A 72-year-old male who presented with a deep planar abscess in the foot secondary to longstanding history of neuropathy and non-compliance with glucose management. The patient presented to the emergency department with puncture wound to the foot and deep abscess with surrounding cellulitis and osteomyelitis of the calcaneus. The patient underwent multiple debridements of the tissue to ensure no residual infection remained. Multiple comorbidities added complexity to this case. The patient underwent vascular intervention to allow for optimal perfusion to the lower extremity. The Arkle-Brachial-Index following vascular intervention was 0.49 indicating perfusion to the lower extremity. The vascular surgery team recommended to the patient was an above-the-knee amputation. Due to the patients social environment, limb salvage techniques were instead implemented. Reverse sural fasciocutaneous flap was decided to be the most appropriate for deficit coverage.

The Reverse sural fasciocutaneous flap was delayed in order to allow for vasoadium of the distal perforators; also known as the choke vessel phenomenon. Delay in the flap would increase our chance of flap survival by preventing vasoaspass in the distal perforator that could be observed with a one-step flap rotation. After a clean margin of bone and soft tissue were verified by microbiology and pathology, the fasciocutaneous flap could be initiated. At week one, the medial aspect of the flap was infiltrated with 1% lidocaine plain at the planned incision site. The medial margin of the flap was incised and careful attention was made to prevent injury to the neurovascular bundle at the proximal aspect of the flap.

The leg was bandaged and the patient returned one week later. At the second week, a lateral incision was planned. 1% Lidocaine plain was infiltrated into the incision site. The incision was made once again ensuring the neurovascular bundle was not infringed upon. At this point, careful dissection was utilized to free up the fasciocutaneous flap from medial to lateral ensuring the plane between the deep fascia and the muscle belly were well-defined and not breached. Previously described in literature, a sterile glove would be placed in this plane to prevent adhesion while the flap was delayed further. Instead, at this time, a meshed bi-layer skin substitute with a silicone backing was placed on the flap donor site with the silicone facing the fasciocutaneous flap to prevent adhesions. The graft was secured with staples and a non-adherent soft dressing was applied to the lower extremity.

Purpose/Literature Review
The Reverse Sural flap originally described by Donski and Fogedstam in 1983 (1). The flap is based on a perforator off the peroneal artery posterior to the tip of the fibula. This perforator is shown in literature to be variable, but at an average of 4-6cm proximal to the tip of the fibula. The anatomy of the flap includes the Sural nerve, Superficial Sural Artery, saphenous vein, and the flap is based off distal perforators from the peroneal artery. All should be running in a linear fashion through the center of the flap. The idea of Pre-lamination was originally introduced by Pribaz and Fine (2). As a term, prelamination should be used to describe implantation of tissue or devices into a flap prior to transfer. Preadaptation is limited in its meaning to implantation of a vascular pedicle into a new territory and to transfer the tissue with its implanted pedicle. Prior to Pribaz and Fine paper entitled Preamplation: Defining The Preadapted Flap - A Case Report and Review the term preadaptation was a generalized term being used to describe any adjustment to the flap (2). A literature review showed no cases of prelamination of the donor site being published.

Here a case is described of prelamination at the donor site in order to achieve increased wound healing time and prepare the wound bed for split thickness skin grafting following transposition of the reverse sural fasciocutaneous flap.

Case Report
The patient returned the following week for rotation of the fasciocutaneous flap. The flap was secured with 5-0 Monocryl suture. A ring external fixator was applied to ensure protection of the flap and compliance with pressure restrictions. A Zimmer dermatome was utilized at 0.018 setting in thickness to harvest a split thickness skin graft from the ipsilateral thigh approximately 5cm in width and 10cm in length. The graft was meshed at a 3:1 ratio prior to application to the posterior call. The split thickness graft was then secured with 5-0 Monocryl. The patient was closely monitored over the next several weeks to ensure graft take. A small area of necrosis was noted to the fasciocutaneous flap. The patient was followed weekly. At the 8 week interval, enough graft take was achieved to remove the external fixator. Following removal of the external fixator, the leg was bandaged with a protective dressing consisting of non-adherent, gauze, cast padding and ace. The patient continued to follow up weekly with serial debridement. Noted healing of the donor site was seen at week 8. The recipient site was not as vigorous in its healing. It was not considered clinically healed until 3 month interval.

Discussion
The reverse sural fasciocutaneous flap is typically used for coverage of soft tissue defects created by traumatic injury in the healthier patient population. This case of a reverse sural fasciocutaneous flap was described with the addition of prelamination at the donor site. By prelaminating the donor site, the wound bed is being prepared to receive the split thickness skin graft. During the delay of the flap maximum dilation can take place in the flap pedicle artery; which will overall decrease our healing time post rotation of the flap. To our knowledge, this will be the first report on the use of prelamination at the donor site of a reverse sural fasciocutaneous flap.

In this specific case, we report a successful flap for wound coverage. However, the overall success rates of reverse sural fasciocutaneous flaps are mixed in literature. Most recently (Lee, Ha, et al) reported 8% partial necrosis and no flap loss (3). We did report some necrosis and flap loss which was augmented with further split thickness skin graft from the thigh. This case was a successful report of limb salvage on a planned above-knee amputation. To date, the patient reports ambulation with assistive device.

Conclusion
Coverage of the calcaneus was achieved with the reverse sural fasciocutaneous flap and prevention of amputation was successful, despite non-compliance of the patient. The meshed bi-layer graft incorporated well at the donor site and was assistive in preparing the site for split thickness skin graft. The silicone layer at the posterior margin was successful in preventing the fasciocutaneous flap from adhering to the donor site during the delay. Some flap loss was noted in areas without exposed bone. The areas of flap loss were augmented with split thickness skin grafting. Reverse sural fasciocutaneous flap is more technically challenging and should be reserved as a final option for limb salvage. Nazir et al. concluded, flaps performed on patients with significant risk factors should be staged in order to minimize complications(4).

References