

Use of Fish Skin Xenograft to Assist Management of Wounds in Patients with Peripheral Vascular Disease Richard Bruno, DPM, FACFAS

Statement of Purpose

The aim of this study was to evaluate the efficacy of the use of fish skin xenografts for wounds in patients with peripheral vascular disease.

Level of Study

Case Study IV

Introduction

Peripheral arterial disease affects 202 million people worldwide. The cost for caring for patients with Diabetes Mellitus and PAD range from \$84 to \$380 billion.

Co-morbidities such as Diabetes Mellitus increase the risk and incidence of PAD. Patients with peripheral vascular disease usually present with wounds which are difficult to heal. Traditionally, these are wounds which are not receptive to graft treatments due to the lack of blood supply to assist with full incorporation. Fish skin xenografts were utilized in this study on patients with peripheral vascular disease to evaluate the efficacy of healing.

Nishio et al studied average wound healing rates in patients with PAD versus patients without PAD. PAD patients healed at 128 days versus 79 days for those patients without PAD. These patients with PAD also face increased risk of wound recurrence and further amputation. A study of 90 diabetic patients including PAD and prior first-ray amputations, 60% went on to a second amputation, 21% a third amputation, 7% a fourth amputation, 11% had a TMA. An additional study shows 49% of patients with amputations developed a contralateral foot infection within 18 months following an amputation, and 50% of patients who undergo a lower extremity amputation will require an amputation on the contralateral limb within 2 years.



Initial wound presentation in a patient with severe PAD

Thirty-six patients with wounds were included in this study. Co-morbidities included but were not limited to Diabetes Mellitus, Peripheral Vascular Disease, Congestive Heart Failure, and Chronic Kidney Disease. There were four patients which were transplant patients. Two patients included had contralateral below knee amputations. All patients were optimized based on their need for other medical specialties and management. All patients were cleared by their Vascular service to proceed with graft procedures as these patients were maximally revascularized. The majority of patients (twenty-four) had moderate lower extremity arterial insufficiency at initial presentation. There were nine patients starting with mild arterial insufficiency and three patients with severe arterial insufficiency. All patients had up to date vascular studies which revealed mild to moderate lower extremity arterial insufficiency following intervention which were recorded within one month prior to graft application. Each patient underwent wound graft procedures using fish skin xenograft with applications occurring every three to four weeks.

Thirty-one of thirty-six patients went on to heal fully with fish skin xenograft application. Applications ranged from one to four applications. The average time to healing was 10.2 weeks. Wound sizes ranged from 1.2 cm x 1.0 cm x 0.2 cm to 15.3 cm x 10.3 cm x 1.0 cm. Two patients who failed to heal their wounds went on to proximal amputation. These patients were in the moderate lower extremity insufficiency group with one of them progressing to severe insufficiency after the final skin graft application. Nineteen of the thirty-one healed patients had mild arterial insufficiency while twelve had moderate arterial insufficiency. No patients had improvement in their vascular status or further intervention during and after skin grafting procedures. All thirty-one patients remained healed with an average follow up of 9.3 months at the time of submission. There were no instances of infection following the procedures and throughout management.



Methods

Results







Wound progression with grafting

Discussion

This case series demonstrated the successful use of fish skin xenografts in patients with peripheral vascular disease. These are complicated patients and cases where traditional wound care approaches are limited and may not succeed.

Revascularization plays an important role in assisting the healing of wounds in patients with PAD as proven where endovascular intervention patients had a 26.7% and bypass patients had a 65.0% increase in wound healing compared to patients with no intervention.

A study by Lin et al studied the rate of any subsequent amputation was highest in patients with PAD and DM, 23% vs DM = 17%. The rate of subsequent minor amputation was 16% in the PAD/DM versus 15.2% in PAD and 12.2% in patients with DM. Patients with PAD/DM had the highest rate of subsequent major amputation (6.3% vs DM = 5.2%, PAD = 2.1%. Patients with PAD had a recurrent surgery encountered at 8.6 months following initial surgery due to a recurrent issue.

The difficulty in healing wounds with PAD using graft techniques is highlighted across multiple studies. Naz et al conducted a study reviewing the efficacy of split thickness skin grafting in patients with PAD. Revascularization was required in 23 patients before STSG. Patent pedal arch was present in 8 patients; 35 patients had an absent or incomplete pedal arch. Patients with a fully patent pedal arch healed at a significantly higher rate than those with an absent or incomplete pedal arch at 1 month (62.5% vs. 17.1%). There were 18 of 38 (47.37%) wounds healed and 20 (52.63%) still open.

References

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