallas Plastic Surgery Institute that had the best procedure/technique and used advanced surgical and post-operative equipment. This discovery process took a total period of 4-6 months to accomplish with traditional methods where using a big data mining of EMR/EHR (electronic records) software program could have located treatment procedure/doctor/equipment in much less time.

The advanced procedures that were successful consisted of:

- 1) Very aggressive water scalpel use for wound tissue removal of the infected area. This procedure required general anesthesia in the OR at Baylor University Medical Center in Dallas.
- 2) The use of Negative Pressure Wound Therapy (NPWT) for 2 weeks (wound vacuum and using open cell silver foam dressing), See photo 2 and 3.
- 3) At the end of 2 weeks NPWT (out-patient) therapy, the patient was back in the operating room and received a split thickness skin graft and was put on levofloxacin for anti-infection.



photo 2



photo 3

In photo 3 note the bright red re-granulated tissue due to increased blood flow and fluid removal due to the negative pressure wound system. Notice the square deeper red area (arrow) in the center where local vacuum and re-granulation was slightly higher. The negative pressure from the vacuum system removes liquid exudate and organisms, while increasing blood flow and stretching cellular structure to improve re-granulation tissue (see illustration photo 4) (3).

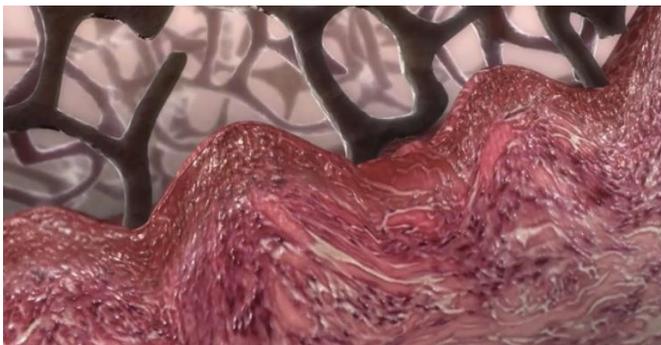


photo 4

Results: Upon 1<sup>st</sup> post-surgery dressing changes there was an absence of green fluorescent protein (GFP) marker indicating that there was no *Pseudomonas Aeruginosa* present. Bio-culture confirmed absence of the organism. This blue-green pigment was previously always seen in other treatments, and is a combination of [pyocyanin](#) (blue) and [pyoverdine](#) (green), which impart the blue-green characteristic. (4) (see photo 5 and 6)



photo 5



photo 6

Split Thickness Graft uptake was ~85 to 90 % and patient wound area completely healed over the next 3 months. See photo 7 below



photo 7

**Conclusion:** Improved quality of life with attendant pain removal occurred as a serious chronic infection due to [\*Pseudomonas Aeruginosa\*](#) was overcome in a venous stasis wound. A wound that was not responding to any conventional wound treatment was healed by the described procedure.

In the future using a directed AI capability, and big data search can lead to locating these effective treatments/solutions for complex issues, and rapidly advancing beneficial patient outcomes.

Patient would like to thank the Doctors and team clinicians at Baylor, Scott, White Denton Wound Center, Baylor University Medical Center in Dallas, and the Dallas Plastic Surgery Institute who helped make this successful treatment possible.

#### References

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