Pyogenic granuloma. A case report

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Case Report

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Background: Pyogenic granuloma, also known as lobular capillary hemangioma, is a common benign vascular proliferation of the skin and mucous membranes characterized by rapid growth and a tendency to bleed following minor trauma. Although its clinical appearance is often characteristic, it may mimic other vascular or malignant lesions, making histopathological examination important for establishing the diagnosis. We present the case of a 43-year-old woman with no relevant medical history who developed a rapidly growing, bleeding lesion on the third finger of the left hand over a 6-week period. Physical examination revealed a solitary, semispherical, lobulated, sessile, reddish-violet nodule measuring approximately 1 × 1 cm, with a granulation tissue-like appearance and a soft consistency. Complete surgical excision was performed, followed by direct closure of the surgical defect, and the specimen was submitted for histopathological examination. Histopathological evaluation demonstrated a dermal vascular proliferation composed of numerous small-caliber capillaries lined by prominent endothelial cells and arranged in a characteristic lobular pattern, separated by edematous stroma. A mixed inflammatory infiltrate and extravasated erythrocytes were also identified. These findings established the diagnosis of pyogenic granuloma (lobular capillary hemangioma). Surgical excision with primary closure provides both definitive treatment and tissue for histopathological confirmation and is associated with a low recurrence rate. Recognition of its clinical and histopathological features is essential to differentiate pyogenic granuloma from other benign and malignant lesions with similar presentations.

Keywords: Granuloma, Pyogenic; Hemangioma, Capillary; Recurrence.

Pyogenic granuloma, also known as lobular capillary hemangioma, is a common acquired benign vascular proliferation of the skin and mucous membranes, first described in 1897.[1] It is occasionally located in the subcutaneous tissue or within blood vessels.[2,4,11] Clinically, it presents as a solitary, rapidly growing papule or polyp with a smooth surface and a red to violaceous color, either sessile or pedunculated, that bleeds easily following minimal trauma and frequently ulcerates.[1,6,11]

The classical term is inaccurate, as the lesion is neither infectious in origin nor pus-producing and does not constitute a granuloma in the histological sense.[9] The term was proposed by Hartzell in 1904.[9] In 1980, Mills et al. proposed the designation lobular capillary hemangioma based on the characteristic lobular arrangement of the capillaries.[3] Both terms are currently used interchangeably.[1,7]

The lesion may occur at any age, without a clear overall sex predilection.[4,11] Cutaneous lesions occur with similar frequency in men and women, whereas mucosal lesions are more common in women.[4,10] The most frequent locations are the hands, particularly the fingers, followed by the lips, gingiva, and head and neck region.[4,11] During pregnancy, the lesion may develop on the oral mucosa, where it is referred to as granuloma gravidarum.[4,11]

Its etiology remains unknown, and local trauma, hormonal changes, certain medications, and systemic diseases have been implicated.[1,2] In most cases, however, no triggering factor can be identified.[4] Despite its benign nature, pyogenic granuloma may mimic other lesions, including amelanotic melanoma, and its diagnosis is therefore not always straightforward.[5,6] This is further complicated by the lack of consensus regarding the optimal treatment and by the possibility of recurrence.[2,7] For these reasons, documenting individual cases remains relevant. We present the case of a 43-year-old woman with a rapidly growing, bleeding nodule on the third finger of the left hand, which was successfully treated with complete surgical excision.

Case report

A 43-year-old woman with no relevant medical history presented with a rapidly growing lesion on the left upper extremity that had developed over the previous 6 weeks and was prone to bleeding following minor trauma. Physical examination revealed a solitary, semispherical, lobulated, sessile nodule involving the third finger of the left hand. The lesion had a granulation tissue-like appearance and was reddish-violet in color, soft to palpation, with regular, well-defined borders, measuring approximately 1 × 1 cm in diameter and showing a subacute course (Figures 1–4). Complete surgical excision of the lesion was performed, followed by direct closure of the surgical defect (Figure 5), and the excised specimen was submitted for histopathological examination. Histopathological examination revealed a vascular proliferation in the dermis composed of numerous small-caliber capillaries lined by prominent endothelial cells, arranged in a lobular pattern and separated by edematous stroma. It was accompanied by a mixed inflammatory infiltrate, predominantly composed of neutrophils, lymphocytes, and plasma cells, as well as extravasated erythrocytes (Figure 6-7).

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Figure 1. Pyogenic granuloma of the finger.



Figure 2. Complete surgical excision followed by primary closure of the surgical defect.

Based on the clinical and histopathological findings, a diagnosis of pyogenic granuloma was established.

Discussion

Mills et al. established that the defining diagnostic feature of pyogenic granuloma is the lobular arrangement of capillaries at the base of the lesion, with lobules composed of well-defined aggregates of endothelial cells and vascular lumina ranging from indistinct to readily apparent.[3] Surface changes, such as stromal edema, capillary dilation, inflammation, and granulation tissue reaction, are secondary and nonspecific findings that had previously been equated with the lesion without objective criteria.[3] This distinction provides the basis for the designation lobular capillary hemangioma.[3]

The pathogenesis remains unclear.[1,2,7] The lesion has been considered a disorder of angiogenesis, with increased levels of factors such as vascular endothelial growth factor (VEGF) and basic fibroblast growth factor (bFGF), which are also elevated during pregnancy.[4] Endothelial cells within the lesion express CD34, ICAM-1, and VCAM-1, with increased microvascular density.[11] In addition, mitotic activity and expression of markers such as GLUT1 and WT1 have been described, together with mutations in the BRAF gene.[1] In particular, the BRAF c.1799T>A mutation has been identified in endothelial cells as a potential driver mutation, which may explain the development of multiple lesions in patients receiving BRAF inhibitors.[11] Viral agents have also been investigated as potential contributors: herpes simplex virus type 1 as an indirect factor, Orf virus in some patients, and human papillomavirus DNA in 44% of the lesions studied, predominantly HPV type 2.[11]

Overall, whether the lesion should be interpreted as reactive or neoplastic remains unresolved. Regression following removal of a stimulus, such as a foreign body, led to the proposal that it represents a vascular hyperplasia.[4] Marla et al. consider it a reactive rather than a neoplastic lesion and emphasize that the terms lobular and nonlobular describe histological variants rather than a true hemangioma.[9] Conversely, molecular findings and mitotic activity suggest that mechanisms beyond a purely reactive process may be involved.[1,11]

Several triggering factors have been described, including local trauma, chronic irritation, and various systemic conditions.[1] In the oral cavity, poor hygiene with plaque and calculus accumulation and overhanging restorations have been implicated.[9] Associations have also been reported with oral contraceptives, retinoids, and targeted anticancer agents, including epidermal growth factor receptor (EGFR), MEK, and BRAF inhibitors, as well as rituximab.[2,11] Lesions may develop over capillary malformations and following treatment with vascular lasers.[11] In eyelid reconstructive surgery, a postsurgical

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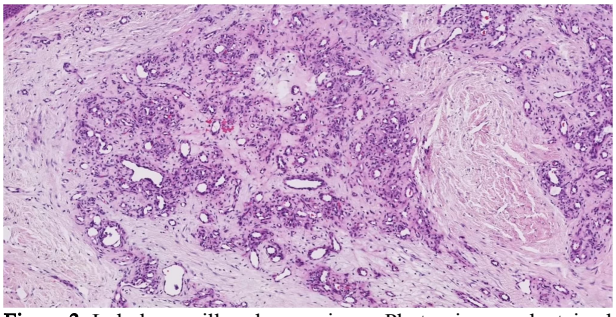


Figure 3. Lobular capillary hemangioma. Photomicrograph stained with hematoxylin and eosin

incidence ranging from 9% to 24.4% has been reported.[1]

Regarding epidemiology, in a series of 63,759 dermatopathology specimens, the lesion accounted for 0.51% of samples, with 86% of cases involving the skin and 12% involving mucous membranes.[10] In that series, the mean age was 32 years in men and 35 years in women, with a cutaneous peak during the second and third decades and, among women, a mucosal peak during the fourth decade.[10] In the audit by Giblin et al., the mean age was 40.5 years and 47 years in the adult subgroup, in which the sex distribution was nearly equal (53% men and 47% women).[4] Mills et al., in oral and nasal lesions, reported a predilection for males younger than 18 years and for women of reproductive age, with an equal sex distribution after 40 years of age.[3] This pattern supports a possible hormonal influence on mucosal lesions, although Harris et al. noted that the small number of cases and the lack of information regarding pregnancy status limited this conclusion.[10] Granuloma gravidarum occurs in 0.2% to 5% of pregnancies, particularly during the second and third trimesters, and is usually gingival.[4] Marla et al. explain that estrogen and progesterone levels modify the vascular response to local irritants.[9]

The anatomical distribution varies among series. Giblin et al. found that 36% of lesions were located in the head and neck, one-third on the upper extremities, 15% on the trunk, and 8% on the lower extremities.[4] Within the upper extremities, the fingers accounted for 52.4% of cases, whereas in the head and neck region, the cheeks, intraoral region, and lips predominated.[4] In contrast, Harris et al. found that cutaneous lesions occurred most frequently on the trunk and extremities, followed by the head and neck, and that 70% of mucosal lesions were oral, particularly involving the lips, gingiva, and tongue.[10] They attributed the differences between series to variations in the study populations, including age and medical specialty, as well as a lack of uniformity in classification between mucosal and cutaneous lesions.[10] These authors suggested that the higher frequency of lesions on the neck in men and on the legs in women could be related to shaving-associated trauma.[10] Wollina et al. also noted that the lesion frequently affects the nail folds and, less commonly, the vulva, penis, esophagus, intestine, and tracheobronchial tree.[11]

The typical clinical presentation consists of small or large reddish exophytic nodules that may be smooth or lobulated and grow rapidly, eventually becoming pedunculated with a mushroom-like appearance.[11] A tendency toward profuse bleeding is the main symptom and the most common reason for consultation.[11] Mills et al. described a spontaneously bleeding, painless mass.[3] In the oral cavity, lesions range from a few millimeters to several centimeters, tend to grow slowly, and are usually asymptomatic; their color varies according to vascularity.[9] Complications are uncommon and include ulceration, trauma-related bleeding, infection, and cosmetic impairment.[1] The latter, together with bleeding, is the most common reason patients seek treatment.[4]

Dermoscopy provides useful diagnostic clues. In the initial series of 13 patients, the most frequent finding was a homogeneous reddish area (92%), followed by a white collarette (85%), ulceration (46%), and white rail lines (31%), with no specific criteria for other tumors or melanocytic pigmentation.[5] The authors correlated the homogeneous reddish area with small capillaries within a myxoid stroma, the white collarette with hyperplastic adnexal epithelium surrounding the lesion, and the rail lines with fibrous septa surrounding the capillary lobules in more advanced lesions.[5] A subsequent study of 122 pyogenic granulomas and 140 comparison tumors confirmed that the homogeneous reddish area was the most sensitive finding (96.7%), although it had low specificity (37.1%), whereas the white collarette was the most specific finding (90.7%), with a sensitivity of 73.8%.[6] The pattern consisting of a reddish area, white collarette, and rail lines without vascular structures showed 100% specificity but only 22.1% sensitivity, while the combination of a reddish area and white collarette showed 99.3% specificity.[6] These patterns were not observed in amelanotic melanomas; however, the three most specific patterns together were present in only 52% of pyogenic granulomas.[6] In addition, vascular structures were identified in 45% of lesions, predominantly irregular linear vessels, which were also present in 83% of nodular amelanotic melanomas and their metastases, while 5% of cases showed bluish homogeneous areas that may mimic melanoma.[6] Therefore, dermoscopy does not replace histopathological examination.[5,6]

Microscopically, the lesion consists of capillaries and venules lined by prominent endothelial cells, separated into lobules by a fibromyxoid stroma.[11] Giblin et al. additionally reported the frequent presence of an epidermal collarette, ulceration, and superimposed inflammation, without features of malignancy.[4] Near the surface, the capillaries display a

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radiating pattern within a loose, edematous matrix with a mixed inflammatory infiltrate, whereas older lesions tend to become fibrotic, with fibrous septa producing the lobular pattern.[5] Three evolutionary phases have been described: cellular, capillary or vascular, and involutional, characterized by intra- and perilobular fibrosis.[9,11] In untreated lesions, slow fibromatous regression may occur over a prolonged period.[11]

Marla et al. further distinguish two histological variants. In the lobular variant, the vessels are arranged in lobular aggregates, have small lumina, and the perivascular mesenchymal cells are positive for smooth muscle actin (α-SMA), whereas in the nonlobular variant, the tissue resembles granulation tissue, with wider lumina and negative perivascular cells.[9] They suggest that these findings may reflect distinct evolutionary pathways.[9] In their series of four cases, which included lesions of the gingiva and buccal mucosa, the cellular, capillary (lobular and nonlobular), and involutional phases were documented.[9]

The differential diagnosis is broad, and diagnostic errors occur in both directions. Up to 18% of lesions have been reported to be misdiagnosed, and in a series cited by Zaballos, the clinical diagnosis was incorrect in 38% of cases.[4,5] In the epidemiological study by Harris et al., dermatologists included the correct diagnosis in 88% of cases, compared with 28% among nondermatologists; common incorrect diagnoses included granuloma, verruca vulgaris, basal cell carcinoma, squamous cell carcinoma, and melanoma.[10] Clinical mimickers include Spitz nevus, warts, true hemangiomas, amelanotic melanoma, squamous cell carcinoma, and spindle cell tumors.[4] Kaleeny and Janis additionally included fibrokeratomas, glomus tumors, cutaneous metastases from clear cell renal cell carcinoma, hepatocellular carcinoma, and breast carcinoma, cutaneous anaplastic large-cell lymphoma, and malignant fibrous histiocytoma.[1] Wollina et al. included kaposiform hemangioendothelioma, Kaposi sarcoma, and, in immunocompromised patients, phaeohyphomycosis and bartonellosis, and clarified that so-called Kaposi-like pyogenic granulomas with HHV-8 are in fact Kaposi sarcoma.[11] In the oral cavity, early lesions may be mistaken for granulation tissue, hemangioma, Kaposi sarcoma, or bacillary angiomatosis, whereas older lesions may resemble fibroma, peripheral giant cell granuloma, or peripheral ossifying fibroma.[9] The absence of atypical cells and bizarre vascular channels distinguishes the lesion from Kaposi sarcoma, while the absence of granular bacterial material distinguishes it from bacillary angiomatosis.[9] Histopathological interpretation also has its own diagnostic pitfalls.[8]

For this reason, treatment modalities should provide tissue for histopathological examination whenever possible to exclude alternative diagnoses.[4] Zaballos et al. considered surgical excision and histopathological examination mandatory for reddish tumors in adults because amelanotic melanoma may mimic the lesion, particularly when ulcerated.[5] In their subsequent series, they reiterated their preference for excising all lesions for histopathological evaluation.[6]

Regarding treatment, definitive evidence remains limited.[1] Lee et al. reviewed 34 studies involving 1,162 lesions treated with 19 different modalities and reported an overall recurrence rate of 4.56%. They acknowledged that the heterogeneity of the available data, ranging from case reports to retrospective series, was the main limitation of the evidence.[7] Plachouri and Georgiou concluded that treatment should be individualized according to the severity, location, and size of the lesion, patient characteristics and expectations, cosmetic outcome, and cost.[2] Although spontaneous resolution has been described, observation remains controversial because most lesions eventually require treatment due to discomfort, recurrent bleeding, or obstruction of adjacent structures.[2] Older lesions tend to undergo fibrosis and persist, and cases persisting for up to 20 years without treatment have been reported.[4]

Surgical excision with primary closure is considered the treatment of choice in most reviews.[1,2,7] Lee et al. reported a recurrence rate of 2.94% following excision, compared with 9.55% after curettage or shave excision with or without cautery, with a statistically significant difference ($p < 0.001$).[7] Giblin et al. observed a recurrence rate of 3.7% among 326 excised lesions and 10.3% among lesions treated with other modalities, making excision with direct closure the approach associated with the lowest number of recurrences.[4] Kaleeny and Janis calculated a 96.2% resolution rate after a single session of excision in their meta-analysis, the highest rate among the modalities evaluated.[1] The technique requires a single session and allows the entire lesion to be submitted for histopathological examination.[7] Its main disadvantage is scarring, which may be cosmetically unacceptable.[4] Lee et al. recommend excision for small cutaneous lesions in areas without significant cosmetic concerns.[7] Giblin et al. cautioned that histological completeness of excision is rarely documented and that recurrences occurred even when complete excision had been reported (2 of 20 recurrences).[4] In gingival lesions, according to the review by Kaleeny, modified excision with deep curettage outperformed simple excision by nearly 15%, while shave excision followed by silver nitrate achieved a 90% success rate, with a risk of transient skin staining.[1]

Destructive methods have more variable outcomes. In the audit by Giblin, intraoral recurrence after shave excision was 13%,[4] while the series reviewed by Lee reported recurrence rates ranging

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from 3.7% to 43.5%, depending on the technique.[7] Cryotherapy with liquid nitrogen showed a recurrence rate of 1.62% in that review, with protocols involving two freeze-thaw cycles every three weeks and resolution within one to four sessions.[2] However, in the only randomized trial included by Kaleeny, cryotherapy achieved a 63% resolution rate and required more treatment sessions than curettage with electrodesiccation, which achieved a 97% resolution rate.[1] Excision following silver nitrate debridement achieved a success rate above 85% and a 15% recurrence rate in 13 patients.[2] Lee et al. concluded that, when nonsurgical management is selected, silver nitrate cauterization should be considered the first option, while cryotherapy and CO_2 and pulsed-dye lasers may also be appropriate depending on the experience of the treating center.[7] Nonsurgical management is generally reserved for patients who are not surgical candidates, cosmetically sensitive sites such as the face, lesions near vital structures, cases in which primary closure is not feasible, and situations in which the patient prefers a nonsurgical approach.[7]

Lasers provide good cosmetic outcomes, with differences among devices. Continuous and pulsed CO_2 laser treatment eradicated the lesion in a single session in 98% of patients in the study by Raulin, with a recurrence rate of 4.85% in the review by Lee.[1,7] Nd laser achieved approximately 50% resolution after a single session in two retrospective series and 74% in a prospective study; multiple sessions were frequently required, with crusting, pain, bleeding, and scarring reported.[1] The pulsed-dye laser had a recurrence rate of 4.35% in the review by Lee but also resulted in seven treatment failures (10.14%).[7] Plachouri and Georgiou describe the use of pulsed-dye laser alone for lesions smaller than 5 mm and shave excision followed by pulsed-dye laser treatment of the base for larger lesions, with a mean of 2.7 sessions.[2] Diode lasers, with wavelengths ranging from 808 to 980 nm, have been successfully used for adult gingival lesions, and in a randomized trial of 21 patients, they achieved an 8.2% higher success rate than surgical excision.[1,2,11] Er laser lacks a coagulative effect, which may be a disadvantage in large lesions.[11] The literature regarding pulsed-dye and diode lasers remains limited and requires larger studies.[1] Unlike excision, none of these ablative techniques provides the entire lesion for histopathological examination.[4,7]

Sclerotherapy and injectable treatments have yielded inconsistent results. In the review by Kaleeny, monoethanolamine oleate achieved 100% resolution without recurrence in nine patients, although pain during injection and post-inflammatory hyperpigmentation were reported, while absolute ethanol achieved 100% resolution in five patients with one month of follow-up.[1] Polidocanol achieved 73% clearance after a single session, whereas 3% sodium tetradecyl sulfate achieved only 16.6% resolution in oral lesions.[1] Lee et al. reported a recurrence rate of 13.33% with sodium tetradecyl sulfate and no recurrences with monoethanolamine oleate.[7] Intralesional triamcinolone, bleomycin, phenol, ingenol mebutate, 5-aminolevulinic acid photodynamic therapy, and radiation therapy with plaques have been described only in isolated case reports or small series.[2,11]

Among topical treatments, 5% imiquimod is considered a safe option in both adults and children.[2] In the review by Lee, no recurrences occurred among 17 treated lesions, although two treatment failures were reported (11.76%).[7] Plachouri and Georgiou described one of their own cases with partial regression, treatment discontinuation because of local irritation, and subsequent recurrence requiring excision.[2] Topical beta-blockers have been studied primarily in young children and in ocular and periungual lesions.[11] Timolol 0.5% achieved an excellent response in 77.5% of ophthalmic lesions, whereas timolol and propranolol achieved only a 15% resolution rate in periungual lesions after one month.[1] Propranolol 1% cream applied under occlusion resulted in complete resolution of lesions in 10 adult patients with periungual granulomas.[2] Because of systemic absorption, even with ophthalmic preparations, patients should be monitored for bradycardia, hypotension, hypoglycemia, and bronchospasm; syncope and falls have also been reported in older adults.[11] Systemic treatments are limited to isolated reports, such as prednisolone for a giant recurrent granuloma with satellite lesions.[2] Therefore, in adults with cutaneous lesions, these alternatives should be regarded as treatments supported by limited evidence.[1,2,11]

Recurrence remains the main challenge of treatment. In the audit by Giblin, the overall recurrence rate was 5%, with 20 recurrences in 18 patients, occurring predominantly on the fingers (50%) and head and neck (35%); only two occurred after documented complete excision.[4] Satellite lesions are exceedingly uncommon in a benign tumor but have been reported.[11] Overall, the available evidence derives from heterogeneous studies with low levels of evidence and variable follow-up periods, highlighting the need for higher-quality comparative studies.[1,2,7]

Conclusion

In conclusion, pyogenic granuloma is a common benign vascular lesion whose diagnosis is guided by clinical and dermoscopic findings but should be confirmed by histopathological examination, given its potential to mimic malignant lesions, including amelanotic melanoma.[4,5,6] Treatment should be individualized. Excision with primary closure

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provides a low recurrence rate while allowing complete histopathological examination, whereas nonsurgical alternatives are generally reserved for situations in which surgery is not appropriate.[1,4,7]

Conflicts of interests

None declared by the authors.

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