Application of Allograft Adipose Matrix to a Below the Knee Amputation Post Surgical Wound Dehiscence

INTRODUCTION

Below the knee amputations are complex procedures leaving many patients with minimal subcutaneous tissue over bony prominence. As a result, patients may experience wound dehiscence from shearing and friction forces from the prosthetic leg. Aseptically processed allograft adipose matrix (AAM) is a treatment option that can help to restore the natural cushion or supplemental support in the underlying adipose tissue matrix as the result of damage or naturally occurring defects. This case demonstrates how AAM can minimize shearing and dehiscence from the bony prominence over a prosthetic limb.

METHODS

A 57 year-old male with a significant past medical history of coronary artery disease, end stage renal disease on hemodialysis, hypertension, and diabetes mellitus type 2 (uncontrolled), neuropathy who was treated for bilateral lower extremity diabetic foot ulcerations which required below the knee amputations. A rotational muscle flap gastrocsoleus over the leg proximal tibia was performed. The patient was ambulating post-operative with prosthetic legs. However, the patient returned to the clinic 11 month's later secondary to new wound dehiscence of the right leg. The prosthetic leg was rubbing against the wound where there was a bony prominence. The patient underwent routine wound care (debridement, application of collagen, compression) to achieve wound closure. AAM was treated in the subcutaneous space along the bony prominence. Non-contact near infrared spectroscopy of the flap was examined (ratio of tissue oxygenation) every 2 weeks.

RESULTS

The patient tolerated the procedure with minimal discomfort and was able to resume wearing the prosthetic limb without any further issues. No dehiscence was observed from any shearing action.

DISCUSSION

The AAM treatment was able to provide a cushion over the bony prominence and minimize frictional forces from the prosthetic leg. There was no dehiscence observed and the patient was able to resume wearing the prosthetic limb without any issues.

*Leneva[®] (MTF Biologics, Edison, NJ)

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Patient Information:

57 year old male, significant medical history of coronary artery disease of native vessel, hypertension, diabetes mellitus type 2 (uncontrolled), complications of retinopathy, neuropathy, peripheral arterial disease and nephropathy. Patient required bilateral below the knee amputations

Initial Examination/Wound History:

Patient required bilateral below the knee amputations. Left BKA was performed 9/6/2021; Right BKA was performed 1/2022. The patient returned to the clinic 12/2022 secondary to wound dehiscence of the right BKA stump secondary to shearing/friction between bone and below the knee prosthetic leg.



Figure 1a: 12/13/22, wound dehiscence of BKA stump due to shearing between bone & below knee prosthetic leg



Figure 1b: 12/29/22 wound closed, padding over distal tibial bone consid ered insufficient, as it rubs against prosthetic



Figure 2a: 12/13/22, wound dehiscence observed, average of 70% oxygenation was measured using the SNAPSHOT NIR imaging device



Figure 2b: 12/29/22, wound closed, average of 85.5% oxygenation measured. Are-as of robust red may be indicating pres-ence of inflammation. The fat pad was considered inadequate with the tibial bony prominence

CASE REPORT

Treatment:

After healing the wound, the patient was considered for the application of AAM to make a "fat pad" over the distal tibial bone. AAM was applied to make a fat pad around the protruding tibia felt along the patient's right transmetatarsal amputation. The patient's prosthetic leg rubs against the area which recently created an ulceration. SNAPSHOT NIR (Kent Imaging) was used to measure oxygenation and microcirculation in the wound bed. Robust red can indicate hyperemia/inflammation. As this subsides, the red coloration is less pronounced. Blue indicates poor oxygenation, red indicates increased oxygenation.

<u>Outcome</u>: Patient has remained closed. No dehiscence observed at 10 weeks post treatment of AAM. In trying to correlate oxygenation, variable oxygenation was observed. Shadowing caused by the curvature of the BKA stump and/or thickness of the skin may be contributing to the oxygenation variability. More patients are needed to be evaluated to establish trends.

Figure 1c: 2/23/23 (pretreatment), protruding tibia felt along right transmetatarsal amputation

Figure 1d: 2/23/23, AAM injected subcutaneously



Figure 1e: 3/2/23, 1 week post-treatment of AAM, area has remained closed, no dehiscence observed

Figure 2c: 2/23/23, average of 80% oxygenation observed

Figure 2d: 3/2/23, 1 week post-treatment, range of oxygenation val-ues from 70-80% in the middle



Figure 1f: 3/16/23, 4 weeks post-treatment, no dehiscence, skin appears softer



Figure 1g: 4/13/23, 10 weeks posttreatment, still no dehiscence with bone on below the knee prosthetic

Figure 2e: 3/16/23, at 4 weeks posttreatment, variable oxygenation values observed. Values of 81-85% in the center with a range of 68-76% oxygenation

Figure 2f: 4/13/23, 10 weeks posttreatment, variable oxygenation values ob-served. Center was at 81% with a range of 68-79% oxygenation