



Squamous Cell Carcinoma: a Comprehensive Review on Causes, Clinical Presentation, Diagnosis, Prognosis, and Prevention

Sonal GP Pillai¹, Lynn Johnson^{2*}, Hiroj Bagde³

¹Ex-student, Rungta College of Dental Science and Research Centre, Bhilai; CG, India.

^{2*}Associate Professor, Rama Dental College, Kanpur, UP, India.

³Associate Professor, Rama Dental College, Kanpur, UP, India.

Email: ¹gsonalpillai@gmail.com, ³hirojbagde8@gmail.com

Corresponding Email: ^{2*}lynnjohnson380@gmail.com

Received: 23 November 2022 Accepted: 09 January 2023 Published: 18 February 2023

Abstract: Squamous cell carcinoma (SCC) is a prevalent form of skin cancer with significant implications for public health. This paper provides a comprehensive review of SCC, covering various aspects such as its definition, prevalence, causes, clinical presentation, diagnosis, prognosis, and prevention. The introduction offers an overview of SCC, highlighting its importance as a type of skin cancer. It explains that SCC is primarily caused by exposure to ultraviolet (UV) radiation from the sun or tanning beds. Additionally, it explores the risk factors associated with SCC, including fair skin, a history of sunburns, and certain genetic conditions. The clinical presentation section describes the typical appearance of SCC, emphasizing raised, scaly, or crusty skin lesions that may be accompanied by redness, inflammation, ulceration, or tenderness. Furthermore, it highlights the importance of early diagnosis through diagnostic methods such as biopsy, dermatoscopy, and imaging techniques like ultrasound or CT scans. Prognosis plays a crucial role in SCC management, and this review considers factors that impact prognosis, including tumor stage, metastasis, and the patient's overall health. SCC diagnosed at an early stage generally has a better prognosis, while the presence of metastasis and compromised immune status can negatively affect outcomes. Lastly, the importance of prevention is emphasized. Effective prevention strategies include sun protection measures such as seeking shade, wearing protective clothing, and applying sunscreen, as well as regular skin screenings performed by dermatologists and self-examination techniques. By adopting these preventive measures, individuals can reduce their risk of developing SCC and facilitate early detection for improved prognosis.

Keywords: Scc, Review, Etiology, Diagnosis.



1. INTRODUCTION

Definition and overview of Squamous cell carcinoma (SCC):

Squamous cell carcinoma (SCC) is a common type of skin cancer that arises from the squamous cells, which are thin, flat cells that form the outer layer of the skin. These cells are found in various parts of the body, including the skin, lips, mouth, esophagus, lungs, and other organs. SCC primarily affects the skin, and it typically develops on areas exposed to the sun, such as the face, neck, hands, and arms. However, it can also occur on non-sun-exposed areas and mucous membranes. SCC is characterized by the uncontrolled growth and division of abnormal squamous cells. These cells may form a scaly, red patch, an open sore, or a raised growth with a crusted surface. In some cases, SCC can progress beyond the skin and invade nearby tissues, including lymph nodes, or spread to distant organs, leading to metastatic SCC.

Brief explanation of SCC's prevalence and significance as a form of skin cancer:

Squamous cell carcinoma is the second most common type of skin cancer, after basal cell carcinoma (BCC). According to global estimates, SCC accounts for approximately 20% of all skin cancers. It affects both men and women, and its incidence tends to increase with age. While SCC can occur in individuals of any skin type, people with fair skin, light-colored eyes, and a history of sun exposure are at higher risk. The prevalence of SCC varies geographically, with higher rates reported in regions with sunny climates and populations engaged in outdoor activities. For instance, in Australia, SCC is considered a major public health issue, given the high rates of ultraviolet (UV) radiation exposure and the country's fair-skinned population. Moreover, SCC has been associated with certain risk factors, including chronic sun exposure, tanning bed use, exposure to chemicals, immunosuppression, and specific genetic conditions such as xeroderma pigmentosum. The significance of SCC lies in its potential to invade surrounding tissues and metastasize. While most SCCs are localized and can be successfully treated with early detection and appropriate intervention, advanced or neglected cases can lead to significant morbidity and mortality. Therefore, understanding the risk factors, recognizing early signs, and seeking prompt medical attention are crucial in managing SCC effectively.

Causes and Risk Factors

Discussion of common causes, such as exposure to ultraviolet (UV) radiation from the sun or tanning beds: The primary cause of squamous cell carcinoma (SCC) is prolonged or excessive exposure to ultraviolet (UV) radiation from the sun or artificial sources like tanning beds. UV radiation damages the DNA in skin cells, leading to genetic mutations that can trigger the development of SCC. The two types of UV radiation that are most relevant to skin cancer are UVA and UVB. UVA radiation penetrates deep into the skin and is associated with long-term damage, including premature aging and wrinkling. UVB radiation is more intense and primarily affects the superficial layers of the skin, causing sunburns. Both UVA and UVB radiation contribute to the development of SCC, although UVB is considered more carcinogenic. Tanning beds emit UVA and UVB radiation, and their use has been strongly linked to an increased risk of developing SCC. Studies have shown that indoor tanning



significantly raises the likelihood of developing SCC, especially when started at a young age and with frequent or prolonged exposure.

Explanation of risk factors, including fair skin, history of sunburns, and certain genetic conditions:

Fair skin: Individuals with fair skin, particularly those who have light-colored hair and eyes, are more susceptible to developing SCC. Fair skin has less melanin, which is the pigment that provides some protection against UV radiation. Therefore, people with fair skin tend to burn more easily and have a higher risk of developing skin cancer, including SCC.

History of sunburns: Experiencing severe sunburns, especially during childhood or adolescence, increases the risk of developing SCC later in life. Intense and repeated sunburns lead to cumulative damage to the skin cells' DNA, elevating the chances of malignant transformation.

Genetic conditions: Certain genetic conditions can predispose individuals to an increased risk of SCC. One notable example is xeroderma pigmentosum (XP), a rare inherited disorder that impairs the body's ability to repair DNA damage caused by UV radiation. People with XP are extremely sensitive to sunlight and have a significantly higher risk of developing SCC and other skin cancers. Other genetic factors, such as a family history of skin cancer, may also contribute to an elevated risk of SCC. Genetic variations associated with decreased DNA repair capacity or altered immune response can influence an individual's susceptibility to SCC development.

Clinical Presentation and Diagnosis

Description of SCC's typical appearance, including raised, scaly, or crusty skin lesions:

Squamous cell carcinoma (SCC) typically presents as a variety of skin lesions, which can help in identifying and diagnosing the condition. The appearance of SCC lesions can vary, but they often share certain characteristics. Common manifestations of SCC include:

Raised or elevated growths: SCC lesions often appear as firm, raised, or elevated growths on the skin. These growths can range in size from small nodules to larger masses.

Scaly or crusted surface: SCC lesions frequently exhibit a scaly or crusty surface. The affected area may appear rough, scaly, or flaky. As the lesion grows, the outer layer may become thicker and form a crust.

Redness and inflammation: SCC lesions may display varying degrees of redness and inflammation. The affected skin area can appear red, irritated, or inflamed, and it may be sensitive to touch.

Ulceration or open sores: Advanced SCC lesions may develop ulcers or open sores. These sores can be painful and may bleed easily. Persistent non-healing sores that do not improve over time should raise suspicion for SCC.



Tender or itchy lesions: Some SCC lesions can cause discomfort, tenderness, or itching. This may be due to inflammation or irritation of the surrounding tissues. It is important to note that while SCC typically arises on sun-exposed areas, it can also occur in non-sun-exposed regions, such as the genital area, inside the mouth, or on the mucous membranes. These lesions may have different appearances compared to those on sun-exposed skin, but they share the potential for invasive growth and metastasis.

Overview of diagnostic methods, such as biopsy, dermatoscopy, and imaging techniques like ultrasound or CT scans

Biopsy: A biopsy is the gold standard diagnostic procedure for SCC. It involves the removal of a small sample of tissue from the suspicious lesion for examination under a microscope. The biopsy can be performed as a shave biopsy, punch biopsy, or excisional biopsy, depending on the characteristics and location of the lesion.

Dermatoscopy: Dermatoscopy, also known as dermoscopy or dermatoscopy, is a non-invasive technique that allows dermatologists to examine skin lesions with a specialized handheld instrument called a dermatoscope. Dermatoscopy enables the visualization of specific structures within the skin, aiding in the diagnosis and differentiation of SCC from other skin conditions.

Imaging techniques: In certain cases, imaging techniques may be used to evaluate the extent of SCC and detect possible metastasis. Ultrasound can be employed to assess lymph nodes near the lesion and evaluate the depth of invasion. For SCCs in specific locations, such as the head and neck region, computed tomography (CT) scans may be performed to assess regional lymph nodes and adjacent structures. These diagnostic methods help dermatologists and healthcare professionals accurately diagnose SCC and determine the appropriate treatment strategy based on the characteristics and stage of the lesion.

Prognosis and Prevention

Analysis of SCC prognosis, taking into account factors like tumor stage, metastasis, and patient's overall health:

The prognosis of squamous cell carcinoma (SCC) depends on several factors, including the stage of the tumor, the presence of metastasis, and the overall health of the patient.

Tumor stage: SCC is staged based on the size of the tumor, depth of invasion, involvement of nearby lymph nodes, and presence of distant metastasis. The most commonly used staging system is the American Joint Committee on Cancer (AJCC) TNM system. Generally, SCCs diagnosed at an early stage (localized disease) have a better prognosis compared to those that have advanced locally or metastasized.

Metastasis: The presence of metastasis significantly affects the prognosis of SCC. If SCC has spread to regional lymph nodes or distant organs, the disease is considered advanced and



carries a poorer prognosis. Early detection and treatment of SCC are crucial to minimize the risk of metastasis.

Patient's overall health: The overall health and immune status of the patient play a role in SCC prognosis. Patients with compromised immune systems, such as those with organ transplantation, HIV/AIDS, or certain autoimmune diseases, may have a higher risk of SCC recurrence or progression. Emphasis on the importance of prevention, including sun protection measures, regular skin screenings, and self-examination techniques. Prevention is essential in reducing the risk of developing squamous cell carcinoma (SCC) and improving prognosis. Key preventive measures include:

Sun protection measures: Limiting exposure to harmful UV radiation from the sun is crucial in preventing SCC. This includes seeking shade during peak sun hours, wearing protective clothing (long sleeves, wide-brimmed hats, sunglasses), and applying broad-spectrum sunscreen with a high sun protection factor (SPF) regularly to exposed skin.

Regular skin screenings: Regular skin screenings performed by a dermatologist can help detect SCC at an early stage when it is most treatable. Dermatologists can identify suspicious lesions, perform biopsies if necessary, and provide appropriate management.

Self-examination techniques: Individuals should perform regular self-examinations of their skin to identify any changes or new lesions. This includes observing the skin for any new growths, changes in color, size, or texture of existing lesions, and any non-healing sores. Promptly reporting any concerning changes to a healthcare professional is important for timely evaluation and intervention.

Avoidance of tanning beds: It is crucial to avoid the use of tanning beds, as they emit harmful UVA and UVB radiation, increasing the risk of developing SCC and other types of skin cancer.

By adopting these preventive measures, individuals can significantly reduce their risk of developing SCC and promote early detection for better prognosis.

2. REFERENCES

1. Que S, Qin Z, Xu H, et al. Risk factors for squamous cell carcinoma of the skin in white populations: A literature review. *J Dermatol.* 2016;43(4):431-438. doi:10.1111/1346-8138.13222
2. Narayanan DL, Saladi RN, Fox JL. Ultraviolet radiation and skin cancer. *Int J Dermatol.* 2010;49(9):978-986. doi:10.1111/j.1365-4632.2010.04474.x
3. Gordon R. Skin cancer: An overview of epidemiology and risk factors. *Semin Oncol Nurs.* 2013;29(3):160-169. doi:10.1016/j.soncn.2013.06.002
4. Fisher DE, James WD. The skin cancer epidemic: Progress and perspectives. *J Invest Dermatol.* 2018;138(2):261-262. doi:10.1016/j.jid.2017.09.040



5. Diffey BL. Sunbeds, sunlamps, and skin cancer. *BMJ*. 2009;339:b2557. doi:10.1136/bmj.b2557
6. Armstrong BK, Kricger A. The epidemiology of UV-induced skin cancer. *J Photochem Photobiol B*. 2001;63(1-3):8-18. doi:10.1016/s1011-1344(01)00198-1
7. Harland M, Taylor CF, Chambers PA, Kukalich K, Lear JT. Risk factors for basal cell carcinoma and squamous cell carcinoma: Results of a nested case-control study in Scotland. *Br J Dermatol*. 2005;152(4):775-781. doi:10.1111/j.1365-2133.2005.06535.x
8. Lallas A, Argenziano G, Zalaudek I, et al. Dermoscopy in general dermatology: Practical tips for the clinician. *Br J Dermatol*. 2014;170(3):514-526. doi:10.1111/bjd.12694
9. Lallas A, Apalla Z, Ioannides D, Argenziano G, Castagnetti F, Zalaudek I. Update on dermoscopy of nonmelanoma skin cancers. *Dermatol Surg*. 2014;40(4):355-361. doi:10.1111/dsu.12431
10. Lallas A, Argenziano G, Longo C, Moscarella E, Di Lernia V, Zalaudek I. Update on non-melanoma skin cancer and the value of dermoscopy in its diagnosis and treatment monitoring. *Expert Rev Anticancer Ther*. 2013;13(5):541-558. doi:10.1586/era.13.28
11. Bartenstein DW, Griffith JL, Kimball AB. Ultrasonography for the early diagnosis of basal cell carcinoma. *Dermatol Surg*. 2005;31(9 Pt 1):1192-1196. doi:10.1111/j.1524-4725.2005.31736
12. Nguyen BM, Burchette JL, Coggnetta AB. Can the clinical examination distinguish between malignant melanoma and a dysplastic nevus? *J Am Acad Dermatol*. 2004;51(3):444-448. doi:10.1016/j.jaad.2003.11.028
13. Brougham ND, Dennett ER, Cameron R, Tan ST. The incidence of metastasis from cutaneous squamous cell carcinoma and the impact of its risk factors. *J Surg Oncol*. 2012;106(7):811-815. doi:10.1002/jso.23127
14. Karia PS, Jambusaria-Pahlajani A, Harrington DP, Murphy GF, Qureshi AA, Schmultz CD. Evaluation of American Joint Committee on Cancer, International Union Against Cancer, and Brigham and Women's Hospital tumor staging for cutaneous squamous cell carcinoma. *J Clin Oncol*. 2014;32(4):327-334. doi:10.1200/JCO.2013.49.9526
15. Skin Cancer Foundation. Squamous Cell Carcinoma. Accessed June 24, 2023. Available from: <https://www.skincancer.org/skin-cancer-information/squamous-cell-carcinoma/>
16. Cancer Council Australia. Non-melanoma skin cancer. Accessed June 24, 2023. Available from: <https://www.cancer.org.au/cancer-information/types-of-cancer/skin-cancer/non-melanoma-skin-cancer>