



Granulomatous disorders

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Abstract Almost all granulomatous skin disorders can cause red lesions on the face. Such disorders may include many bacterial, fungal, or parasitic infections, noninfectious inflammatory disorders, foreign body reactions, and even neoplasms. Clinically, they usually present with papules, plaques, nodules, and/or abscesses, which may ulcerate. It may be helpful in their differential diagnosis to define certain clinical patterns, such as multiple and discrete papules, necrotic or umbilicated papules or nodules, annular plaques, vegetative plaques or tumors, verrucous plaques or tumors, abscesses and/or sinuses, and lymphocutaneous pattern. Some disorders, such as sarcoidosis, can cause a wide variety of lesions. We accept that cutaneous leishmaniasis is also among such great imitators.

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Introduction

Granulomatous disorders are a large group of conditions that share the common denominator, namely, histologic evidence of granuloma formation. A granuloma is an organized collection of epithelioid histiocytes. Various adjectives have been used to categorize granulomas, including sarcoidal, tuberculoid, palisaded, suppurative, and foreign body.^{1,2} Sarcoidal granuloma (seen in sarcoidosis, orofacial granulomatosis, and tattoo granuloma) is a well-circumscribed collection of epithelioid histiocytes with relatively few or no lymphocytes. Tuberculoid granuloma (seen in lupus vulgaris, syphilis, and leishmaniasis) is a well-circumscribed collection of epithelioid histiocytes in association with a surrounding relatively dense infiltrate of lymphocytes. Langhans giant cells and central necrosis may also present. Palisaded granuloma (seen in granuloma annulare [GA], necrobiosis lipoidica, and necrobiotic xanthogranuloma) consists of histiocytes arranged in a palisade fashion at the periphery of a necrobiotic area of collagen. Suppurative granuloma (seen in rhinoscleroma,

histoplasmosis, and amebiasis) is a neutrophilic abscess surrounded by histiocytes and lymphocytes. Foreign body granuloma is an accumulation of histiocytes, giant cells, neutrophils, and lymphocytes around an extrinsic or intrinsic body. Two more categories are “lichenoid and granulomatous dermatitis” and “granulomatous vasculitis.” The former (seen in lichen nitidus and lichen striatus) is characterized by a bandlike lymphocytic infiltrate with a concomitant granulomatous inflammation.³ The latter (seen in Wegener granulomatosis and Churg-Strauss syndrome) is characterized by an angiocentric granulomatous inflammation or by a granulomatous inflammation unrelated to vessels accompanied by necrotizing vasculitis.⁴ These categories are not absolute; for example, sarcoidosis may also demonstrate tuberculoid or foreign body granulomas.²

Almost all granulomatous skin disorders can cause red lesions on the face. **Table 1** gives a comprehensive, but not complete, list of such disorders. Facial red lesions caused by a granulomatous inflammation demonstrate a wide variety of clinical morphologies. Some disorders have many clinical presentations; some disorders have no distinctive clinical presentation. It is almost impossible to categorize these disorders according to their clinical presentations; however, it will be helpful to list the disorders capable of causing a

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Table 1 Granulomatous disorders capable of causing facial red lesions

Bacterial infections	Noninfectious inflammatory disorders
Tuberculosis	Lichen nitidus
Tuberculous chancre	Lichen striatus
Scrofuloderma	Granulomatous rosacea
Miliary tuberculosis	Lupus miliaris disseminatus faciei
Tuberculous gumma	Granulomatous periorificial dermatitis
Tuberculosis verrucosa cutis	Idiopathic facial aseptic granuloma
Lupus vulgaris	Sarcoidosis
Papulonecrotic tuberculid	Blau syndrome
Erythema induratum of Bazin	Interstitial granulomatous dermatitis and palisaded neutrophilic and granulomatous dermatitis
Lichen scrofulosorum	Orofacial granulomatosis
Atypical mycobacterial infections	Crohn disease
Leprosy (tuberculoid and dimorphous)	Granuloma annulare
Syphilis (secondary and tertiary)	Actinic granuloma
Rhinoscleroma	Necrobiosis lipoidica
Cat-scratch disease	Necrobiotic xanthogranuloma
Actinomycosis	Wegener granulomatosis
Nocardiosis	Churg-Strauss syndrome
Botryomycosis	
Pyoderma vegetans	
Fungal infections	Foreign body reactions
Kerion	Gout
Majocchi granuloma	Ruptured cysts
Candida granuloma	Tattoo
Coccidioidomycosis	Hyaluronic acids
Histoplasmosis	Silicone
Cryptococcosis	Silica
Blastomycosis	Metals
Paracoccidioidomycosis	Cactus spines
Sporotrichosis	Neoplasms
Chromoblastomycosis	Granulomatous mycosis fungoides
Phaeohyphomycosis	
Alternariosis	
Eumycetoma	
Lobomycosis	
Rhinosporidiosis	
Entomophthoromycosis	
Zygomycosis	
Penicilliosis marneffei	
Algal infections	
Protothecosis	
Protozoal infections	
Leishmaniasis	
Amebiasis	
Parasitic infections	
Demodicidosis	

certain clinical pattern, as in Table 2. In this contribution, granulomatous disorders, which can cause facial red lesions, will be briefly discussed in the context of clinical morphology with a special emphasis on the face.

Bacterial infections

Tuberculosis

Tuberculous chancre is primary inoculation tuberculosis of the skin.⁵ Several weeks after the inoculation, an erythematous papule or nodule appears, which eventually ulcerates. Regional lymphadenopathy may follow the skin

Table 2 Certain clinical patterns of granulomatous skin lesions on the face and their causes

Multiple and discrete papules	Leishmaniasis, demodicidosis, granulomatous rosacea, lupus miliaris disseminatus faciei, granulomatous periorificial dermatitis, sarcoidosis, Wegener granulomatosis
Grouped or confluent papules	Syphilis, lichen scrofulosorum, Blau syndrome, cactus spine granuloma
Necrotic or umbilicated papules or nodules	Miliary tuberculosis, papulonecrotic tuberculid, histoplasmosis, cryptococcosis, alternariosis, penicilliosis marneffei, granuloma annulare, Wegener granulomatosis, Churg-Strauss syndrome
Urticarial plaques	Churg-Strauss syndrome
Yellowish brown plaques or tumors	Necrobiotic xanthogranuloma
Annular plaques	Leprosy, syphilis, leishmaniasis, sarcoidosis, actinic granuloma
Centrally atrophic plaques	Lupus vulgaris, syphilis, blastomycosis, chromoblastomycosis
Vegetative plaques or tumors	Pyoderma vegetans, blastomycosis, paracoccidioidomycosis, rhinosporidiosis, leishmaniasis
Verrucous plaques or tumors	Tuberculosis verrucosa cutis, coccidioidomycosis, blastomycosis, paracoccidioidomycosis, chromoblastomycosis, rhinosporidiosis, leishmaniasis
Cutaneous horns	<i>Candida</i> granuloma, rhinosporidiosis
Keloidlike lesions	Lobomycosis
Abscesses and/or sinuses	Scrofuloderma, tuberculous gumma, cat-scratch disease, actinomycosis, nocardiosis, botryomycosis, phaeohyphomycosis, eumycetoma, metal granuloma
Boggy plaques	Kerion
Lymphocutaneous pattern	Nocardiosis, coccidioidomycosis, sporotrichosis, leishmaniasis
Necrotic eschars	Zygomycosis
Phagedenic ulcers	Buruli ulcer, amebiasis

lesion. Tuberculous chancre is usually located on the face, hands, and feet.

Scrofuloderma, also known as tuberculosis cutis colliquativa, begins as a painless subcutaneous nodule, which is called a *cold abscess*.⁶ Then, the violet-red induration suppurates and breaks down, forming an irregular, pus- or caseous material–discharging, superficial ulcer with a granulating base and with undermined cyanotic edges. Sometimes, sinuses may develop between deep foci of the infection. Ulcers heal with retracted, cordlike, bridgelike, irregular scars. Lesions are densely fibrous in some places, and fluctuant or discharging in others. The most commonly affected areas are the neck, armpits, chest wall, and groin, because the deep foci are most commonly lymph nodes and bones⁵; however, cases of facial scrofuloderma have also been reported to be due to orbital tuberculosis.⁷

Miliary tuberculosis can cause multiple, discrete, erythematous papules on the skin.⁵ They may be capped by vesicles, pustules, or necrosis, so later they may become crusted. Upon removal of the crust, an umbilication may be seen. Lesions heal with depressed scars. They can occur anywhere on the body, especially on the trunk, buttocks, genitalia, and thighs. The face may also be involved.⁸

Tuberculous gumma, also known as cutaneous metastatic tuberculous abscess, is a result of reactivation of mycobacteria that settle in the skin after a hematogenous dissemination and remain latent there until a period of impaired immunity.^{5,9,10} It begins as a nontender, firm, subcutaneous nodule, then becomes fluctuant, gradually breaks down the skin, and evolves into an ulcer with bluish red, undermined edges. The sites of involvement are commonly the limbs and trunk. Facial involvement has also been reported.¹¹

Tuberculosis verrucosa cutis is usually characterized by a solitary verrucous plaque with inflammatory borders. The most common sites of involvement are the hands and feet.⁵ Lesions have also been described in other anatomic sites, such as the face and buttocks.¹² An extensive multifocal case has also been described, showing multiple plaques distributed over the limbs and face.¹³

Lupus vulgaris usually starts with a single, reddish brown, soft papule. The papule slowly evolves into a plaque by peripheral extension and central atrophic scarring. The plaque has an irregular or serpiginous and sharply defined border. Ulcers, crusts, or hyperkeratosis may develop within the lesion. New papules may appear within atrophic scarred areas. On diascopy, erythematous papules or plaques of lupus vulgaris show an “apple-jelly” color. It has been suggested that a yellow or golden background on dermoscopy corresponds to the “apple-jelly” color on diascopy, and this background along with fine focused telangiectasias, milialike cysts, and whitish reticular streaks may be typical of lupus vulgaris.¹⁴ Besides the typical plaque described earlier, lupus vulgaris may also present as tumorlike or vegetating lesions. Whereas the head and neck region is the most common site involved by lupus vulgaris in Europe,¹⁵ the lower limbs are most commonly involved in India.¹⁶ In

the head and neck region, sites of predilection are the cheeks, nose, ears, chin, and neck. Although lupus vulgaris usually presents as a solitary lesion, satellite or disseminated lesions have been reported rarely.^{17,18} Although the bone is usually spared in lupus vulgaris, the nasal or auricular cartilage within the affected area may be progressively destroyed, especially in cases left untreated for years.¹⁹ As a result of the cartilage destruction, severe mutilations may occur.²⁰ This mutilating character, reminding ravages of a wolf, has a significant contribution in using the word *lupus*, which means “wolf,” in the name of the disease. Another complication of long-standing lupus vulgaris is the development of skin cancers, especially squamous cell carcinoma, and, less commonly, basal cell carcinoma and sarcomas.^{19,21} Facial lupus vulgaris may extend to the buccal, nasal, and conjunctival mucosae. Tuberculosis of the pharynx, larynx, and middle ear may accompany facial lupus vulgaris.²² Again, patients with lupus vulgaris may also suffer from tuberculosis of lymph nodes, lungs, bones, and joints.

Papulonecrotic tuberculid presents as multiple, more or less symmetrically distributed, discrete, dusky red papules, occurring in crops.^{5,23} They are umbilicated and necrotic in their centers, and eventually form varicelliform scars. The most common sites of involvement are the extensor surfaces of the limbs; however, the face, ears, trunk, and buttocks may also be involved. The face may be the initial site of the disease.²⁴

Erythema induratum of Bazin presents with recurrent flares of bluish red, painful, cold, subcutaneous nodules or deep-seated plaques, which often ulcerate.^{5,25,26} Most lesions resolve spontaneously within a few months, leaving postinflammatory hyperpigmentation and occasionally atrophic hyperpigmented scars. The most common sites of involvement are the shins and calves of the lower legs; however, the lesions may also occur on the feet, thighs, arms, and face.^{25–27} Erythema induratum of Bazin is most frequently seen in patients with fatty legs, diffuse erythema, cutis marmorata, and follicular hyperkeratosis.²⁵ It may occasionally coexist with other tuberculids, such as papulonecrotic tuberculid.

Lichen scrofulosorum usually presents as an eruption of multiple, follicular or parafollicular, pinhead-sized, skin-colored, yellowish, pink, red, or reddish brown, flat-topped papules.^{5,28} They are commonly arranged in clusters. Sometimes, papules may demonstrate a polygonal shape, a shiny surface, and an umbilication, mimicking the lesions of lichen planus.²⁹ Sometimes, clusters of papules may be seen as psoriasiform plaques studded with pustules.³⁰ Sometimes, papules may be arranged in rings or arcs, mimicking the lesions of GA.³¹ Lichen scrofulosorum almost always affects the trunk.³² Sometimes, lesions may extend onto the thighs, buttocks, and arms. The face may also be involved.³³ Lichen scrofulosorum is usually associated with tuberculosis of the lungs, pleuras, bones, joints, or lymph nodes.

Atypical mycobacterial infections

Atypical mycobacteria are *Mycobacteria* species other than *M tuberculosis* and *M leprae*. They are ubiquitous in nature and are widely distributed in water, soil, and animals.

The most familiar atypical mycobacterial infections are swimming pool granuloma and Buruli ulcer. The former is caused by *M marinum* and presents as a single, blue-red, ulcerating nodule most commonly on the hands, feet, knees, or elbows; however, a case of *M marinum* infection of the face, after a cat scratch, has also been reported, presenting as red-purple, discharging, cystic nodules, extending in a sporotrichoid pattern.³⁴ The latter is caused by *M ulcerans* and presents as a rapidly and extensively enlarging ulcer most commonly on the legs or arms; however, it has also been reported to occur on the face.³⁵

Another common presentation of atypical mycobacterial infections is cervicofacial lymphadenitis. It is usually caused by *M avium* complex and *M haemophilum*.³⁶ The disease usually affects children between the ages of 1 and 5 years. The most commonly involved nodes are the submandibular, cervical, or preauricular nodes. The skin overlying a swelled node shows purplish erythema.

Atypical mycobacterial infections may also occur after some cutaneous procedures, such as tattoos.³⁷ Again, they may follow various plastic surgery operations, such as liposuction and breast implants.^{38,39} Facial cosmetic procedures, such as fractionated carbon dioxide laser resurfacing, may also lead to atypical mycobacterial infections.⁴⁰ They may present as an atypical acneiform eruption, histologically showing a pustular and granulomatous folliculocentric inflammation.

Leprosy

Leprosy can be roughly divided into three forms: tuberculoid, borderline, and lepromatous. Tuberculoid leprosy is characterized by a single or very few well-defined, hypopigmented or erythematous macules or plaques.⁴¹ The plaques are often flattened in the center. The lesions are frequently scaly, dry, hairless, and hypoesthetic. Lepromatous leprosy begins with widely and symmetrically distributed, ill-defined, slightly hypopigmented and erythematous macules.⁴¹ Later, flesh-colored or occasionally erythematous papules and nodules develop, and the skin thickens in various regions, including the face, earlobes, and legs. Borderline leprosy shows skin lesions intermediate between tuberculoid and lepromatous forms.⁴¹ Its lesions may be macules, papulonodules, or plaques. The last ones may become annular. In midborderline leprosy, plaques have a well-demarcated central depression, the so-called punched-out appearance. The face can be involved in all of these three forms.⁴²⁻⁴⁴ It is a noteworthy feature that in facial tuberculoid leprosy, demonstration of the sensory loss is difficult, even impossible, because the facial skin is

abundantly innervated. In lepromatous leprosy, skin thickening along with papulonodular lesions creates the so-called leonine facies.

Syphilis

Secondary syphilis can present as macular, papular, or rarely, pustular lesions. Usually, they are discrete and generalized early in the course, whereas they tend to be grouped and localized late in the course. Although more usual for late secondary syphilis, papules of early secondary syphilis may also show granulomas histologically. The face is a common location for secondary syphilis. Both discrete and grouped papules may be seen on the face.^{45,46} Annular syphilid, consisting of very closely arranged papules, is often seen on the cheeks, especially near the angle of the mouth.⁴⁷ It may also cause arciform, serpiginous, polycyclic, and gyrate patterns.

Tertiary syphilis presents on the skin with either tubercular syphilid or gumma. The former begins as a pink to purple papule or nodule. Over weeks or months, it evolves into a plaque, with peripheral extension and with central atrophy and scarring. The lesion may ulcerate.⁴⁸ The latter, namely, gumma, begins as a pink to dusky red, hard, subcutaneous nodule. After softening, it may be absorbed, leaving a scarlike retraction, or may evolve into a punched-out ulcer covered with adherent yellowish white slough. The face is a common location both for tubercular syphilid and for gumma.^{49,50}

Rhinoscleroma

Rhinoscleroma begins almost always in the nasal mucosa and gradually invades neighboring structures, including the wings of the nasal alae, upper lip, and cheeks.^{51,52} There are three distinct stages in its development: exudative, infiltrative, and cicatricial. The first stage is characterized by abundant, foul-smelling, mucopurulent secretion, lasting for weeks to months; the second stage is characterized by bluish red, rubbery nodules, which may restrict the air passage and may ulcerate. If the infection extends to the skin, yellowish red papules or plaques appear around the nostrils. These skin lesions have been reported also to be the sole manifestation of the disease.⁵²

Cat-scratch disease

Cat-scratch disease is almost always seen in patients younger than 21 years.⁵³ About 2 weeks (range, 5-120 days) after a bite or scratch by a cat, swollen tender lymph nodes appear in the drainage area of the injury.⁵⁴ They may be associated with fever, fatigue, and malaise. The nodes may eventually suppurate and can persist for several months.⁵⁵ In about two thirds of the patients, one or several erythematous papules occur at the site of inoculation, before the

appearance of the lymphadenopathy, in other words, 3 to 10 days after the bite or scratch.⁵⁴ The most common location of the lymphadenopathy has been found to be either the armpits or the neck in different series.⁵⁶

Actinomycosis

Actinomycosis has mainly cervicofacial, thoracic, abdominal, and pelvic forms.⁵⁷ The cervicofacial form is the most common. It often appears as submandibular or supramandibular nodules or swellings after a trauma, such as tooth extraction. The overlying skin becomes purple and warm. Subsequently, fistulae or ulcerations develop with a seropurulent discharge, containing minute yellowish granules. Masticatory spasm may be present.

Primary cutaneous actinomycosis, an extremely rare form, is caused by the direct inoculation of *Actinomyces* species into the skin, usually through an external trauma. It has also been reported to occur on the face, as a soft yellow-green mass consisting of multiple pustules on the root of nose, or as multiple superficially eroded, erythematous nodules and plaques with sinus tracts on the forehead.^{58,59}

Nocardiosis

Primary cutaneous nocardiosis is seen typically in immunocompetent individuals with a history of trauma. It has three types: superficial, deep, and lymphocutaneous. The superficial type follows a superficial inoculation and manifests as pustules, abscesses, or cellulitis. The deep type, also known as mycetoma, follows a deep inoculation into the subcutaneous tissue and presents as multiple discharging sinuses. It has a chronic course. Although it occurs most commonly on the limbs, especially on the foot, facial involvement has also been reported.⁶⁰ The lymphocutaneous or sporotrichoid type starts as a papule or pustule at the site of inoculation. Then the infection spreads through the lymphatics, so subcutaneous erythematous nodules along the lymphatics and deep regional lymphadenopathy appear. This type occurs most commonly on the upper limbs of farmers and gardeners; however, its subtype, the so-called cervicofacial nocardiosis, is typically seen in children, as a febrile suppurative submandibular or cervical lymphadenopathy, following a pustule in the nasolabial fold.⁶¹

Secondary cutaneous nocardiosis is a result of a hematogenous dissemination or a direct extension from a visceral, particularly pulmonary, infection. It is seen primarily in immunocompromised patients and presents as a single or multiple subcutaneous abscesses and pustules.⁶²

Botryomycosis

Cutaneous botryomycosis leads to lesions similar to those of mycetoma and actinomycosis.⁶³ Most cases present as

nodules, abscesses, sinuses, fistulas, and/or ulcers. Some cases present as cysts, tumors, or verrucous plaques. There may be a seropurulent discharge with granules, consisting of accumulations of bacteria. Cutaneous botryomycosis classically occurs on the limbs in areas of trauma^{63,64}; however, it has also been reported on the face, neck, trunk, and buttocks.^{63,65}

Pyoderma vegetans

Pyoderma vegetans, also known as blastomycosislike pyoderma, starts as erythematous papulopustular lesions.⁶⁶ They rapidly coalesce into large, exudative, vegetative plaques with well-defined and elevated borders. These plaques may have multiple pustules. Healing is usually with postinflammatory hyperpigmentation. Pyoderma vegetans is usually localized on the face, scalp, armpits, genitalia, and, less commonly, the abdomen, trunk, and distal parts of the limbs. Pyoderma vegetans may also affect the oral mucosa, forming vegetative, pustular plaques.⁶⁷ Pyoderma vegetans may coexist with a variety of diseases, including ulcerative colitis, Crohn disease, chronic malnutrition, alcoholism, lymphoma, leukemia, and HIV infection.⁶⁸

Fungal infections

Kerion

Kerion (a Greek word for “honeycomb”), a type of dermatophytosis, presents as an inflammatory painful plaque or tumorous mass, which has pustules, abscesses, ulcers, and crusts.⁶⁹ Regional lymphadenopathy without fever is frequently present. Alopecia is quite evident in the plaque and may be permanent if left untreated. Kerion can be localized to any area in the skin, including the face, but it is common on the scalp.^{69,70}

Majocchi granuloma

Majocchi granuloma, also known as trichophytic granuloma, is characterized by erythematous indurated plaques.⁷¹ Discrete or grouped papules or nodules can occur either within the plaques or alone. Pustules are occasionally observed on the plaques.⁷² Majocchi granuloma is frequently seen on the anterior aspects of the legs of women, and is seen only occasionally on the face.⁷¹

Candida granuloma

Candida granuloma is seen in chronic mucocutaneous candidiasis.⁷³ It is characterized by numerous crusted or hyperkeratotic lesions. The most common sites of involvement are the face and scalp.

Coccidioidomycosis

Disseminated coccidioidomycosis affects most commonly the skin.⁷⁴ Skin lesions may be either single or multiple. They appear as papules, nodules, plaques, pustules, abscesses, or sinus tracts. They may be erythematous, frambesiform, warty, scaly, crusted, or ulcerated. The sites of predilection are the head and neck. A verrucous papule or plaque on the nasolabial fold is the classic cutaneous finding of disseminated coccidioidomycosis.⁷⁵ It also has been suggested that patients with facial lesions are more likely to have meningitis.⁷⁶

Primary cutaneous coccidioidomycosis appears as an ulcerated nodule at the site of inoculation. Then new nodules may arise along the lymphatics, as in lymphocutaneous sporotrichosis. *Locus minoris resistentiae*, in contrast, is a well-documented phenomenon in disseminated coccidioidomycosis.⁷⁴ In other words, a hematogenous dissemination from pulmonary infection may be targeted specifically to the site of an injury. A case of primary cutaneous coccidioidomycosis has been reported, presenting as a verrucous nodule on the tip of the nose.⁷⁷

Histoplasmosis

Disseminated cutaneous histoplasmosis often presents as multiple molluscum contagiosumlike papules or nodules⁷⁸; however, papulonecrotic lesions, verrucous plaques, panniculitis, abscesses, gummata, and ulcers may also be seen.^{79,80} They usually develop on the head and neck. Occasionally, the entire skin is affected including the palms, soles, and mucous membranes. Disseminated cutaneous histoplasmosis is seen mostly in patients with HIV/AIDS. Such lesions may also be seen in immunocompetent adults, even in the absence of any visceral involvement.^{81,82}

Primary cutaneous histoplasmosis presents as a chancre-like ulcer with regional lymphadenopathy. It has also been reported to appear as several molluscum contagiosumlike lesions on the face.⁸³

Cryptococcosis

Cutaneous cryptococcosis may be either primary or secondary. The former is a result of direct inoculation after an injury and may be seen in healthy individuals. It is characterized by a single nodule, ulcer, cellulitis, panniculitis, or abscess. The latter is a result of hematogenous dissemination from pulmonary infection and is usually seen in immunocompromised patients. It presents with a wide variety of lesions, including papules, vesicles, bullae, pustules, plaques, nodules, tumors, subcutaneous masses, cellulitis, abscesses, draining sinuses, ulcers, and purpura. The face, neck, and scalp are most commonly involved. Multiple erythematous or skin-colored, umbilicated, papulonodular lesions, primarily involving the face and mimick-

ing molluscum contagiosum, have been reported repeatedly in patients with HIV/AIDS.^{84–86} These lesions are often the first presenting symptom of the fatal systemic disease; therefore, recognition of them is crucial to start an early treatment.

Blastomycosis

Disseminated cutaneous blastomycosis can cause either verrucous or ulcerative skin lesions. Both types may be seen together. The former starts as papulopustules and then slowly enlarges to form verrucous plaques or fungating tumors.⁸⁷ The latter starts as pustules and then slowly enlarges to form superficial ulcers or vegetative plaques. Both types of lesions may show central atrophy and scarring. Subcutaneous nodules, abscesses, and gummata have also been reported.⁷⁸ The face, neck, and limbs are commonly involved in disseminated cutaneous blastomycosis.

Primary cutaneous blastomycosis can cause, in decreasing order of frequency, nodules or papules, verrucous lesions, pustules, ulcers, abscesses, and erythematous indurations.⁸⁸ Lymphangitis and painful lymphadenopathy may accompany them. The face may be involved also in primary cutaneous blastomycosis.

Paracoccidioidomycosis

Paracoccidioidomycosis typically affects the skin around the mouth, as a result of direct extension from the so-called muriform or mulberrylike stomatitis.^{89–91} The lips may be diffusely swollen or a plaque may be seen. The surface usually becomes verrucous, vegetative, ulcerated, or crusted. The skin is also affected rarely by direct inoculation, and more commonly by hematogenic dissemination. The lesions present as erythematous papular, papulopustular, papulovegetating, ulcerated, and ulcerocrusted lesions, with the surface covered by fine hemorrhagic dots. The face can be involved in disseminated paracoccidioidomycosis. Sarcoid-like cutaneous lesions in paracoccidioidomycosis have been described, presenting as violaceous infiltrated papules and plaques on the earlobes or the tip of the nose.^{92,93} Lymphadenopathy may accompany perioral or disseminated skin lesions. Multiple enlarged lymph nodes may be seen in the cervical and submandibular regions.⁹⁴ These nodes tend to suppurate and to cause fistulas.

Sporotrichosis

Sporotrichosis begins as a red papule or pustule at the site of inoculation after a minor injury, such as a puncture from a rose thorn. The lesion gradually evolves into a subcutaneous ulcerating nodule. The infection either may remain “fixed” at the site of inoculation or may spread through the lymphatics, so that new nodules appear along the lymphatics. The latter condition, which is the most common form of sporotrichosis,

may also be seen in other infections, and is called a *sporotrichoid* or *lymphocutaneous* pattern. Adults usually acquire the disease on the legs or hands because of their jobs, whereas children commonly get it on the face from scratches of thorny branches while they are playing.^{95,96} Sporotrichosis rarely presents as a visceral or disseminated disease, usually in immunocompromised patients. Disseminated cutaneous sporotrichosis could appear as multiple painful ulcers with raised indurated margins and a yellow fetid secretion, distributed over the face, thorax, arms, and legs.⁹⁷

Chromoblastomycosis

Chromoblastomycosis begins as a red papule at the site of inoculation after a minor injury, such as a puncture from a splinter. The lesion enlarges centrifugally to form a red scaling plaque, which may be ring- or horseshoe-shaped. The surface of the lesion may become warty. The sites of predilection are the exposed parts of the limbs; however, the face may be involved rarely, suggesting a possible airborne infection.^{98–101} Chromoblastomycosis does not heal spontaneously and progresses slowly. It may cause lymphedema and elephantiasis, and skin cancers may develop in its scars.¹⁰² Disseminated chromoblastomycosis has also been reported and it may present as multiple warty nodules and plaques on the face, neck, trunk, and limbs.¹⁰³

Phaeohyphomycosis

Phaeohyphomycosis can be divided into three forms: superficial, subcutaneous, and systemic.¹⁰⁴ Superficial phaeohyphomycosis includes tinea nigra, which is characterized by brown to gray patches on the palms and soles. Subcutaneous phaeohyphomycosis presents as erythematous papulonodules; scaly, hyperkeratotic, verrucous or ulcerated plaques; cysts; abscesses; sinuses; or ulcers.^{105,106} Lesions may be single or multiple. They are located most commonly on the limbs; however, other areas may also be involved, such as the waist, buttocks, neck, and face.¹⁰⁷ Lymphangitis and regional lymphadenopathy are unusual.

Alternariosis

Cutaneous alternariosis has three forms: exogenous superficial, exogenous unilocular, and endogenous multilocular.¹⁰⁸ The exogenous superficial form resembles seborrheic eczema and is mostly located around the nose and on the cheeks. The exogenous unilocular form appears as a livid-red plaque, which can evolve into a crusted ulcer, and is located on bare parts of the body, legs, and arms. Verrucous lesions may also be seen. The endogenous multilocular form appears as multiple erythematous, partially necrotic papules. Papulonodules or nodules can also be observed. The lesions are often found simultaneously on the trunk, neck, and limbs. In general, the most common sites of

involvement in cutaneous alternariosis are the upper and lower limbs, followed by the face and neck and trunk.¹⁰⁹

Eumycetoma

Eumycetoma begins as small, firm, painless subcutaneous nodules or plaques that gradually increase in size.¹¹⁰ They extend slowly to adjacent structures by contiguous spread. The tumor develops as a result of the enlargement of nodules and formation of new ones. Generally, it is firm and round, but may be soft and lobulated. Enlarged nodules open to the skin through sinus tracts, discharging sanguineous, seropurulent, or purulent exudates that usually contain grains. Established sinuses heal and recur, whereas new sinuses develop continually. The disease usually runs a chronic course from several years to decades. Eumycetoma affects most frequently areas subjected to repeated trauma, namely, the feet, legs, and hands. In more than three fourths of cases, only one foot is involved. Again, as a result of repeated trauma, eumycetoma rarely involves other parts of the body, such as the scalp, eyelids, neck, abdominal wall, perineum, and buttocks.

Lobomycosis

Lobomycosis begins as a small, wartlike papule, nodule, or plaque.^{111,112} Gradually new lesions appear as a result of contiguity or lymphatic dissemination. In the fully developed disease, keloidlike lesions of different sizes are seen. They are smooth, pink or dark brown, and shiny; however, scales and crusts may be on their surfaces. Telangiectasias may also be seen. In many cases, there is hyperesthesia, and some describe a burning sensation. The most common sites of involvement are the ears, arms, and legs. Lesions may be tumoral on the lower limbs and verrucous on the palmar edges. The face is the fourth most common site of involvement. In most cases, the disease is restricted for many years to the site of onset; however, cutaneous dissemination may occur occasionally.

Rhinosporidiosis

Rhinosporidiosis affects especially the nasal and nasopharyngeal mucosae.¹¹³ It begins as a small pink or purple-red polyp and grows slowly, becoming pedunculated and multilobular. The polyp is very friable. In the nostril, it can grow to the pharynx and palate, or externally through the nasal orifice invading the upper lip. In the skin, the tumor has a warty appearance.

As a result of hematologic or lymphatic dissemination, autoinoculation, or direct inoculation, skin lesions distant from the nose may appear.^{114–120} These have a wide variety of morphology: confluent papules forming plaques, annular plaques, verrucous plaques, cutaneous horns, raised nodules, pedunculated tumors, pyogenic granulomalike lesions,

furunclelike lesions, subcutaneous nodules (sometimes being gigantic and globoid), and subcutaneous swellings (sometimes being capped with a buttonlike warty lesion). Again, the face is a commonly involved site for many of these lesions.

Entomophthoromycosis

Entomophthoromycosis, also known as subcutaneous phycomycosis, encompasses both basidiobolomycosis and conidiobolomycosis.¹²¹ Basidiobolomycosis presents as a subcutaneous induration. The overlying skin does not ulcerate. The most common sites of involvement are the upper and lower limbs, and lateral sides of the head, back, shoulders, and buttocks. Conidiobolomycosis produces a chronic nasal inflammation and sometimes extends to paranasal sinuses, so an erythematous fixed mass may appear on the cheeks, forehead, lips, and eyelids.

Zygomycosis

Primary cutaneous zygomycosis, also known as mucormycosis, is seen in immunocompromised patients, burn victims, and patients with severe soft tissue trauma.¹²² It starts with erythema and induration, indistinguishable from any cutaneous or subcutaneous infection. Then necrotic eschars develops, as its diagnostic hallmark. The disease is capable of extending rapidly along tissue planes. The necrosis is typified by pathognomonic black pus.¹²³ Cutaneous zygomycosis can be further subdivided into superficial and gangrenous subtypes. The superficial form is characterized by a gradual onset and slow progression. Deep tissue involvement is uncommon. Conversely, the gangrenous form is rapidly progressive and more aggressive. Primary cutaneous zygomycosis involves exposed sites, including the face.¹²⁴

Penicilliosis marneffeii infection

Penicilliosis marneffeii is an opportunistic infection of patients with HIV/AIDS.^{91,125} The majority of its skin lesions are umbilicated papules with or without central necrosis that are similar to molluscum contagiosum. Other forms of lesions are nodules, pustules, abscesses, and ulcers. The lesions are distributed primarily on the upper half of the body, namely, on the face, scalp, upper limbs, and trunk. In immunocompetent patients, abscesses are the most common form of cutaneous penicilliosis.¹²⁶

Algal infections: Protothecosis

Cutaneous protothecosis is mostly seen in immunocompromised patients.¹²⁷ It usually presents as an erythematous plaque that can be vesiculobullous or, less commonly, ulcerative, with crusting and purulent discharge. Some

lesions are verrucous, hypopigmented, or atrophic. The most common sites of involvement are the face and limbs. Subcutaneous nodules may also be seen.¹²⁸

Protozoal infections

Leishmaniasis

Cutaneous leishmaniasis (CL) can be divided into two groups: localized CL and disseminated anergic CL. Localized CL can be further divided into two subgroups: acute CL and chronic CL. Among these groups and subgroups, granulomas are the histologic hallmark of chronic CL¹²⁹; therefore, only chronic CL will be discussed in this contribution. In general, CL has a wide clinical spectrum.¹³⁰ In particular, chronic CL exhibits a wide variety of clinical presentations, so Douba et al.¹³¹ have recently accepted it to be a “great mimicker.” According to these authors, chronic CL has three different types: papulonodular, plaque, and ulcerative. The first and second types most commonly occur on the face, whereas the third type favors the lower limbs. The papulonodular type commonly presents as multiple erythematous papules or nodules, resembling sarcoidosis or granulomatous rosacea. It has three special subtypes: tumoral, verrucous, and sporotrichoid. The tumoral subtype commonly presents as a single vegetative lesion, resembling eccrine poromas, amelanotic melanomas, and lymphomas. The verrucous subtype commonly presents as a single verrucous lesion, resembling warts, deep mycoses, and tuberculosis verrucosa cutis. The sporotrichoid subtype presents as multiple nodules along the lymphatics, resembling sporotrichosis. The second type, namely, the plaque type, commonly presents as a single erythematous plaque, resembling lupus vulgaris, sarcoidosis, granuloma faciale, Sweet syndrome, psoriasis, and pseudolymphoma. It has two special subtypes: annular and erysipeloid. The annular subtype resembles borderline leprosy, GA, and tinea faciale. The erysipeloid subtype resembles butterfly rash of lupus erythematosus. The third type, namely, the ulcerative type, resembles chronic venous ulcers.

Our department has gained a lot of experience on CL, particularly with the studies done by one of our former colleagues, Soner Uzun.^{132,133} He has also accepted CL to be a “great imitator” for at least 10 years (Figs. 1 and 2).¹³⁴

It should be remembered that CL is not only clinically, but also histologically a mimicker. Recently, it has been reported that CL may histologically simulate not only granulomatous disorders, but also neoplastic processes, such as squamous cell carcinoma and mycosis fungoides.¹³⁵

Amebiasis

Cutaneous amebiasis is characterized by rapidly growing, severely painful, necrotic ulcers with an intensely erythematous



Fig. 1 Cutaneous leishmaniasis. Upper left, A solitary dome-shaped papulonodule on the forehead. Upper right, A solitary crusted papulonodule on the cheek. Lower left, Multiple papulonodules on the mandibular area. Lower right, An “apple-jelly” color on diascopy.

halo, along with regional adenopathy, fever, and malaise.¹³⁶ Some lesions are vegetative, verrucous, or hyperkeratotic. The most common site of involvement is the perianal region. Cutaneous amebiasis has also been reported to occur on the face.^{137,138}

Parasitic infections: Demodicidosis

Demodicidosis has four clinical types: pityriasis folliculorum, rosacealike demodicidosis, perioral dermatitislike demodicidosis,^{139,140} and granulomatous rosacealike demodicidosis. Pityriasis folliculorum presents as diffuse but slight facial erythema with numerous tiny follicular plugs and scales that impart a “nutmeg-grater” or “sandpaperlike” appearance to the face. Rosacealike demodicidosis presents as erythema, scaling, and papulopustules, involving multiple areas of the face in an asymmetric distribution. Perioral dermatitislike demodicidosis presents as papulopustules limited to the perioral areas. Granulomatous rosacealike demodicidosis, also known as demodicidosis gravis, presents as discrete, erythematous, dome-shaped papules without obvious pustules on the entire face. This last type shows histologically granulomas.

Noninfectious inflammatory disorders

Lichen nitidus

Lichen nitidus is characterized by sharply demarcated, pinpoint- to pinhead-sized, round or polygonal, usually skin-colored, slightly elevated, flat, shiny, generally asymptomatic papules.¹⁴¹ These papules are strikingly monomorphic in nature. Sometimes, they have pink, red, purple, yellow, or brown hues depending on the background color of the patient’s skin. On their surfaces, there may be a fine scale or a hyperkeratotic plug. The Koebner phenomenon is observed. The lesions tend to occur in groups, primarily on the abdomen, chest, glans penis, and upper limbs. Generalized cases have also been reported.^{142,143} In such cases, the face may also be involved. A case of generalized lichen nitidus in association with Down syndrome has been reported to show a perioral and perinasal accentuation.¹⁴⁴ Facial involvement of lichen nitidus may be a part of actinic lichen nitidus, which is a photosensitive variant lichen nitidus.^{145–147} In such cases, the rash may spare the sunshaded areas of the face, such as the frontal hairline, vertical forehead folds, upper eyelids, nasolabial folds, and a part of the upper lip shaded by the nose.



Fig. 2 Cutaneous leishmaniasis. Upper left, A crusted plaque on the forehead. Upper right, A verrucous plaque with satellite umbilicated papulonodules on the cheek. Lower left, An erythematous plaque in a “butterfly” distribution. Lower right, Eroded papules and plaques scattered over the forehead and scalp, associated with umbilicated papulonodules near the medial canthus.

Lichen striatus

Lichen striatus is characterized by a single, or sometimes multiple, continuous or interrupted, linear or curved bands, extending mostly along Blaschko lines.^{141,148} The band is composed of pinpoint- to pinhead-sized, red, pink, skin-colored or hypopigmented, sometimes scaly, flat, asymptomatic papules. The bands occur most commonly on the limbs and less frequently on the trunk, neck, or head.^{141,148,149} A case with an erythematous band confined to the face has been reported.¹⁵⁰ The band usually resolves spontaneously within 1 year.

Granulomatous rosacea

Granulomatous rosacea is a variant of rosacea, histologically showing granulomas.¹⁵¹ Clinically, it usually presents as monomorphic, discrete, yellow, brown, or red, hard, persistent papules or nodules on the malar, perioral, and periocular areas. On diascopy, these lesions may show an “apple-jelly” color. They may lead to scarring. Other features of rosacea, namely, flushing, persistent erythema, telangiect-

asias, and pustules, are not common. Erythematous plaques are not uncommon; however, it should be stressed that granulomatous rosacea is not a clinical subtype but a histologic variant, so that it may be encountered throughout the clinical subtypes of rosacea, namely, erythematotelangiectatic, papulopustular, and phymatous. Lymphedematous rosacea, clinically presenting as persistent and progressive swelling predominantly in the central face, histologically may show granulomas.¹⁵²

Lupus miliaris disseminatus faciei

Lupus miliaris disseminatus faciei, also known as acne agminata, is characterized by multiple, monomorphic, discrete, reddish brown, dome-shaped, asymptomatic papules, appearing either singly or in crops, especially on the lower eyelids, cheeks, and nasolabial folds. These papules may extend onto extrafacial regions such as the neck, shoulders, armpits, arms, hands, groins, and legs.¹⁵³ On diascopy, they may show an “apple-jelly” color. The disease heals spontaneously within several years and usually leaves disfiguring, ice-picking, punctate scars.^{154,155}

Granulomatous periorificial dermatitis

Granulomatous periorificial dermatitis, also known as facial Afro-Caribbean childhood eruption, typically affects otherwise healthy prepubertal children.¹⁵⁶ It is characterized by monomorphic, flesh-colored, yellow, brown, or red, pinhead-sized, dome-shaped, usually asymptomatic papules around the mouth, nose and/or eyes. Scaling may also be present. Occasionally, extrafacial regions such as the ears, neck, trunk, upper limbs, and genital area may also be involved.^{156,157} The disease heals spontaneously within several months to years, mostly without leaving scars.¹⁵⁵

Idiopathic facial aseptic granuloma

Idiopathic facial aseptic granuloma presents as one or several, red or purplish, soft or elastic, painless nodules exclusively in children.^{158–160} These lesions may be associated with chalazion.^{160,161} The disease has a chronic course, but spontaneous healing eventually occurs. The face is the sole location. In two thirds of cases, lesions are located within an triangular area on the cheek, demarcated by lines drawn between the lateral corner of the eye, the corner of the mouth, and the most caudal anterior attachment of the earlobe to the cheek skin.¹⁵⁸ It has been suggested that idiopathic facial aseptic granuloma might be a possible marker of childhood rosacea.^{160,161}

Sarcoidosis

Sarcoidosis is a multisystemic granulomatous disease of unknown cause. Skin involvement is seen in almost one fourth of patients with sarcoidosis. Because of a vast array of morphologies, cutaneous sarcoidosis is known as one of the “great imitators” in dermatology.¹⁶² The face is the most common site of involvement in cutaneous sarcoidosis.¹⁶³ Among its protean manifestations, papular sarcoidosis, sarcoidal plaques, angioliupoid sarcoidosis, and lupus pernio have a predilection for the face.^{164–166}

Papular lesions are the most common form of cutaneous sarcoidosis. They are symmetric, red-brown to purple, smooth, usually asymptomatic, and sometimes itchy. On diascopy, they may show an “apple-jelly” color. On the face, their sites of predilection are the periorbital areas and nasolabial folds. These papules may heal spontaneously with or without atrophic scarring, or they may enlarge and coalesce to form plaques or annular lesions. They may be associated with acute forms of the disease.

Sarcoidal plaques are symmetric, round or oval, brownish red, and infiltrated. On the face, their sites of predilection are the nose and cheeks. These plaques tend to resolve with scarring and may take an annular shape. Erythematous papules, annular plaques, or nodules on the face may be a part of a rare variant, the so-called photo-induced

sarcoidosis.¹⁶⁷ Erythematous plaques may cause leonine facies.¹⁶⁸ Sarcoidal plaques are associated with chronic forms of the disease.

Angioliupoid sarcoidosis is a rare variant of sarcoidal plaques. It is characterized by erythematous asymptomatic plaques with superficial telangiectasias and typically appears on the area between the nasal root and inner canthi.¹⁶⁹ Angioliupoid sarcoidosis is often associated with eye involvement.¹⁷⁰

Lupus pernio is the most characteristic skin lesion of sarcoidosis. It consists of indolent, relatively symmetric, red-brown to purple, shiny, smooth, doughy, indurated, swollen skin changes. On the face, its sites of predilection are nose, lips, cheeks, and ears. Lupus pernio can be disfiguring, and may erode into the underlying cartilage and bone. It commonly coexists with chronic fibrotic disease of the lower and upper respiratory tracts.

Blau syndrome

Blau syndrome is an autosomal dominant disorder characterized by the triad of skin eruption, arthritis, and uveitis.¹⁷¹ Its signs and symptoms begin usually before 4 years of age. The eruption consists of multiple, pinhead-sized, yellowish to brown-red, flat-topped, slightly scaly papules. They are usually arranged in clusters or linear arrays, and may become confluent. Intermittent episodes of the eruption with spontaneous resolution may occur over years. Eventually, pitted scars may develop at sites of previous inflammation. The eruption is distributed, often symmetrically, over the trunk and/or extremities; however, the face may also be involved and may even be the first affected region. The eruptions may have a butterfly distribution on the face.

Interstitial granulomatous dermatitis

Palisaded neutrophilic and granulomatous dermatitis

Interstitial granulomatous dermatitis is characterized by a polymorphous eruption, consisting of erythematous, indurated, linear bands, papules, nodules, or annular plaques.¹⁷² The eruption favors the thighs, intertriginous areas, and flanks in a symmetric fashion.

Palisaded neutrophilic and granulomatous dermatitis (PNGD) is characterized by symmetric, skin-colored to erythematous papules with a central crust or ulceration creating an umbilicated appearance.¹⁷³ Nodules may also be seen. The lesions favor the extensor forearms, fingers, and dorsal surface of the hands. Less frequently, lesions have been reported on the buttocks, thighs, and legs.

These two granulomatous dermatitides may be associated with autoimmune diseases including rheumatoid arthritis and lupus erythematosus. PNGD and interstitial granulomatous dermatitis may represent poles of a solitary process. Although the face is not among their favorite

locations, facial involvement with erythematous nodules has been reported in a case of PNGD associated with systemic sclerosis.¹⁷⁴ A butterfly rashlike lesion has been observed in a case of PNGD associated with systemic lupus erythematosus, and it was suggested that this facial rash might be either an systemic lupus erythematosus-specific butterfly rash or a butterfly rashlike PNGD lesion.¹⁷⁵

An interesting recent finding in lupus erythematosus is that sebaceous granulomas, consisting of epithelioid cells, foreign body giant cells, partially digested sebaceous material, and a few lymphocytes, has been observed in 8% of cases with discoid lupus erythematosus.¹⁷⁶

Orofacial granulomatosis

Orofacial granulomatosis classically presents as recurrent swelling of one or both lips that eventually becomes persistent.^{177,178} The swelling is initially soft, but becomes firmer with time. It may also affect the chin, cheeks, eyelids, and forehead. Angular cheilitis and vertical fissures of the lips may also be seen. Intraoral manifestations may also occur, including mucosal swelling, erosions, ulcers and tags, fissured tongue, and gingival enlargement. Both the facial skin and the oral mucosa may show erythema.^{179,180} These cutaneous and mucosal findings may be associated with facial paralysis and cervical lymphadenopathy. Orofacial granulomatosis encompasses the previously recognized Melkersson-Rosenthal syndrome and cheilitis granulomatosa of Miescher. The former is characterized by a triad of persistent labial or facial swelling, recurrent facial paralysis, and fissured tongue. The latter is characterized by swelling restricted to the lips. Orofacial granulomatosis may be the oral manifestation of a systemic condition, such as Crohn disease, sarcoidosis, or more rarely, Wegener granulomatosis.

Crohn disease

Crohn disease may cause orofacial granulomatosis and metastatic cutaneous lesions on the face. The former has been discussed in the previous paragraph. Remember that patients with orofacial granulomatosis should be carefully evaluated for gastrointestinal symptoms such as diarrhea, hematochezia, and abdominal pain.¹⁸¹ The latter is called *metastatic Crohn disease* of the skin. It is defined by the presence of cutaneous granulomatous lesions noncontiguous with the gastrointestinal tract or fistulae.¹⁸² Metastatic Crohn disease of the skin presents as single or multiple papules, nodules, plaques, or ulcers. The most common sites of involvement are the intertriginous and flexural areas of the body, with a predilection for the lower limbs. Involvement of the vulva, penis, trunk, upper limbs, and face has also been described. Facial metastatic Crohn disease presents as erythematous papulonodules, nodules, plaques, or ulcers.

Granuloma annulare

GA has four main clinical forms: localized, disseminated, subcutaneous, and perforating.¹⁸³ Localized GA is characterized by annular lesions consisting of closely arranged papules. This arrangement gives the border a beaded appearance. Papules are pink, red, or violet and domed or slightly flat in shape. The most common sites of involvement are the lateral and dorsal surfaces of the hands and feet. Disseminated GA is characterized by multiple, symmetrically distributed papules. They may be discrete or confluent, with or without an annular configuration. Lesions are distributed primarily over the trunk. Subcutaneous GA is characterized by subcutaneous nodules. The most common sites of involvement are the limbs and scalp. Perforating GA is characterized by discrete or annularly arranged, skin-colored or red papules with a central crust or scale. They may be umbilicated. Lesions are preferably located on the limbs. In general, the face is the most uncommon location in GA; however, pediatric cases of subcutaneous and perforating GA have been reported to be located on the face.^{184–186}

Actinic granuloma

Actinic granuloma, also known as O'Brien granuloma or annular elastolytic giant cell granuloma, was previously suggested to be a form of GA.¹⁸⁷ Now, it has been accepted as a separate entity due to its histologic differences. Actinic granuloma usually presents with erythematous asymptomatic papules. They coalesce and enlarge to form annular plaques. These plaques have raised erythematous borders and slightly atrophic hypopigmented centers.¹⁸⁸ The sites of predilection are the neck, face, chest, and arms. Spontaneous remission, sometimes with mottled dyspigmentation, may occur after months to years.

Necrobiosis lipoidica

Necrobiosis lipoidica is characterized by irregular, ovoid plaques with a violaceous, indurated periphery and a yellow, shiny, atrophic center.¹⁸⁹ In the later stage of development, visible telangiectasia on the surface is common. One third of the lesions ulcerate, sometimes spontaneously or after trauma. Hypohidrosis, alopecia, and anesthesia may also occur within the lesions. The most common sites of involvement are the lower legs. Other parts of the body may also be involved, including the scalp, face, abdomen, and arms. Gross bilateral induration of the eyelids may cause closure of both eyes.¹⁹⁰

Necrobiotic xanthogranuloma

Necrobiotic xanthogranuloma is characterized by multiple yellowish to reddish brown nodules, which slowly enlarge into plaques or tumors with yellowish hue and

telangiectasia.^{191,192} Almost half of the cases show central atrophy and ulceration. The most common site of involvement is the face, especially periorbital areas. The trunk and proximal aspects of the arms and legs are other affected sites. Patients with necrobiotic xanthogranuloma are often found to have paraproteinemia or hematologic disorders, including multiple myeloma or lymphoproliferative diseases.

Wegener granulomatosis

Wegener granulomatosis can cause a wide range of skin lesions.^{193–195} Among them, palpable purpura is the most common manifestation. Papules or nodules undergoing central necrosis are also common. They are followed by ulcers and subcutaneous nodules. Other types of skin lesions are petechiae, vesicles, pustules, bullae, livedo reticularis, digital or penile necrosis, and subungual splinter hemorrhages. Fewer than half of skin biopsies show vasculitis, granulomatous inflammation, or both. Skin lesions of Wegener granulomatosis tend to be on the legs, but involvement of the face, trunk, and upper limbs has also been reported. In Wegener granulomatosis, facial papules or nodules later becoming necrotic ulcers may mimic acne excoriée and acne fulminans, or multiple erythematous papules on the nose, cheeks, and upper lip may simulate granulomatous rosacea.^{196–199}

Churg-Strauss syndrome

Churg-Strauss syndrome can cause a wide range of skin lesions.²⁰⁰ Among them, palpable purpura of the extremities is the most common manifestation. It is followed by urticarial lesions. Less common manifestations include papules or nodules, vesicles, pustules, bullae, livedo reticularis, Raynaud phenomenon, cutaneous infarcts, and ulcers. Main histologic features of skin lesions are vasculitis, eosinophil infiltration, and extravascular granuloma. In cases of Churg-Strauss syndrome, urticarial or papulonodular lesions have been reported to occur also on the face.^{200–203} These facial urticarial lesions may disappear within several days or may remain constant for months. Sun exposure may provoke them. The facial papulonodular lesions are red to violaceous in color. They can undergo central necrosis.

Foreign body reactions

Gout

Gouty tophi appear as small, whitish to yellowish nodules, which have been described as looking like crab eyes.^{204–206} Later, they may enlarge, become fixed, ulcerate, and drain a chalky material. With or without breaking, tophi may become inflamed, showing erythema. The most common sites of involvement are the ears, elbows, fingers,

knees, Achilles tendons, and toes; however, some facial regions, such as the nose and the lateral canthus, have also been reported as locations of tophi.^{205,207} Gouty panniculitis is another dermatologic manifestation of gout.²⁰⁸ It is characterized by irregular, erythematous, indurated, subcutaneous nodules or plaques, located predominantly on the legs, which can also ulcerate and drain.

Ruptured cysts

Epidermoid and trichilemmal cysts present as skin-colored to yellowish or whitish, round, smooth, firm, mobile nodules. Epidermoid cysts often have a central dimple or punctum. They are located mostly on the face, neck, chest, or upper portion of the back. Trichilemmal cysts are seen predominantly on the scalp. Occasionally, they are found on the face, neck, or trunk. As a result of rupture, both types of cysts may become inflamed, causing reddening, swelling, and tenderness.

Tattoo

Tattoo granuloma develops mostly as a result of a classic foreign body reaction and sometimes of an allergic reaction.²⁰⁹ The interval between tattooing and its appearance is widely variable, ranging from months to decades. Tattoo granuloma usually presents as an erythematous plaque with firm papules in the shape of the tattoo. Sometimes, papules have a yellowish hue. Although tattoo granuloma is more common after decorative body tattoos, cases developing after cosmetic facial tattoos have also been reported.^{210,211} Invisible tattoos, which are becoming increasingly popular, also can cause granulomatous reactions.²¹² One should also consider that tattoo granuloma may be a sign of systemic sarcoidosis.²¹³

Hyaluronic acids

Hyaluronic acid granuloma develops several weeks after injection of hyaluronic acids, which are used for facial rejuvenation.^{214–216} It presents as erythematous indurated nodules.

Silicone

Silicone granuloma, also known as siliconoma, develops even decades after injection or implantation of silicone, which is often used for soft tissue augmentation.^{217,218} It may present as diffuse red swelling, induration, nodule formation, ulceration, and regional lymphadenopathy. Cases of siliconoma that affect the face have been reported repeatedly. An injection to only one area of the face may lead to an angioedemalike total facial swelling.²¹⁹ Injections to the face may cause silicone granulomas both locally and in distant sites such as the knees²²⁰; conversely, a breast

implant may cause metastatic silicone granulomas on the face, presenting as lupus miliaris disseminatus facie-like papules.²²¹

Silica

Cutaneous silica granuloma develops after contamination of a wound with silica, which is present in ordinary sand, glass, granite, slate, mica, flint, gravel, cement, brick, and asbestos.²²² It usually presents as erythematous, firm, nontender, dermal, or subcutaneous nodules, often associated with scars.²¹⁸ They may occur singly or concurrently at multiple sites. Erythematous, nontender, and mildly verrucous plaques have also been reported.²²² Cutaneous silica granuloma usually occurs on exposed sites, including the face. Lymphadenopathy may accompany them.²²³

Metals

Metals may be accidentally implanted into the facial skin or may be embedded into it by various therapeutic or cosmetic procedures other than tattoo.^{224,225} All of them are capable of inducing a granulomatous reaction. Clinically, the reaction may present as erythematous, hard, or fluctuating and later draining nodules.

Cactus spines

Cactus spine granuloma develops typically 4 to 8 weeks after an injury.²²⁶ It presents as erythematous and indurated papules, plaques, or nodules. They are often grouped and localized. Such an arrangement is a clue to the diagnosis. An unusual case recently has been reported, in which each papule possessed a central thin spine, extending up to 4 to 5 mm in length from the skin.²²⁷

Besides cactus spines, glochids may also cause skin problems.²²⁸ They are barbed bristles on cacti, such as the prickly pear. Gatherers of its fruit may suffer an itchy papulovesicular rash mimicking scabies. A granulomatous dermatitis may also develop. It is characterized by glistening and sometimes erythematous papules with a central dot. Vesicles, pustules, and even ulcers may also occur. A case with such lesions on the face has been reported to occur years after an accidental injury.²²⁹

Neoplasms

Granulomatous mycosis fungoides

Granulomatous mycosis fungoides is an unusual histologic variant of cutaneous T-cell lymphoma without clinical distinction from classic mycosis fungoides.^{230,231} In such cases, the first symptoms may be patches, plaques, papules,

nodules, or tumors.²³² The predilection site is the trunk. Cases of granulomatous mycosis fungoides, having facial erythematous plaques or diffuse infiltration along with extrafacial lesions and mimicking leprosy, have also been reported.^{230,233}

Conclusions

Granulomatous disorders capable of causing facial red lesions are numerous. Most of them usually manifest themselves with some common types of elementary lesions, namely, ulcerated or nonulcerated papules, plaques, nodules, and/or abscesses; therefore, their differential diagnosis is not easy. It is possible, however, to shorten the list of possible diagnoses in a given case by considering certain clinical patterns. Some disorders, on the other hand, such as sarcoidosis and leishmaniasis, have so many clinical presentations. A clinician should always keep them in mind according to their frequencies in his or her place of practice.

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