

CORR Insights®: Proximal Tibial Cortex Transverse Distraction Facilitating Healing and Limb Salvage in Severe and Recalcitrant Diabetic Foot Ulcers

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Where Are We Now?

In 2019, approximately 463 million adults worldwide were diagnosed with diabetes [5], which can be linked to a global burden of disease of USD 760 billion. By 2045, the number of adults diagnosed with diabetes worldwide is estimated to climb to more than 700 million, which is expected to

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carry a price tag of about USD 845 billion [5].

Drilling down more specifically, diabetes is the leading cause of foot ulceration, infections, and amputations. Since my training in 1990s, there have been few surgical advances in foot salvage for severe diabetic wounds. The main advance was in realizing this systemic disease requires a comprehensive team of experts including nursing, nutritionist, endocrinologists, and social workers beyond the isolated surgeon [7, 9].

Perhaps recognizing the long road of challenges in securing a healed foot wound that is durable and shoe-able, along with the hope of improved prosthetics technology and materials, general orthopaedic surgeons have moved toward amputations as the better option. As experts in musculoskeletal care, we told ourselves and our patients that quality of life was better having eliminated the healing time course with limb salvage. But the pendulum swing from salvage to amputation might not represent what the patient wants, and as we learn from the current study by Chen and colleagues [2], all ethnicities and patient populations

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may not want the same thing. Perhaps one of the first questions is to identify what the patient hopes to achieve with treatment and focus our efforts on the patient's wishes. If these wishes are for limb salvage, there are several challenges. The barriers in studying this topic are the multiple comorbidities experienced by patients with diabetes, as well as confounding issues, such as ethnicity and socioeconomic status, which complicate analysis. What is novel about the current study [2] is the concept of bringing blood flow by “indirectly” using the bone osteotomy to signal the body to enhance blood flow to aid in healing.

Where Do We Need To Go?

We need to identify the patients whose goals match up with the requirements of the limb salvage option, which include long recovery, continued need for modifications to footwear, and risk of recurrence. In the case of Asian patients, limb amputation can be a social impairment that is not acceptable [1], but for other populations, the more predictable recovery of an amputation and potentially earlier return to work/home responsibilities may be preferable. Understanding what the patient wants is pivotal.

Chen and colleagues [2] do an excellent job of reporting on patient factors known to delay wound healing like

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HGA1C lab values, age, wound size, and the absence of infection. The surgical technique describes cutting bone and perturbing the adjacent soft tissues through intermittent distraction to enhance blood flow promoting healing of a severe diabetic wound that could not be healed with other conventional methods. What is unknown is the mechanism of how this surgery enhances blood flow and more importantly, what is this blood providing to the tissues to encourage healing? In order to advance the science of wound healing, there are several questions that we need to answer including: What does the body need to heal a wound? When does the body need it? What are patients with diabetes lacking in this wound healing pathway so we can provide it to them?

How Do We Get There?

Knowing what your patient wants is of primary importance. There is moderate evidence that decision aids are helpful in discussing treatment choices with patients. There are also shared decision making tools that can be helpful to present options in an objective way with health literacy limitations kept in mind [8]. There certainly have been studies describing the many systemic and local factors impacting the diabetic foot ulcer healing cascade [3, 4].

The results of the current study offer insight into the systemic and local factors that affect the healing of diabetic foot ulcers, as well as the impact of

improved blood flow on surgical success in a difficult wound healing patient population. We need to build off of these results by determining whether increased blood flow, other growth factors, or blood products help induce healing. Once we do this, we can add in these targeted therapies to obtain the same cellular environment that will produce healing at perhaps an expedited fashion.

Researchers should go “back to the lab” to perform cellular analysis on the factors that the bone osteotomy are enhancing. By doing this, we can determine whether these factors can be turned on in a less invasive way. The challenge is that such investigations may also require genomic research. We do know that not all patients with diabetes have foot ulcers and that not all foot ulcers fail to heal. There are patient factors at the genetic level that make some patients more “brittle” and some diabetic wounds easier to manage. Patient-targeted therapies are on the rise in cancer treatments [6], and patients with diabetes may benefit from similar strategies.

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