

Lower Extremity Guidelines for Salvage (LEGS): An interview with Penn Orthopaedics Chair S. Scott Levin, MD, FACS, FAOA

TRANSCRIPT

Melanie Cole (Host): Welcome to the podcast series from the specialists at Penn Medicine. I'm Melanie Cole. And today, we're discussing the new lower extremity salvage guidelines and the Penn Orthoplastic Limb Salvage Center. Joining me is Dr. L. Scott Levin. He's the Chair in the Department of Orthopedic Surgery and a professor of Surgery in Plastic Surgery at Penn Medicine.

Dr. Levin, it's a pleasure to have you join us today. A hundred and eighty-five thousand lower limb amputations occur each year in the US. Where and why are these amputations taking place? And why are more than 500 of them occurring every day?

Dr. Levin: The cause for amputation is multifactorial. We can take three domains that predominantly cause limb loss. Number one, sadly, trauma due to injuries such as car accidents, motorcycle injuries, lawnmower injuries in children; the ravages of peripheral vascular disease and diabetes left untreated shut down the circulation in the extremities, the lower extremities more than the upper extremities, resulting in unsalvageable limbs; infection because of what we call sepsis or rampant infection in extremities requiring drugs to save life, but with loss of limb; and then a smaller percentage of patients with malignancies such as osteosarcoma or soft tissue sarcomas, which are soft tissue cancers or bone cancers, where the limb is amputated to treat the cancer effectively. So multiple, multiple reasons. Again, to narrow it down, mainly vascular disease and trauma, I would say.

Host: Well, thank you for sharing that. Can you tell us about the Lower Extremity Guidelines for Salvage or LEGS effort at Penn Orthopedics and why it was created? What is LEGS? Tell us a little bit about it.

Dr. Levin: Lower Extremity Guidelines for Salvage, LEGS grew out of the establishment of what we call the Penn Orthoplastic Limb Salvage Center. Orthoplastic is a term that I coined more than 30 years ago that describes applying the principles and practice of both orthopedics and plastic surgery to clinical conditions simultaneously to optimize care as it centers around what we call limb salvage.

So orthoplastic approach is for patients who were being threatened with limb loss, upper and lower extremity. And in our limb salvage center, using the orthoplastic approach, which has orthopedics and plastic surgeons working together on a patient's problem, the orthopedic surgeons obviously predominantly expert in bone and joint surgery, in fracture fixation, in joint replacement and reconstructive plastic surgeons are knowledgeable about soft tissue reconstruction and particularly microvascular surgery, which is transferring tissue from one place in the body to another on its blood supply.

Such as a patient injured in a motorcycle accident where the trauma causes avulsion or destruction of soft tissue over bone exposing the bone and rendering the limb at risk for amputation if the soft tissue is not restored. And we use these so-called microvascular techniques to transfer tissues from the back or the thigh or the abdomen to the extremities to reconstitute or rebuild soft tissue that is missing.

And that can occur in patients that have infection and even patients that have diabetes or vascular disease, where they have diabetic ulcers or vascular ulcers that result in soft tissue loss that is skin and subcutaneous tissue and muscle exposing bone, exposing the heel, exposing body parts that if they're not covered and they're not resurfaced, will render the part non-salvageable and require amputation.

So our Limb Salvage Center specializes in taking any patient who's had a trauma, chronic infection, vascular disease, diabetes, diabetic ulcers, intractable nerve pain, all sorts of conditions related to extremity dysfunction and treating them and reestablishing normal function, normal gait and normal quality of life with the limb salvaged.

Host: That's fascinating. So can you expand just a little on the guidelines to evaluate lower extremity injury patients and help streamline that transfer to dedicated centers to help them avoid amputation?

Dr. Levin: Well, our team, which includes orthopedics and plastic surgeons and vascular surgeons and interventional vascular radiologists, at the Penn Orthoplastic Limb Salvage Center is available 24/7, 365. We're here for patients that are acutely injured, as I said, that will require soft tissue reconstruction; patients with vascular disease, meaning the limb in trauma or even in chronic conditions is rendered ischemic, ischemic means the blood supply is either acutely interrupted with trauma or patients such as those with

peripheral vascular disease that have narrowing of the arteries and they also may or may not have diabetes, also characteristically have poor blood supply at baseline.

Then if that patient gets an injury or a diabetic develops an infection and soft tissue loss, not only do we have to reconstitute the soft tissue, but many times we have to improve what we call the inflow, the blood going into the limb, so we can transfer vascularized tissue or at least provide additional nutrients and blood to the limb that is threatened.

Host: Well, how then do dedicated centers like the Penn Orthoplastic Limb Salvage Center care for patients at risk? What are some of the potential benefits of transfer? And tell us about some of the different treatments and technologies that you've really mastered there.

Dr. Levin: Well, the technology again involves a very heavy reliance on vascularized tissue transfer using microsurgical techniques, so-called free flap surgery. We can transfer soft tissue, patients that have lost segments of bone in the thigh bone or the leg bone, the femur, or the tibia. We can take other body parts that contain living bone, either from the knee or the opposite leg, a bone called the fibula. We can take that on its blood supply and rebuild not only soft tissue with our microvascular techniques, but rebuild bones.

We have a way in patients that have threatened limbs with acute trauma to perform stabilization, acute stabilization, and then revascularize the limb and cover the limb in many patients such as those with what we call 3C injuries. There's a classification, 3B and 3C. And characteristically, 3C injuries are severe injuries that if these limbs in a timely fashion, within a few hours, do not have their blood supply reconstituted, so-called bypass operation, that limb is lost forever.

So we have incredible vascular surgeons at the Limb Salvage Center that work with the orthopedic trauma team and the plastic surgeons. We work as a team, the acronym TEAM, together everyone achieves more. And by working together, we bring the best of Penn Medicine, the surgical skillset, the radiologist skillset, the management of pain, which presents to these patients not infrequently. And we put our toolbox all in the same room and go to work and salvage limbs. Other centers may not have the depth and breadth of talent and techniques that we offer that can salvage limbs.

Host: That is so interesting. Now, as you've told us about the multidisciplinary services, Dr. Levin, and why they're critical to managing some of these very complex patients, can you explain the benefits from not only the surgical standpoint as you've just discussed, but also from managing those medical comorbidities that come, as you mentioned, diabetes and vascular issues? Speak about how you all work together to help manage some of those.

Dr. Levin: Well, we rely heavily on our medical colleagues, our endocrinologists, our surgical intensivists, patients perhaps have to go to the intensive care unit. They manage their fluids, their nutrition, their pain, their ventilators. A lot of these are what we call polytrauma patients that have had life-saving surgery, for example, on the outside done very well by our community physicians, community surgeons, and basic trauma care by excellent orthopedic surgeons.

But the level of expertise after what we call damage control is performed and life is saved is then to turn attention in the polytrauma patients, the patients who had a severe crushing injury or a car accident or a fall from a height or an electrical injury, you think of a traumatic mechanism. After the life is saved from such an adverse event, then attention is turned to limb salvage, which becomes a secondary consideration. How do we rebuild that damaged and fractured and soft tissue deficient leg?

If it can be done in the community, that's great. But often, the armamentarium in many community regions is not such that they have the availability of that expertise. And so we offer partnership with the excellent physicians in the community to work with us, to let us take on the patient for the next step related to limb salvage.

Host: Finally, Dr. Levin, what message do you have for non-tertiary trauma centers and emergency departments to encourage them to refer to limb salvage centers like the Penn Orthoplastic Limb Salvage Center? To whom do they reach out and how? And if a provider has a patient with a lower extremity trauma that includes those factors you've mentioned, what's the best way to transfer that patient to the Penn Orthoplastic Limb Salvage Center.

Dr. Levin: Well, as I said, we're available 24/7, 365. So if you have a patient that has an acute problem or a chronic problem, a non-healing wound; a non-union, a fracture that has not united; intractable extremity pain, nerve injury,

call the orthoplastic center, think LEGS, Lower Extremity Guidelines for Salvage, and we'll be here to help you.

Host: What great information and great work that you're doing, Dr. Levin. Thank you so much for joining us today. And to refer to Dr. Levin at the Penn Orthoplastic Limb Salvage Center, please visit pennmedicine.org/refer or you can call our dedicated line at (215) 615-6978 and speak directly to one of our POLSC surgeons.

That concludes this episode from the specialists at Penn Medicine. I'm Melanie Cole.