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Review Article

Sebaceous gland diseases: clinical picture risk factors and treatment

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ABSTRACT

Sebaceous glands are present in almost every part of the skin or body except the palms and soles, and the primary function of these glands involves the generation of sebum. However, numerous diseases, both benign and malignant, have been linked to abnormal sebaceous gland activity. Sebaceous gland disorders are a class of widespread dermatological conditions with numerous aetiologies. Diseases in which the primary involvement is associated with sebaceous glands comprise conditions such as steatocystoma, sebaceous gland hyperplasia, sebaceoma, sebaceous adenoma, nevus sebaceous, and sebaceous carcinoma. Additionally, sebaceous glands play a secondary role in androgenic alopecia, acne vulgaris, and seborrheic dermatitis. Steatocystoma simplex or multiplex is a non-cancerous growth that arises either sporadically or through inheritance in an autosomal dominant manner, originating from mutations in the keratin 17 gene. Sebaceous gland hyperplasia refers to the non-malignant enlargement of sebaceous lobules, which presents as papules exhibiting a yellowish color and telangiectatic features. Common treatment methods for sebaceous gland hyperplasia include the application of topical retinoids, the administration of oral isotretinoin, and the surgical removal of the affected lesions. Nevus sebaceus also referred to as a nevus of Jadassohn or organoid nevus, represents a congenital skin hamartoma originating from mosaic mutations. While acne vulgaris is a highly prevalent and complex disorder influenced by various factors, one of which is the increased production of sebum. Acne can be managed using approaches like topical or systemic antibiotics, hormonal therapies, cautery-based lesion removal, and phototherapy techniques such as laser treatment. The purpose of this research is to review the sebaceous gland diseases: clinical picture, risk factors, and treatment.

Keywords: Sebaceous, Gland, Disease, Treatment

INTRODUCTION

The human sebaceous gland is composed of multiple acini that join together to form an excretory duct. It is present in every part of the skin except for the palms and soles, and quite rarely the dorsal surfaces of the hands and feet are affected by it. The generation of sebum is the sebaceous gland's primary function. Sebum performs a variety of activities and has a distinct composition that varies depending on the species and age. Human sebum is composed of wax esters, glycerides, squalene, cholesterol, cholesterol esters, and free fatty acids and is a mixture of sebaceous lipids and cell detritus. Growth factors, hormones, and steroids all regulate its synthesis. A diverse range of sebaceous disorders can result from the sebaceous glands' involvement in various inflammatory, necrosed, benign, and malignant processes.[1]

Numerous diseases, both benign and malignant, have been linked to abnormal sebaceous gland activity. With the exception of steatocystoma multiplex and acne vulgaris, most diseases are solitary. Some of the diseases manifest in the proximal extremities, with a preference for the head and neck region. Although histology and immunochemistry are often employed to confirm clinical diagnosis, they can also be used to confirm challenging diagnoses, particularly when distinguishing cases of sebaceous hyperplasia from adenoma and cancer.[2] Sebaceous gland disorders are a class of widespread dermatological conditions with numerous aetiologies. Seborrhea is a common clinical symptom of the disorder's seborrheic dermatitis, acne, androgenetic alopecia, and rosacea, among others. The lesions typically affect the patient's physical appearance, sense of self-worth, and quality of life. They frequently affect the face, scalp, and thoracic areas. Although the pathophysiology of sebaceous gland diseases is currently unknown and not well-defined, it is understood that a variety of factors affect both their occurrence and course of development.[3]

Sebaceous glands are involved secondarily in androgenic alopecia, seborrheic dermatitis, and acne vulgaris, while they primarily present as steatocystoma simplex and multiplex, sebaceous gland hyperplasia, sebaceoma, sebaceous adenoma, sebaceous carcinoma, nevus sebaceous, and folliculosebaceous cystic hamartoma.[2] In present times, medical research is focusing its attention on the sebaceous gland in an effort to better understand the particular method of sebaceous lipogenesis and differentiation and to create innovative treatment options that target molecular mechanisms and pathways involved in the pathogenesis of sebaceous gland diseases.[4] The purpose of this research is to review sebaceous gland diseases: clinical picture, risk factors, and treatment.

LITERATURE SEARCH

This study is based on a comprehensive literature search conducted on August 29, 2023, in the PubMed, Web of Science, Science Direct, and Cochrane databases, utilizing the medical topic headings (MeSH) and a combination of all available related terms, according to the database. To prevent missing any possible research, a manual search for publications was conducted through Google Scholar, using the reference lists of the previously listed papers as a starting point. We looked for valuable information in papers that discussed information about sebaceous gland diseases, including clinical pictures, risk factors, and treatment. There were no restrictions on date, language, participant age, or type of publication.

DISCUSSION

The sebaceous gland undergoes renewal throughout adulthood, and the precise interplay of hormones, cytokines, signalling molecules, and mediators of lipid metabolism regulates the sebaceous gland's homeostasis.[5] Lipids from the sebaceous glands help maintain a healthy skin barrier. Atypical skin hydrolipid films and skin barrier function result from their failure. Sebaceous gland barrier disruption, particularly changes in lipid content and production, may be a neglected factor in the aetiology of inflammatory dermatoses.[6] Several skin-related diseases have been attributed to sebaceous gland dysfunction. The most prevalent skin condition of adolescence, acne, is characterized by an increase in sebum production and modifications to the composition of sebum. In addition, seborrheic dermatitis, psoriasis, cicatricial alopecia, eczematous disorders, and sebaceous tumours have all been associated with defective sebaceous gland activity.[7]

Some of the sebaceous gland diseases are briefly described below.

Sebaceous gland hyperplasia

Clinical manifestations and risk factors

Sebaceous gland hyperplasia (SGH) is a benign cutaneous sebaceous gland proliferation that mostly affects the face and becomes exacerbated with ultraviolet-B exposure and ageing. Almost 1% of the healthy population, mostly men or boys, have been reported to experience it. Skin-colored or whitish-yellow, typically umbilical papules that range in size from 2 to 9 mm, are the usual SGH symptoms. The diagnosis is simple and based on clinical and dermoscopic findings; however, the gold standard in more complicated situations when malignancy cannot be ruled out is histopathological finding.[8] Figure 1 shows slight yellow papules of sebaceous hyperplasia on the cheek of a heart-transplanted patient.[9] The histological findings of SGH exhibit enlarged sebaceous glands originating from the infundibular region of the hair follicle, along with undifferentiated sebocyte hyperproliferation and differentiation arrest, resulting in multilayered basal cells and very few differentiated sebocytes. Patients using long-term ciclosporin, such as those undergoing organ transplantation, are more likely to develop SGH on the face and trunk. Ciclosporin-related SGH may develop in very young patients, with the lesions spreading to other parts of the body such as the trunk and limbs, in contrast to SGH that typically presents on the face in elderly people. SGH, however, is additionally seen in people who are taking systemic corticosteroids, are on hemodialysis, or have disorders like Pachydermoperiostosis, Muir-Torre syndrome, or the X-linked hypohidrotic ectodermal dysplasia syndrome. SGH is a distinct cutaneous adverse effect of ciclosporin that only affects men undergoing transplants.[10]

Figure 1: Slight yellow papules of sebaceous hyperplasia on the cheek of a heart-transplanted patient.[9]

Treatment

Various invasive methods such as cryosurgery, electrodessication, curettage, shave excision, and topical trichloroacetic acid are common SGH therapies. These procedures have a chance of leaving scars and discolouring the skin. As an alternative, isotretinoin is beneficial for SGH, but it is associated with side effects and a rapid recurrence of lesions after stopping the drug. Topical photodynamic therapy and lasers like carbon dioxide or pulsed dye lasers are further treatment options. Topical photodynamic therapy is linked to excellent cosmesis, but transitory dyspigmentation and scarring are probable laser-related side effects.[10]

Sebaceous carcinoma (SC)

Clinical manifestation and risk factors

SC is a rare but potentially aggressive adnexal neoplasm. SC typically manifests as a painless pink or yellow nodule. Nevertheless, clinical characteristics can vary considerably, from skin-coloured to red papules, plaques, or nodules that are difficult to differentiate from other, more typical types of skin cancer on clinical examination. The final confirmatory diagnosis requires histologic analysis. Sebaceous and undifferentiated cell collections in lobular, dermally based collections are the hallmark histologic features of SC. The literature lists advanced age, female sex, and Asian race as risk factors for SC. While, Muir-Torre syndrome, a history of radiation, immunosuppression, and familial retinoblastoma have notable associations with SC.[11] A pictorial representation of SC in the ocular region is shown in Figure 2.[12] Almost 0.2% to 4.6% of all malignant cutaneous neoplasms are SC, while the estimated incidence of SC is 1-2 instances per million individuals annually. SC most frequently manifests as a periocular adnexal periocular tumor. Periocular tumors account for up to 75% of all SC. Both men and women are equally affected. The ocular variation affects Asians and those over 60 years of age more commonly.[13]

Figure 2: Presentation of SC in the ocular region.[12]

Treatment

SC is still mostly treated with surgery, including Mohs micrographic surgery. The advantages of Mohs micrographic surgery include precise margin evaluation and low recurrence rates. Radiation therapy, chemotherapy, orbital enlargement, or a combination of treatments may be used to treat advanced cases.[13]

Steatocystoma multiplex

Clinical manifestations and risk factors

It is a rare condition marked by the presence of cutaneous cysts which can be inherited in autosomal dominant pattern or develop randomly. It is believed that mutations in the keratin 17 gene are an integral component of the pathophysiology. No internal manifestations exist and usually, the lesions cause no symptoms.[14] Due to the high density of the formed pilosebaceous units, the disease commonly manifests as many asymptomatic cysts on the axilla, groin, trunk, scrotum, and proximal extremities. It is uncommon for the disease to manifest itself on the face and scalp. Males, although frequently have symptoms in the sternal area. The disease is subcategorized into localized, generalized, facial, acral, and suppurative types. Steatocystoma simplex is the name for the sporadic single lesions. Early dome-shaped lesions of steatocystoma multiplex are translucent, and as they get older, they turn yellowish. Though the comedones are a related characteristic, the puncta are not immediately apparent. If the cysts spontaneously break, it will cause Steatocystoma multiplex (SM) suppurativum, a condition that resembles acute conglobata in that it is characterized by inflammation and scarring. There is no sex preference, and the cysts develop during adolescence and the early stages of adulthood. The actual cause of the cysts is still unknown; however, several theories claim that they are the result of nevoid sebaceous retention cysts, hamartomas, or different types of dermoid cysts.[15] There are no well-defined risk factors for SM in the literature, although Marasca et al reported the emergence of multiple steatocystomas in a psoriatic patient alongside ustekinumab treatment.[16] However, this necessitates further clinical research to draw any evidence-based conclusions. SM presented on the neck and chest are shown in Figure 3.[17]

Figure 3: Presentation of SM on neck and chest.[17]

Treatment

The preferred treatment for SM is medical management with oral isotretinoin, which significantly reduces inflammation. Though recurrence after discontinuance has been observed, results are frequently not evident for several months. Multiple lesions can be treated using cryotherapy in a single session, but its use is severely constrained due to the cosmetic damage and extremely low efficacy it causes. The use of forceps, vein hooks, or a curette to remove the cyst wall after a small incision produces good cosmetic results but is time-consuming and invasive. Successful cystic needle aspiration with gentle extirpation of the cystic contents has produced outstanding cosmetic results. Despite producing positive outcomes, this procedure necessitates a qualified practitioner and is ineffective for cysts that are either very large (> 15 mm in diameter) or very small (3 mm in diameter), and this therapeutic approach has very high recurrence rates. Recent research has demonstrated the ability of carbon dioxide lasers to successfully cure many lesions in a single session with favourable cosmetic results. However, not all patients can easily access this surgery, and it may not be appropriate for larger cysts.[18]

Acne vulgaris

Clinical manifestation and risk factors

It is a highly prevalent condition, with the prevalence of acne varying across geographical locations and age groups, with estimates ranging from 35% to nearly 100% of adolescents having acne at some point. Comedones, papules, and pustules are the usual symptoms of acne in patients. Open comedones, commonly referred to as blackheads, which are clogged follicles with openings that allow the air to enter, and closed comedones, also commonly termed whiteheads, which are blocked follicles without an opening, are two categories of comedones. Papules are raised skin lesions with a diameter of less than 1 cm, whereas pustules resemble papules but are inflammatory and filled with pus. Nodules and cysts, inflammatory, swollen lesions that are at least 5 mm in size, may be seen in people with severe acne. Additionally, patients with acne may also have other symptoms like scarring, erythema, and hyperpigmentation. Numerous studies have found a high correlation between several risk factors, including family history, age, body mass index, and skin type [19]. A figurative illustration of acne is shown in Figure 4.[20]

Figure 4: Presentation of acne on face of patient.[20]

Treatment

There are various formulations and therapeutic modalities, each of which targets a different aspect of the pathophysiology of acne. The choice of treatment depends on the severity of the condition, the patient's preferences, and its tolerance. Topical retinoids are recommended for the treatment and management of acne of any severity. Only benzoyl peroxide and retinoids should be used in conjunction with systemic and topical antibiotics, and the treatment period should not exceed 12 weeks. While isotretinoin is used to treat severe, persistent acne.[21]

Nevus sebaceus

Clinical manifestation and risk factors

Nevus sebaceus (NS) is a congenital cutaneous hamartoma of the pilosebaceous unit, also referred to as nevus of Jadassohn or organoid nevus. In addition to the epidermis and hair follicles, NS is characterised by the proliferation of immature sebaceous and apocrine glands.[2] Although it frequently manifests at birth, it may not be noticeable until much later in life. Neoplasms may develop in NS, generally in adulthood, and may be benign or malignant.[22] Depending on the degree of lesion growth, the clinical manifestation appears as plaques with partial or total alopecia, a linear or oval form, a colour ranging from skin-colored to yellowish-orange or brownish-black, and a smooth, nipple-like, or verrucous look. The scalp, preauricular area, face, and cervical regions are the most often impacted areas. However, some other research studies have documented its presence in other, less common locations, such as the mucosa, trunk, and extremities; when identified in these locations, the lesions are dispersed in accordance with the Blaschko lines. Linear nevus syndrome, also known as Schimmelpenning-Feuerstein-Mims syndrome, is a more complex clinical picture that results from the extracutaneous manifestations of sebaceous nevi that may damage many organs.[23] A pictorial representation of NS is demonstrated in Figure 5. To the best of our knowledge, there are no defined risk factors for NS in the literature, and we need further research to elaborately study the pathophysiology of this anomaly.

Figure 5: Pictorial representation of NS around the ear of patient.[23]

Treatment

NS can be permanently removed with full-thickness excision, just like other epidermal nevi, in patients who express aesthetic and psychological discomfort. The excision of lesions for preventive reasons is still debated intensively. Other modalities, such as curettage, cauterization, cryotherapy, photodynamic therapy, topical salicylic acid, topical and systemic retinoids, topical application of vitamin D analogues, laser therapy, and dermabrasion, are frequently used to treat and improve Jadassohn lesions in addition to excision. A multidisciplinary approach to treatment is advised for people with Schimmelpenning-Feuerstein-Mims syndrome who have more severe system impairments.[23] Our review elaborately highlights various sebaceous gland diseases along with their risk factors and treatment approaches, which is the strength of our study; however, all sebaceous gland diseases could not be covered in this paper since they are beyond the scope of this study and are a limitation of our study, although we aim to cover other sebaceous gland diseases in our successive research studies in the future to signify the importance of diagnosis and management of these conditions in clinical practice.

CONCLUSION

The sebaceous gland plays an essential role in the development of disease, and sebaceous gland dysfunction is linked to several diverse diseases. Since some of these diseases mimic several other skin conditions, they therefore need to be critically diagnosed and managed. Early diagnosis and prompt management aid in achieving optimal outcomes and patient satisfaction.

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