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Chalazion Risk Factors: A Review Article

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ABSTRACT

Introduction: *The chalazion is a common eyelid lesion that arising from obstruction of the Meibomian glands within the tarsal plate. The sebaceous material accumulated within the eyelid interstitium will lead to blockage of glands. It occurs equally in males and females may affect people of all ages, occurs often in adults aged 30-50 years. It can manifest as solitary or multiple lumps. It is more common in the upper eyelid. Risk factors that may cause chalazion formation include seborrheic dermatitis, rosacea, chronic blepharitis, high lipid blood concentration, viral infection, poor lid hygiene, stress, eyelid trauma, gastritis, hormonal changes, vitamin A deficiency, smoke. Most of the chalazia are self-limited. However, some cases may need warm compresses, corticosteroid injection, or surgical evacuation and removal.* ***Objective:*** *To summarize most of the literature reviews about risk factors of chalazion and to provide a highly evident base resource to all ophthalmologists to revise the most common risk factors of chalazion formation.* ***Method:*** *For doing this review, Medline, PubMed, Google Scholar, Science Direct Database were used to identify relevant articles published until July 2020. The search was done by using the following descriptors chalazion, risk factors, and pathophysiology.* ***Conclusion:*** *The most common eyelid lesion is chalazion that arising from obstruction of the Meibomian glands within the tarsal plate. Blepharitis is one of the most common risk factors and other significant factors such as seborrheic dermatitis, rosacea, high lipid blood concentration, gastritis, hormonal changes, vitamin A deficiency viral infection, stress, eyelid trauma, poor lid hygiene, and smoking.*

Keywords: Chalazion, Risk factors, Pathophysiology

INTRODUCTION

A chalazion is a common eyelid lesion arising from obstruction of the Meibomian glands within the tarsal plate. Normally, Meibomian glands produce oily sebaceous secretions which spread over the surface of the conjunctiva and cornea to keep the moisture and avoid their dryness. In chalazion, the sebaceous material accumulated within the eyelid interstitium will lead to blockage of glands and inflammatory response. A fibrous capsule also produces a noticeable bump in the eyelid around the sebaceous material [1,2].

It occurs equally in males and females, may affect people of all ages, occurs often in adults aged 30-50 years, can manifest as solitary or multiple, the upper eyelid is much more common which can be explained by the presence of more glands on the upper eyelid. They vary in size, and are often not even visible, but just as palpable resistance in the tarsus [3,4].

Risk factors that may cause chalazion formation include seborrheic dermatitis, rosacea, chronic blepharitis, high lipid blood concentration, poor lid hygiene, viral infection, stress, eyelid trauma, eyelid surgery [5,6]. The range of presentation can be from a gradually enlarging painless rounded nodule, self-limiting to a painful lid swelling complicated by corneal astigmatism and mechanical ptosis from the space-occupying effect of the chalazion in the relatively limited eyelid space [7]. If the chalazion becomes secondarily infected, it will be tender, painful, with the discoloured overlying skin, and fever may occur. Most of the chalazia are self-limited. However, some cases may need warm compresses, corticosteroids, or surgical evacuation and removal [2,8-10].

In this article, I will review the most risk factors that can lead to cause the chalazion formation.

Objective

To summarize most of the literature reviews about risk factors of chalazion and to provide a highly evident base resource to all ophthalmologists to revise the most common risk factors of chalazion formation.

LITERATURE REVIEW

For doing this review, Medline, PubMed, Google scholar Science Direct Database were used to identify relevant articles published until July 2020.

The search was conducted using the electronic library of Taibah University for Health Sciences, Madinah, Saudi Arabia. The search was done using the following descriptors chalazion, risk factors, pathophysiology. The final list consisting of more than 35 results either abstract or full text.

Pathophysiology of Chalazion

Chalazion is an inflammatory lesion that occurs when lipid products breakdown infiltrates into surrounding tissue and enhances a granulomatous inflammatory response. Accordingly, a chalazion is also called a conjunctival granuloma. The location of Meibomian glands is in the tarsal plate of the eyelids; consequently, the edema due to blockage of these glands is generally found in the conjunctival portion of the lid. Chalazia due to Zeis gland obstruction is usually found along the edge of the lid [11].

The exact underlying cause for this blockage remains unclear. Many factors have been proposed as risk factors for chalazion formation, such as seborrheic dermatitis, rosacea, chronic blepharitis, high lipid blood concentration, poor lid hygiene, viral infection, stress, eyelid trauma, eyelid surgery [5,6].

Risk Factors of Chalazion

Blepharitis: Blepharitis is a chronic inflammatory process of the eyelid margin and can cause dry eye, damaging the cornea and eyelids. The blepharitis is divided into anterior and posterior. Anterior blepharitis is the inflammation of the follicles and eyelashes, while posterior blepharitis includes the Meibomian glands obstruction [12].

Blepharitis is a considerable risk factor for chalazion. In the cohort study conducted in Bundelkhand in 2017, 75 patients with chalazion involved in this study (2014-2016), found that blepharitis is one of the most common causes of a chalazion in their study. Once blepharitis reaches an advanced stage, the patient's risk of developing hordeolum and chalazion increases [6]. Another retrospective case-control study was conducted in Israel in 2011, involved in their study all patients who were diagnosed with chalazion for 8 years from 2000 to 2008, have shown that a significant association between chalazion and blepharitis [13]. Also, a retrospective observational case-control study done in 2010 in Israel, revealed the same significate relation between them [14].

Posterior blepharitis is associated with Obstructive Meibomian Gland Dysfunction (MGD) by obstruction and inflammation of the Meibomian glands or, less frequently, atrophy of the Meibomian glands [15]. MGD is a common and chronic disease that is often associated with chalazia.

Rosacea: It is a chronic inflammation of the skin that affects approximately 5% of the adult population, presented with Centro-facial redness with ocular manifestations [16,17]. Ocular involvement includes chronic conjunctivitis, blepharitis, MGD, and relapsing chalazion [18]. A retrospective case-control study conducted in Israel in 2011, reported that rosacea is highly associated with chalazion [13].

The most frequent association of rosacea is with blepharitis, in which Meibomian gland involvement is seen in up to 50% of cases. Hypersecretion of the Meibomian glands can occur, seen as the release of large quantities of lid oil on the lid margin with expression. Obstructive MGD is strongly associated with skin disease and characterized by ductal plugging or pouting, and dilation of the Meibomian ducts with squamous metaplasia, abnormal keratinization, and foreign-body reaction [19].

Seborrheic Dermatitis: A Seborrheic Dermatitis (SD) is a chronic, recurrent inflammatory skin disorder that manifests as plaques or erythematous macules with different grades of scaling associated with severe itching. The condition happens as an inflammatory response to Malassezia species and on the sebum-rich areas of the face, trunk,

and scalp [20]. Meibomian glands of the lids are secretory sebaceous glands that are often affected which will lead to seborrheic blepharitis and chalazion formation [12,21].

Dyslipidemia: Dyslipidemia is defined as a disorder of lipid metabolism that manifests as an elevation of total cholesterol, Low-Density Lipoprotein (LDL), and triglyceride levels and as a decrease in High-Density Lipoprotein (HDL) levels in the blood [22]. Dyslipidemia leads to hypersecretion of meibum which will cause high concentrated meibum in Meibomian glands, so that leads to blockage of ducts of Meibomian glands and Meibomian gland dysfunction happened, so it will increase the risk for blepharitis and subsequently chalazion [23]. A systematic review proved that a strong positive correlation exists between dyslipidemia and MGD [24]. Another study prospective cohort study done in 2013 showed that the prevalence of elevated triglyceride and low-density lipoprotein levels is higher with the increasing severity of MGD [25].

A case-control study conducted in 2013 found that the young and middle-aged patients with MGD without a history of hypercholesterolemia might have higher blood cholesterol levels than controls of similar age with no MGD [26].

Viral and bacterial infection: Infection of the Meibomian glands and their ducts is another risk factor for chalazion formation. Chalazion was reported to spread between school children, and to be transmitted between family members and household contacts in one report. It was also reported to follow systemic infections and follicular conjunctivitis. Viral etiology was confirmed by histopathological examination of chalazion Meibomian gland tissue examination [27]. Also, it can be an exacerbation factor in a subclinical Meibomian gland dysfunction and induce that early dysfunction in the glands [27].

Bacterial infection contributes to the pathogenesis of chalazion as well. Specific organisms, in particular staphylococcus aureus, can cause chalazia, while other organisms occur as secondary superimposed infection on top of the already developed chalazion [28].

Gastritis: It is a microscopic gastric mucosal inflammation [29]. The relation between chalazion and gastritis might represent as an indirect association *via.* infectious etiology (such as *Helicobacter pylori*), or psychological stress. *H. pylori* is a considerable pathogen that leads to cause gastritis, peptic ulcer disease. Also, *Helicobacter pylori* have been linked with non-digestive presentation, such as rosacea, Raynaud phenomenon, cardiovascular diseases [13,30]. Sacca, et al. have pointed to an association between *H. pylori* infection and blepharitis, but not automatically indicative of a causal relation [31]. In their study, the blepharitis group showed an *H. pylori* infection prevalence of almost 76.3% compared with 42.3% of the control group (asymptomatic). Elimination of *H. pylori* ameliorated ocular cytology results. Chronic blepharitis and chalazia may theoretically be extra digestive forms of *H. pylori* infection [31].

Vitamin A deficiency: World Health Organization defines it as Low serum of vitamin A and it considers as a deficiency when vitamin A (<0.7 mmol/L) is in serum [32]. Vitamin A deficiency can lead to hyperkeratosis in the Meibomian gland ducts and consequently obstructs these ducts [33]. A case-control study done in 2017 found that The average serum vitamin A levels in patients with chalazion in the age groups of 7-12 and 13-19 years were significantly lower than in their control counterparts there were no significant differences between the two groups in the age group of more than 19 years old. These findings suggest that low vitamin A levels play a role in the pathogenesis of chalazion in younger ages [34]. Another prospective case-control study done in 2014 in the children population (6 months up to 12 years) reported that the average serum vitamin A levels of patients with chalazia in the case group were significantly lower than the average for the control group (without chalazion) [32].

As mentioned before the vitamin A deficiency considers a risk factor, especially in young subjects.

Hormonal changes: Some hormones have a role in sebum production from the Meibomian glands. Androgens induce the growth of the sebaceous gland and sebum production [35,36]. It is more common in adults (aged 30-50 years) than in children, and in pregnant ladies and after menopause. Hormonal effect on sebaceous secretion and sebum viscosity might explain clustering during pregnancy and at the time of puberty [37]. A retrospective case-control study conducted in Israel in 2011 showed that the chalazion incidence peak in the 10s to 20s (in females more) and again in the 50s. Hormonal effect on sebaceous secretion and viscosity can explain that, clustering during pregnancy, and after menopause. Stress typical to those periods might be another factor. Also, they found that chalazion was less prevalent in hypothyroidism, diabetes, and obesity. Common to all those conditions is the low androgen levels [13].

Anxiety: Anxiety is an emotion caused by worrying thoughts, feelings of tension, and physical changes such as

palpitations, increased blood pressure [38]. A correlation between stress and recurring chalazia has been suggested by many, based on patients' self-reporting and clinical impression. In clinical practice, many patients report that the chalazion has occurred in a very stressful time, like weddings, work stress, and examinations. Episodes of recurrent or multiple chalazia associated with psychologically stressful events have been reported [37].

A retrospective case-control study conducted in 2011 in Israel reported that a significant association between anxiety and chalazion but the mechanism by how stress acts is not known. Mostly, many patients do not admit to having anxiety or stress feeling, and the coincidence of chalazion and psychological conditions might be even more significant [13].

Poor lid hygiene: It considers as one of the risk factors of chalazion as reported in cohort study they found a significant association between poor hygiene of the eyelids and chalazion formation, which can cause the abstraction of Meibomian glands which lead to blepharitis and it is one of the most common risk factors of chalazion. Moreover, This is supported by the fact that the incidence of chalazion is higher in adult females as they used to use eye cosmetics [6,39].

Exposure to air pollutants: Like the foreign substance which can obstruct Meibomian gland ducts which will develop a chalazion. This can affect all individuals at any age regardless of their race or sex. It is more common with poor hygiene and lack of regular cleaning of the eyes exist [7].

Smoking: Epidemiological data includes the smoking of cigarettes as a predisposing factor for many ophthalmological diseases, especially cataracts and age-related macular degeneration [40].

There is no prior study that links smoking to chalazia. Although it is obvious that smoking exacerbates age-related changes and is damage the vision, the exact mechanisms by which it does so remains unknown. Tobacco smoke is containing more than 4,800 chemicals, 69 known as carcinogens, and including free radicals that can cause an oxidative distraction to the retina, lowering the protection against antioxidants and decreasing blood flow to choroidal [40].

Also, it was found that chronic smokers have reduced corneal and conjunctival sensitivity and altered tear proteins. Smoking cigarettes was reported as a causative factor of a dysfunctional tear film by destroying the lipid layer of the eye surface [41].

For chronic smokers, a reduced tear film lipid layer induces a substantial increase in tear evaporation rate and may slow down the tear film lipid spread time. Changes in the lipid content of the smoking-induced meibomian gland may cause lipid plugging and cause chalazia [13].

Eyelid trauma: Usual mechanism of trauma to the eye and lid is blunt injury. Trauma damage the structure of eyelids. If the supportive tarsal plate is injured, physiology and the anatomy of Meibomian glands also get disrupted by occlusion of the ductal lumen, sebum sequestration which will lead to chalazion formation. Similarly, sharp eyelid trauma can lead to direct injury to the ducts and malfunction of the ductal release of the produced sebum in the Meibomian glands [42-44].

CONCLUSION

The most common eyelid lesion is chalazion that arising from obstruction of the Meibomian glands within the tarsal plate. Blepharitis is one of the most common risk factors and other significant factors such as seborrheic dermatitis, rosacea, high lipid blood concentration, gastritis, hormonal changes, vitamin A deficiency viral infection, stress, eyelid trauma, poor lid hygiene, smoking.

DECLARATIONS

Conflicts of Interest

The authors declared no potential conflicts of interest concerning the research, authorship, and/or publication of this article.

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