Purpose: Treatment of diabetic ulcers of the lower extremity is technically challenging. Factors such as neuropathy, excess biomechanical pressure, limited soft tissue availability, and vascular compromise make wound healing difficult. Exposed bone, joint, and/or tendon are also difficult to treat while avoiding infection. Muscular flap transposition is a powerful treatment option which not only provides soft tissue coverage, but also increased vascularity from the overlying muscle belly. This case study presents our experience with three patients who underwent local muscle flap transposition, two extrinsic and one intrinsic muscle flap, for treatment of diabetic ulceration. Although current literature describes favorable results with local muscle flap transposition, underutilization of this treatment may be due to lack of familiarity with this option by many community-based providers. Multiple authors report success of flaps in high volume settings. 1,4,5 To our knowledge, there are no case reports in the literature of muscle flap transposition for treatment of diabetic wounds performed in a local community-based hospital.

Reverse Hemisoleus Flap: A 72 yo diabetic female presented to an outside ER with a displaced ankle fracture that was closed reduced and casted. Three weeks later she presented with nausea, fever, chills. Upon removal of the cast she had an ulceration of the medial malleolus with exposed bone and was admitted to our hospital. She underwent initial debridement of the ulcer with complete resection of exposed tibialis anterior tendon and placed in a delta frame. Due to the medial location of the ulceration and exposed bone, a hemisoleus muscle flap was planned. Vascular studies revealed that she had perforators of the posterior tibial artery supplying the soleus muscle belly. The ankle joint was removed for fusion due to the loss of the powerful dorsiflexor tibialis anterior. Next, a longitudinal incision was made 2 cm medial to the medial border of the tibia. The medial half of the soleus muscle belly was carefully dissected from the overlying muscle belly. The flap was then covered with xenograft and wound vac. A circular external fixator was placed for compression across the fusion site and off-loading of the area of the graft. This patient did experience distal tip necrosis of the flap, however with further debridement and split thickness skin grafting went on to full incorporation. She remained non-weightbearing for a total of eight weeks and transitioned into a total contact cast and eventually a CROW.

Abductor Hallucis Flap: 52 yo diabetic male with chronic ulceration right heel. He underwent multiple attempts of wound debridement with allograft and application of wound vac. Due to the plantar medial location of the wound, an abductor hallucis flap was planned. A central incision was made along the medial aspect of the foot to the 1st metatarsal. The planter fascia was incised from the medial and lateral border of the abductor hallucis. The insertion of the abductor hallucis was identified at the calcaneal tubercle. The muscle belly was dissected off of the base of the proximal phalanx and the proximal articular joint was ligated. The flap was then rotated proximally and inset into the defect. The flap was then covered with xenograft and wound vac negative pressure therapy. A split thickness skin graft was placed three weeks later. The patient remained non-weightbearing for eight weeks until the patient had full incorporation of the graft. Three months later, the patient had recurrence of the ulceration from diabetic shoes. He was placed in a total contact cast, which caused him to ulcerate on the medial malleolus. Patient is currently non-weight-bearing and undergoing local wound care.

Discussion: This case study details our experience with muscle flap transposition for the treatment of diabetic wounds of the lower extremity in a community hospital. Our surgical principles and techniques are presented. Although all patients had survival of the transposed flap, the extrinsic flaps were complicated by distal flap necrosis. Due to the multiple comorbidities of this patient population, pre-operative studies are vital for flap survival. Determination of peripheral arterial disease with appropriate vascular consultation and imaging studies is important in pre-operative planning to assess regional vascularity of potential muscle flaps. 1,2 As described in current literature, distal tip necrosis is a common complication. 1-4 Authors recommend careful, precise flap dissection and avoiding tourniquet use during these procedures to allow evaluation of flap viability. Because superficial skin shear can occur, external fixators are recommended for stability and protection at the transfer site. 5 In conclusion, muscle flap transposition is a very useful tool for limb salvage in diabetic patients with chronic non-healing ulcerations. As these patients have complex medical conditions and comorbidities which defy easy solutions, frequent follow-up and preparation for management of ongoing problems is imperative.

References: