



# Pyogenic Granuloma: A Novel Treatment and Case Review

Russell L. Platt III, DPM<sup>1</sup>, Deana L. Lewis, DPM<sup>1</sup>, Isaac Korb, DPM<sup>1</sup>, Said Atway, DPM FACFAS<sup>1</sup>, Benjamin Kaffenberger, MD<sup>2</sup>

1. The Ohio State University Wexner Medical Center, Department of Orthopedics Division of Podiatry, Columbus, OH

2. The Ohio State University Wexner Medical Center, Department of Dermatology, Columbus, OH

## Introduction

Pyogenic Granuloma is a benign vascular tumor that can present as a chronic wound with delayed healing leaving the patient susceptible to infection in the foot and ankle. In this case study, we highlight an unusual and challenging case of pyogenic granuloma presenting as a large chronic wound in the right foot. This case documents the treatment of a pyogenic granuloma that had failed surgical and other conservative treatments and successfully responded to more novel treatment of topical beta-blockers.

## Literature Review

Pyogenic granulomas are benign vascular tumors characterized histologically by a lobular proliferation of capillaries. It is more accurately called a lobular capillary hemangioma and they are a relatively common benign skin and mucosa growth seen on the head, neck, upper trunk, hands and feet that evolves rapidly over a period of a few weeks [1]. The incidence of pyogenic granuloma has been reported as 26.8–32% [2]. Historically these lesions were thought to be caused by a bacterial infection, however it is now thought that several possible etiological factors are implicated [3]. Treatment modalities vary for pyogenic granuloma including the emerging role of beta blockers in the field of dermatology. Beta-blockers antagonize the effects of circulating catecholamines on beta-adrenoceptors within the skin[4]. Beta blockers are increasingly being used for non-healing chronic wounds, as highlighted in our case report. A prospective non-randomized single-center study by Thomas et al. showed that the patients treated with 0.5% topical timolol maleate had a significantly higher ulcer healing rate of 61.79% compared with the control group [5]. Further, several studies have supported topical beta blockers, such as timolol in the treatment of pyogenic granulomas with Timolol maleate in 0.5% gel formulations the most widely used [6]. According to Gupta et al, 10 patients were treated with 0.5% timolol maleate ophthalmic solution four times a day, obtaining complete resolution in 5 cases, partial resolution in 2 patients, and no response in 2 patients [7]. Another study by Neri et al., they treated 22 patients with topical propranolol 1% ointment twice daily under occlusion (hydrocolloid dressing), with complete response in most cases (59% complete regression after an average of 9 and a half weeks, and none of the regressed pyogenic granulomas relapsed within 2 years of follow up [8]. In this case study, we highlight a 65-year-old male patient with a non-healing wound to the right foot with confirmed diagnosis of a pyogenic granuloma that was later treated with topical beta blockers.

## Case Report

Our patient is a 65-year-old male with a past medical history significant for Type 2 Diabetes Mellitus, CKD stage 3a and Lymphedema who presented to OSU Wexner Medical Center ED in June of 2022 with a malodorous wound with significant drainage concerning for osteomyelitis. The wound was located on the right calcaneus, and it did not probe to bone. Radiographic imaging and MRI of the right foot showed concern for osteomyelitis of the calcaneus. These findings were discussed with patient, in which he was amenable to further treatment with surgical intervention consisting of I&D and bone biopsy with skin graft substitute. Upon surgical debridement, intra-operative findings were significant for hyper granular tissue and a bone biopsy was sent to pathology which was negative for osteomyelitis. Upon finishing the procedure, a skin-graft substitute was applied overlying the wound. The patient was subsequently discharged on oral antibiotics and to follow up as outpatient. Upon outpatient follow up in the wound care clinic, the patient was subsequently treated with local wound care modalities with lack of wound healing progression. In November 2022, surgical debridement and grafting was performed again with deep tissue cultures taken as well. Intra-operative tissue cultures were sent to pathology verifying that the wound was a benign vascular mass consistent with Pyogenic Granuloma. At this point, plastic surgery was consulted in addition to dermatologic oncology to verify if the wound would need to be completely resected. Upon follow up with OSU Dermatology, it was determined that resection could be avoided with a topical beta blocker treatment to the wound. The medication of Timolol 0.5%, a betablocker medication typically utilized for ocular hypertension and glaucoma.

Unfortunately, due to financial reasons, the patient was unable to afford timolol and the medication was switched to Propranolol. Propranolol is typically an oral medication more commonly used for circulatory and hypertension conditions and may also be used for the same purpose as Timolol in wound care as a more affordable option. Propranolol 40 mg tablets have been crushed and applied to the wound daily resulting in promising progress in healing of the wound (Figure 2).



Figure 1: Size of wound at its largest measurement at month 2

Figure 2: Application of crushed tablet of 40 mg of Propranolol applied to wound in clinic

Figure 3: Healing progress at time of most recent follow up of this study at month 13

## Results

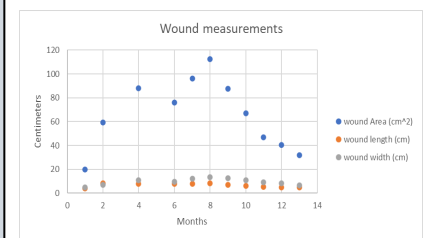


Figure 4: Wound Size Measurements from June 2022-August 2023

Our results show that at 13 months since patient's initial presentation, the wound has seen 65% improvement in wound size with current wound measurements 31.85 cm<sup>2</sup> improved from largest wound measurement size of 112.56 cm<sup>2</sup> (Figure 1), which was when the wound size was at its largest just prior to starting treatment with topical beta-blockers at month 8 (Figure 4). The wound measurement began on June 2022 (month 1) at initial presentation, to August 2023 (month 13). Beta-blocker treatment was initiated on month 7 and continued through month 13 (Figure 4).

## Discussion/Conclusion

Beta-blockers have proven to be safe and well tolerated in the treatment of pyogenic granulomas and is supported by our results and most recent wound measurements of our case study (Figure 3). There are limitations to the results of the study in that wound measurements were taken by a different member of the wound care staff at each follow up visit. Despite the prevalence of pyogenic granulomas, it is important for foot and ankle surgeons to become familiar with this pathology given that they can be threatening to the patient as they grow rapidly and their size causes discomfort and pain which may require surgical excision. Early diagnosis and prompt treatment are very important to prevent further complication as well as to improve the overall quality of life of the patient.

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