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FEATURE ARTICLE

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Pyogenic Granuloma: An Overview of Pathogenesis, Diagnosis, and Management

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Pyogenic granuloma, also known as lobular capillary hemangioma, describes a benign vascular tumor with rapid growth and a friable surface that most commonly appears spontaneously on mucosal and cutaneous surfaces.[1] Typically, pyogenic granulomas present as a painless mass with recurrent bleeding on the head, trunk, or limbs.[2] These lesions can present at any age but are most common in children and young adults.[3] Pyogenic granulomas rarely self-resolve and are often complicated by repeated episodes of bleeding.[3] As a result, surgical treatment is the preferred course of management in most cases.[4]

EPIDEMIOLOGY

Although the prevalence of pyogenic granuloma is difficult to ascertain among the general population, a retrospective study in the United Kingdom estimated that intraoral lesions occur in up to 1 in 25,000 adults and that cutaneous lesions make up 0.5% of childhood skin nodules.[4] This study also found that most pyogenic granulomas (86%) occur on cutaneous surfaces and are most common in children and young adults, with a slight male predominance.[4] Pyogenic granulomas develop less commonly on mucosal surfaces, a presentation that has been reported as being twice as common in the female population.[2] The most common locations of mucosal pyogenic granulomas in one US review were the oral mucosa (69%) and the nose (15%), with conjunctival, cervical, and vaginal lesions each

accounting for approximately 5% of mucosal lesions.[2] Occasionally, pyogenic granulomas may present intravascularly or subcutaneously, and rarely they have been reported in the gastrointestinal system as a cause of iron-deficiency anemia.[4,5]

PATHOGENESIS

Although they are commonly called pyogenic granulomas, these lesions are neither pyogenic nor granulomatous.[3] Instead they are clusters of hyperplastic capillaries separated into lobules by fibromyxoid stroma, hence the term lobular capillary hemangioma.[3] Endothelial cells in these lesions express significantly higher levels of the proteins CD34, ICAM-1, and VCAM-1 than normal tissue, demonstrating increased vascular density and angiogenesis.[6]

Risk factors for developing pyogenic granuloma include trauma, chronic irritation, capillary malformations, and laser treatment of capillary malformations.[3,7]

Pyogenic granulomas also have been associated with certain medications, including isotretinoin,[8] antineoplastic agents such as capecitabine,[9] and the *BRAF* inhibitors vemurafenib and encorafenib.[10]

CLINICAL MANIFESTATIONS

Pyogenic granulomas typically appear as a solitary erythematous nodule that is smooth, soft, occasionally crusted, and commonly surrounded by a thin, white collarette.[3,11] Lesions appear rapidly, within days to weeks.[3] Most patients with pyogenic granuloma report spontaneous presentation with no precipitating exposure or symptoms. However, an estimated 7% to 14% of patients with a pyogenic granuloma report a history of minor trauma or chronic irritation at the site of the lesion.[3] One retrospective analysis of pyogenic granuloma cases in Korea found that the likelihood of prior trauma was higher (23%) in cases of lesions on the fingers.[3] Additionally, most patients with pyogenic granuloma report no symptoms. However, in one study, 26% of patients with pyogenic granuloma experienced bleeding, and 8% experienced pain.[3]

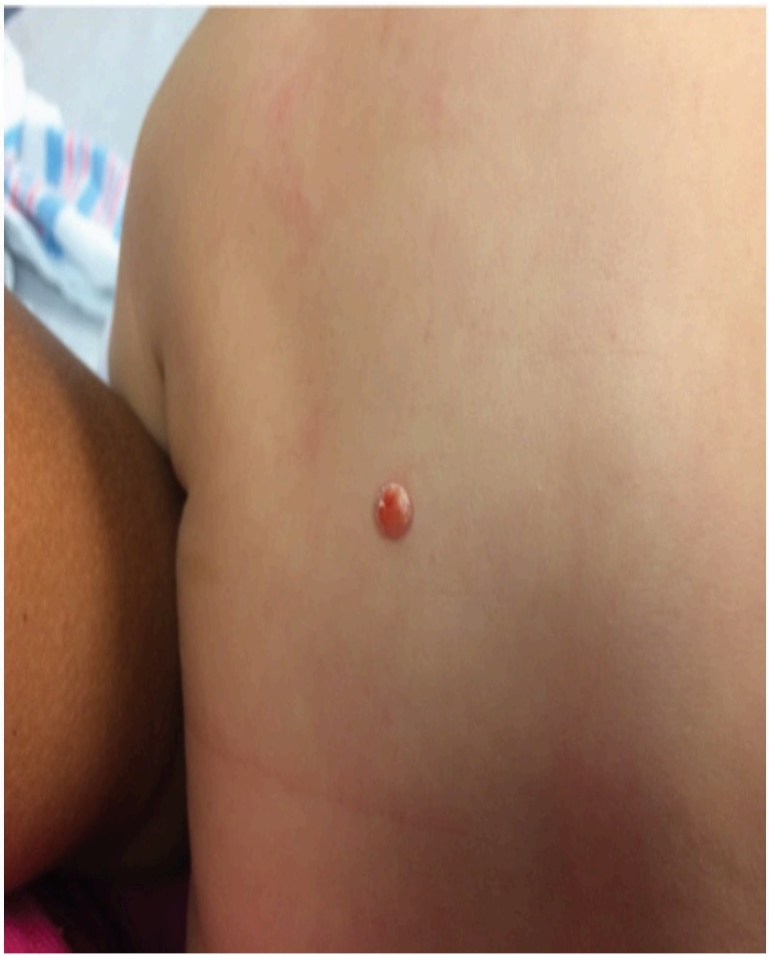

Figure: *This 18-month-old boy developed this lesion on his back over a 2- to 3-week period. At presentation, the parents stated that it had bled at first but had not changed over the past week. The lesion was surgically removed and was definitively diagnosed as a pyogenic granuloma based on clinical presentation and dermoscopy findings.*

DIAGNOSIS

The diagnosis is mainly clinical, based on a history and physical examination findings of an erythematous papule that bleeds easily and that has arisen within days to weeks. Dermoscopy reveals reddish areas separated by white rail lines, which correspond to fibrous septa that separate lobules.[11] Additionally, up to 85% of cutaneous pyogenic granulomas are surrounded by a white collarette, a rim of loosened keratin.[11]

Histopathologic examination can be helpful in excluding other conditions that may resemble pyogenic granuloma, such as hemangioma or malignant lesion.

PROGNOSIS

The prognosis of pyogenic granuloma varies with precipitating factors. Without treatment, pyogenic granulomas arising spontaneously often persist throughout life.[4] Lesions arising after injury or chronic irritation are likely to regress upon removal of the irritating stimulus.[4] With treatment, recurrence rates average 4% to 5% across all treatment types and range from approximately 2% to 15% depending on treatment type.[12]

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MANAGEMENT

The most common treatment of pyogenic granuloma is surgical excision with linear closure.[4] This allows a complete sample to be sent for histopathologic analysis and for a definitive diagnosis to be made. Surgical excision has a recurrence rate of approximately 3% to 4%.[4,12] Other less common surgical treatments such as curettage, shave excision, and cautery have been shown to have a combined recurrence rate of approximately 10%.[4,12]

Several nonsurgical approaches are also available for persons who are not surgical candidates, for lesions in cosmetically sensitive areas, and for persons who prefer nonsurgical treatment. In one retrospective literature review,[12] cryotherapy with liquid nitrogen was associated with a low recurrence rate of 1.62%; however, up to one-fourth of patients treated with this method required a second treatment. Other nonsurgical treatments include carbon dioxide laser ablation and flashlamp-pumped pulsed-dye laser therapy, which had recurrence rates of 4.85% and 4.35%, respectively.[12]

Pyogenic granuloma also can be treated with topical agents. Topical imiquimod cream, 5%, has been shown to greatly reduce the size and color of lesions, with only minor skin irritation as a possible adverse effect.[13] The topical β-blocking agent timolol maleate ophthalmic solution, 0.5%, has been shown to reduce bleeding and tumor size.[14]

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