Case Series

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The Relative Efficacy of Topical and Systemic Antibiotic Therapy in Preventing the Development of Pyogenic Granulomas in Burn Patients

Saba Kiran[1], Samia Tasleem[2], Amber Bawa[3], Maria Attarwala[4], Bushra Syed[5], Humaira Talat[6]

[1]Senior Registrar, Plastic Surgery Burn Centre, Dr.Ruth K.M.PFAU Civil Hospital Karachi
[2]Dow University of Health Sciences, Karachi
[3]Assistant Professor, Plastic Surgery Burn Centre, Dr.Ruth K.M.PFAU Civil Hospital Karachi
[4]3rd year MBBS student Sindh Medical College, Jinnah Sindh Medical University Karachi.
[5]House officer Burn Centre, Dr.Ruth K.M.Pfau Civil Hospital Karachi
[6]Associate Professor and Head of Department Dermatology Dow University of Health Sciences Karachi

Address of Correspondent
Dr. Samia Tasleem
drsamiapapscon123@outlook.com

ABSTRACT

Pyogenic granuloma (PG) is a benign vascular tumor commonly seen in children, typically emerging on the skin or mucosal surfaces. This case series examines ten instances of PG following second-degree burns, presenting unique clinical features and treatment responses. PG, often a result of trauma rather than infection, can mimic other vascular lesions and requires accurate diagnosis to distinguish it from conditions like Kaposi's sarcoma and deep mycosis. The series includes cases of burn injuries caused by various substances, such as hot milk, oil, and boiling water, leading to PG formation. Treatment strategies varied based on the severity and complications of the burns, including bacterial and fungal infections. Standard burn care, including topical antibiotics and dressings, was employed initially, with advanced therapies and surgical interventions applied as needed. Notably, individualized treatment based on microbiological results improved outcomes significantly. This study underscores the necessity for precise diagnosis and tailored therapy to manage burn-related PG and associated infections effectively. Future research should focus on standardized burn care protocols and the impact of antimicrobial treatments on burn healing.

Keywords: breastfeeding, neonatal mortality, postpartum period, low-middle income countries

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Introduction

Pyogenic granuloma (PG) are acquired vascular tumors that typically develop on the skin, but can also impact mucosal surfaces and be detected in subcutaneous or visceral areas. They are the most common. Observed in youngsters, particularly those under five.[1.] The majority of patients are newborns and young children, and all of them have previously suffered second-degree burns with liquids such as milk. BH flared up in patients' burned areas within 1-4 weeks and could be caused by bacteria, fungi, or viruses. And can be classed as proliferative. Growth and shriveling involution phases, with a static interval in between[2] Burn hemangiomas are typically numerous and eruptive[3]. That appears after approximately several weeks later, burn with hot milk and then grow swiftly to become many angiomatous masses that tend to merge into enormous lobulated red gray lumps stay for months, then involute spontaneously in about 37.5% of cases without therapies simulating the stages of infantile hemangioma.[4] The pathology revealed three histological features: hyperkeratosis (acanthosis of the epidermis), proliferative vascular edematous stroma, and plasma cell and lymphocyte infiltration. Marker for DC 34.[5] PG has been associated with certain medications such as oral contraceptives, retinoids, gefitinib, capecitabine, and afatinib [(6)]. Burn hemangioma (BH) is a common type of pyogenic granuloma, and demonstrates strong clinical symptoms that are distinct from those with

classic pyogenic granuloma. The name pyogenic granuloma is misleading as it is neither pyogenic (pus-producing) nor a true granuloma as the cause of hormonal or traumatic and has no association with infection or pus production. Pyogenic granulomas that appear after burn (PGB) are different from those with classic pyogenic granulomas. One of the most important differences is related to infectious agents in classic pyogenic granulomas and pyogenic granulomas following burn.[7]

PG can mimic other vascular tumors including Kaposi form hemangioendothelioma, infantile hemangiomas, vascular malformations, and Kaposi sarcoma. In so-called "Kaposi-like PG" human herpes virus type 8 could be identified. These lesions are true Kaposi sarcomas, not PG Conservative treatment, such as wound management and antibiotics, should be prioritized for big PGBs on sensitive areas of the body. When conservative therapy is inadequate, surgery may be selected, including cautery, cryotherapy, and surgical excision with primary closure or with Grafting.[2]

Case Report

A 60-year-old female with no known comorbidities presented with a 2% total body surface area (TBSA) scald burn caused by boiling milk that affected her chest and right leg. The burns were classified as second-degree. Intravenous fluids, topical ointments, and daily silver sulfadiazine dressings were given at a peripheral healthcare centre as part of the initial therapy. During the initial presentation, no laboratory studies were conducted. By the seventh day after the incident, the patient had noticed blisters on the damaged areas. These lesions were described as pruritic, itchy, and not painful. Initially, the lesions were pink and flat, but after a week, they turned white and then darkened to brown. By day 14, the lesions had become variegated. Growths around the size of 4cm.

Pyogenic granulomas, post-burn angiomas, viral warts, and fungal masses were all probed as possibilities for the diagnosis. Although a biopsy was not performed, swab cultures were taken, and the patient began IV antibiotic therapy with cefepime 1g three times daily (TDS). Topical therapy began with mupirocin ointment dressings twice daily (BD), which was later switched to Kenacomb on day 20. The tissue culture results revealed Pseudomonas species that were susceptible to cefepime, imipenem (Tienam), and piperacillin/tazobactam (Tazocin). The patient was managed accordingly.

The patient reported no changes in the use of personal care products, no ingestion of addictive substances, and no inherited factors that contributed to the development of the lesions. By the eighth day of initiation of mixture o Nystatin, Neomycin Sulfate, Genamicidin and Triamicnolone Acetonide, the lesions began to decrease in size. (Figure 1 & 2)

Case no 2: A 1.5-year-old female with no known comorbidities was admitted to the burns ward with 3% total body surface area (TBSA) hot oil scald burns on the scalp, which were classified as second-degree burns. Immediately after the injury, the patient's mother washed the scalp and applied coconut oil. The youngster was then transferred to a medical institution, where she was given an ointment, Xyzal (levocetirizine), Augmentin (amoxicillin/clavulanate), and paracetamol for pain relief. On the fourth day following the injury, a wound culture sample was taken. Initially, the burn wound seemed pink, but it quickly began to bleed and changed color from light pink to dark pink, then light brown. Despite the fever, no eruptions appeared on the child's scalp. Approximately one week after the injury, yellow crusts formed around the wound, but there was no odor or purulent discharge. Based on the culture and sensitivity (C&S) results, the patient was given intravenous Fortum (ceftazidime) injections at a dose of 650 mg. Dressings were also administered using mixture of Nystatin, Neomycin Sulfate, genamicidin and Triamicnolone Acetonide ointment. Following this therapy program, the wound-healing process was significantly accelerated. By day 18, complete healing had been achieved.

Case no 3: An 8-year-old female with no known

comorbidities was admitted to the burns ward after suffering 6% total body surface area (TBSA) scald burns from boiling water on both arms and the face. The burns were diagnosed as a combination of second and third-degree damage. Initially, the sufferer was transferred to a public hospital, where bandages and ointment were applied. She returned to a private clinic about a week later for additional dressing changes. Following her visit to the private clinic, the patient developed lesions on both elbows, which then progressed to the forearms and wrists around two weeks later. These lesions oozed pus and blood and had a horrible stench. The lesions began as little as a fingerprint and grew to the size of a golf ball. The patient was administered Panadol (paracetamol) and Cebosh(Cefixime)syrup, and her wounds were dressed with mixture of Nystatin, Neomycin Sulfate, genamicidin and Triamicnolone Acetonide cream and silver sulfadiazine. During treatment, the patient developed a loss of appetite, fever, and widespread weakness. Laboratory tests revealed higher CRP levels and total leukocyte count (TLC), indicating an inflammatory reaction. The lesions progressed from red to white to black-brown over time, with itching but no major pain.. Following sepsis care, the patient was transferred to the operating room (OR) for tangential excision and grafting of the left forearm wound. All other wounds were healed themselves on topical Nystatin, Neomycin Sulfate, genamicidin and Triamicnolone Acetonide on 28 days. A biopsy of shaved spicmen showed lobular capillary hemangioma (pyogenic granuloma)

Case no 4: A 33-year-old female with no known comorbidities got scald burns to her face, neck, and right upper and lower limbs while bathing her child. Initially, she was treated at a facility, where her pink-colored lesions and blisters were covered for two days. She sought treatment at a peripheral facility for more dressings. The patient reported a growth on her right arm 15 days after the incident, which was microscopically examined and found to be fungal. In addition, she had sores on her face, stomach, and lower legs. These lesions were initially coin-sized, bloody, and pruritic. They were drained several times in the same clinic. Despite regular bandages for five days, the sores became larger, causing her to seek treatment at a private hospital. At the private hospital, she received intravenous (IV) and oral treatments and fusidic acid, and silver sulfadiazine cream dressings. Laboratory results showed hemoglobin (Hb) at 9.7 g/dL, hematocrit (Hct) at 31.0%, MCV at 75.6 fL, and TLC at 9.1 x 10^9/l. A biopsy of the lesion on her right upper arm revealed characteristics typical of lobular capillary hemangioma. The patient was subsequently sent back to the burns center, where she was treated with topical Nystatin,Neomycin Sulfate, genamicidin and Triamicnolone Acetonide ointment. The lesions steadily faded over the next few weeks, eventually disappearing entirely by day 28th (Picture 3)

Case no 5: A 17-year-old guy appeared with oil burns on the left side of his face, both forearms and upper limbs. On February 8, 2024, he was treated at a peripheral clinic and had his dressings applied. Ten days later, he got blisters near his wrists that started white, then went crimson, black, and finally dark brown. On February 24, 2024, his condition did not improve, therefore he was referred to Civil Hospital's burns center. At the burns center, the patient was started on intravenous (IV) Dexamethasone and Augmentin, and Danzen (Serratiopeptidase) pills were prescribed for 7 days. The blisters turned into painful, non-itchy sores with foul-smelling drainage, but they did not bleed. Differential diagnosis of Kaposi's sarcoma and deep mycosis was made initially A surgical pathology report revealed pseudoepithelomatous hyperplasia with deeper tissue fibrosis, but tests for yeast and cancer were negative. Liver and renal function tests were within normal ranges. After 7 days of treatment, the edema in the lesions subsided and they began to dry out. The patient was subsequently transferred to the dermatology ward, where he was administered injections of Amphotericin (60 mg diluted in 500 mL of 5% dextrose in water) and Cefperazone/Sulbactam(2g). His dressings were done by potassium permanganate (KMnO4)-soaked gauze and fusidic acid cream. The patient mentioned no past trauma or drug use. He was admitted to the ward for 21 days, during which most of the lesions cleared and sloughed off. (Picture 4 & 5)

Case no 6: A 10-year-old female with no known comorbidities was admitted to the burns ward after suffering 6% total body surface area (TBSA) scald burns

from boiling water that covered her e back. The burns were classified as second-degree. Her initial treatment was administered at a peripheral clinic, where she got intravenous (IV) fluid Cefixime syrup. For around two weeks, silver sulfadiazine dressings were applied every day.

After two weeks, the patient developed lesions on her shoulders, which then extended to her back and waist. These tumors were about the size of 5 cm, red, leaking blood, and had a foul odor. She was then transferred to Burn Center, where a histopathology biopsy was done on April 8, 2024. The biopsies indicated localized ulceration and edema. and intensely inflammatory granulation tissue on the skin above the lesions, with bacterial organisms on

the epidermal surface but no signs of fungal infection. The lesions gradually changed color from red to black to brown. The lesions began to improve about 3-4 days after being admitted and had stopped spreading by the thirteenth. During surgery, all lesions were shaved tangentially and allowed to heal via secondary intention, which was finished by day 24. (Picture 6 & 7)

Case no 7: A 10-year-old male arrived with burns and subsequent lesions on the right mandible. The burns were originally treated with local dressings. However, the patient acquired lesions in the afflicted region. These lesions were treated with local steroid dressings and antibiotics (amoxicillin/clavulanate). The lesions gradually improved throughout treatment, with a clear reduction in irritation and discomfort. The patient responded positively to the prescribed regimen, and the lesions gradually healed. Complete resolution was obtained with no difficulties. The patient responded effectively to the treatment, with no documented side effects or lesion recurrence. (Picture 8 & 9)

Case no 8: An 8-year-old female picked up pyogenic granulomas on her buttocks and back as a result of burn injuries. The lesions, which were erythematous, friable, and prone to bleeding, were initially treated with topical Nystatin, Neomycin Sulfate, genamicidin and Triamicnolone Acetonide ointment and intravenous antibiotics according to culture sensitivity. Despite great recovery, surgical excision and skin grafting were necessary due to persisting lesions. The postoperative follow-up revealed excellent healing with no recurrence, highlighting the efficacy of a combination of medicinal and surgical strategies in treating pyogenic granuloma after burn injuries.

Case no 9: A 4 year-old child with no known comorbidities presented with burns on her left foot after accidentally walking into a hot water spill. The injury caused a 1% total body surface area (TBSA) burn, which was classed as second-degree. The patient underwent first care at a peripheral clinic, where he was given silver sulfadiazine dressings and was prescribed paracetamol syrup for pain control.

The patient developed lesions on the dorsum of her right foot around two weeks after the incident. These lesions started little but grew to about the size of a walnut. The lesions were red, exuded serous fluid, and had a slight odor. Concerned about the lack of improvement, the patient was sent to a tertiary care facility. At the hospital, a histological biopsy of the lesion was done, which revealed ulceration, inflammation, and granulation tissue with bacterial colonization. No evidence of fungal infection or malignancy was found. Laboratory testing, including liver and kidney function, were within normal range. The patient was diagnosed with a subsequent bacterial infection of the burn site.

Treatment began with oral Augmentin (amoxicillin/clavulanate) and local steroid dressings. Over the next 7-10 days, the lesions improved significantly, shrinking in size and discharge. The inflammation stopped, and the incision started to heal. The patient continued to receive dressing changes and supportive care until the lesions were completely healed by the third week of treatment.

The patient had no severe negative effects from the treatment was successful, and the burn wound healed completely, with the right foot returning to normal function. Follow-up revealed no recurrence of the lesions.[10]

Case no 10: A 29-year-old male with no known comorbidities appeared with burns on his right hand caused by an accidental spill of boiling oil. The damaged region was originally treated at a nearby clinic, with silver sulfadiazine dressings used and paracetamol recommended for pain relief. Over the next week, the burn wounds, which had first appeared red and inflamed, developed several lesions across the dorsum and palm.

Approximately ten days after the incident, the patient saw the lesions growing in size and becoming painful. The lesions produced a foul-smelling greenish discharge. Concerned about his increasing condition, the patient sought additional treatment at a tertiary care facility.

A wound culture was acquired. The results revealed an infection with Pseudomonas aeruginosa, which was sensitive to ceftazidime. The patient was immediately given intravenous (IV) ceftazidime and local wound care, which included dressing changes with topical Nystatin, Neomycin Sulfate, genamicidin, Triamicnolone Acetonide ointment and saline-soaked gauze.

Despite vigorous therapy, the lesions discharged for 3-4 days before improving. The patient claimed that the discomfort and swelling had gradually subsided, as had the unpleasant odor emanating from the lesions. Laboratory testing, including a complete blood count and liver and kidney function tests, were normal.

By the conclusion of the first week of IV therapy, the lesions had begun to dry up and the exudate had decreased significantly. The patient was shifted to oral antibiotics for a 14-day course, with ongoing local wound care. Complete healing of the lesions was discovered on day 21, and the patient regained complete function of his right hand. Follow-up visits revealed no return of the infection, and the patient reported no side effects from the treatment plan. (Picture 11)

Discussion

Although the specific etiology and pathogenesis of PG remain unknown, some risk factors have been identified for this benign lesion. Trauma is The most common risk factor among others (8) Based on previous evaluations, 50% of patients PG is involved in local trauma.[9,10] However, burn. is the most common among traumas. PG, thereafter Burn appears with different clinical characteristics; thus, it requires correct treatment techniques.[11] As it was. In the current case series, PG experienced subsequently a Second-degree burn.

This case series examines the various presentations and care techniques for burn injuries in different patient demographics and burn severity levels. This study emphasizes the importance of accurate medical history in identifying tumor variants avoiding interventions that are unnecessary or excessive. The instances were from scald

burns and the problems include infection, fungal growth, and delayed recovery. The patients in this series had burns ranging in severity from second to third-degree, and they impacted a variety of body locations. Standard burn care methods, such as intravenous fluids, topical antibiotics, and daily silver sulfadiazine dressings, were used initially. The progression of wounds and lesions frequently required revisions in treatment regimens, especially when complications emerged. Secondary infections with bacterial pathogens such as Pseudomonas aeruginosa, fungal infections, and pyogenic granulomas were some of the complications. The culture results in several cases demonstrated the need for fast and precise microbiological diagnosis. For example, in Case 6, the identification of Pseudomonas aeruginosa and its susceptibility to ceftazidime aided in successful antibiotic treatment. Similarly, fungal infections necessitated focused antifungal treatment, as demonstrated in Case 5.

The absence of fungal or malignant indications in other cases, combined with bacterial development, emphasizes the importance of extensive diagnostic workups for efficient therapy. Treatment strategies varied depending on the infection diagnosed and the clinical presentation. Bacterial infections were treated effectively with suitable antibiotics, which were frequently paired with local wound care. Most patients experienced full wound healing with no major functional impact. The use of sophisticated dressings and tailored antibacterial medicines helped to improve outcomes. The examples showed that early intervention, individualized treatment based on microbiological findings, and thorough follow-up care are critical for successful recovery. Notably, the changes from local to systemic therapy, as well as the involvement of surgical procedures in non-healing wounds, were critical to attaining resolution.

Future research should include a bigger sample size and a consistent approach for first burn care and follow-up. Furthermore, investigating the effects of various antimicrobial drugs and wound care methods on burn healing and infection management should yield useful insights.

Conclusion

This case series contributes to the understanding about the occurrence of pyogenic granuloma (PG) after a second-degree burns and indicates the potential of early diagnosis and individualized treatment. PG findings, although benign, are however associated with significant complications especially in burn patient in whom bacteria and fungus infections play a role in the course of the disease. The study highlights how crucial it is to evaluate and treat wounds using a multidisciplinary approach that includes dermatologists, microbiologists, and wound care specialists. Treatment options ranged from conservative management centered on topical and systemic antibiotic therapy to surgical intervention when necessary, depending on the severity of the ailment. Second, in a very important way, the microbiological analysis was relied on extensively to guide therapy and to improve patient outcomes. Establishing uniform treatment regimens for burn-related PG, investigating the function of antibiotic medication in avoiding it, and searching for innovative therapeutic approaches targeted at preventing recurrence and promoting wound healing in burn patients should all be the focus of future study.

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