

# Squamous Cell Carcinoma: A Pedal Case Presentation

*Squamous cell carcinoma of the foot is a relatively uncommon pedal neoplasm. The authors discuss the etiology, metastatic rate, incidence, morphology, treatment and the histology of this entity. Additionally, the authors present a clinical case report successfully treated by surgical extirpation.*

John F. Grady, DPM, FACFS<sup>1</sup>  
Matthew G. Garoufalos, DPM<sup>2</sup>

Carol J. Moore, DPM<sup>3</sup>  
Ronald Nasadowski, DPM<sup>4</sup>

Squamous cell carcinomas have been described in the literature by various names, which include prickle cell epithelioma, epidermoid carcinoma, spinous cell carcinoma, spinolioma, squamous epithelioma, verrucous carcinoma, epithelium cuniculatum, epidermoid carcinoma, and prickle cell carcinoma (1-3). Squamous cell carcinoma is a malignant neoplasm of skin and mucous membranes that has its origin from the epidermis or epidermal appendages where stratified squamous epithelium is found (4-6).

## Etiology

While the most common predisposing factor is chronic sun exposure, there have been a number of other underlying etiologic factors associated with the development of squamous cell carcinoma. These include preexisting lesions such as leukoplakia, actinic keratoses, xeroderma pigmentosum, and cutaneous horns. Other less common environmental factors include ingestion of arsenic, contact with organic hydrocarbons, tobacco use, radiation and thermal injury, chronic skin ulcerations or sinus tracts, scars, and neurodermatitis (6-8).

## Metastatic Rate

While the squamous cell carcinomas arising on sun-exposed skin are the most common, they typically are less aggressive and less likely to metastasize. The exception to this includes those squamous cell carcinomas found on the ear and lip, which, even when very small,

can metastasize to local lymph nodes (9). Metastasis tends to occur along lymphatic channels, with a low incidence of hematogenous spread (2, 10).

Robbins *et al.* (10) state that when squamous cell carcinoma occurs on sun-exposed skin, the patients that develop metastases are less than 2%. However, squamous cell carcinoma has a significant potential for metastasizing when arising on mucosal surfaces, chronic ulcers, burn scars, genitalia, and areas of radio-dermatitis. This rate of occurrence has been reported to be 20% to 50% (10).

Lund (4) describes four characteristics that seem to differentiate between metastasizing and nonmetastasizing squamous cell carcinoma. The following have been associated with metastasizing malignancies:

1. Occur in association with an etiology other than sun exposure;
2. The metastasizing lesions found by Lund (4) were all large in diameter. The smallest metastatic lesion was 1.3 cm. in diameter;
3. The lesions were all very invasive on histological examination; and
4. The metastatic tumors generally were found to be much less differentiated histologically than the nonmetastatic lesions.

## Incidence

Brietstein and Hugar (11) describe a male predominance of nearly 3 : 1 with the majority developing between the ages of 50 and 60 years. They have also stated that Caucasians have a higher affinity for developing carcinomas and epitheliomas than blacks who were almost never affected. Hoerr and Warren (12), in their study, have shown the incidence of this carcinoma to be 0.6%. This is in contrast to the 2.3% incidence reported by DeMuth and Snider (13). Levene (14), in his study of 511 skin tumors of the foot, reported a 13% incidence of squamous cell carcinoma.

From the Department of Podiatry, Westside Veteran's Administration Medical Center, Chicago, Illinois.

<sup>1</sup> Residency director, department chief.

<sup>2</sup> Fellow American College of Foot Orthopedists.

<sup>3</sup> Submitted while podiatric resident. Address correspondence to: 7441 SW Highway, Worth, Illinois 60482.

<sup>4</sup> Submitted during preceptorship: professional foot care specialists. 0449/2544/90/2904-0375\$02.00/U

Copyright © 1990 by The American College of Foot Surgeons

## Morphology

Clinically, squamous cell carcinoma can appear as either papillary or ulcerative (5). Atypical verrucae can be mistaken for verrucose cell carcinoma (2). The ulcerative form may begin as small, erythematous, hard, scaly plaques, which progress to a larger, nodular, and ulcerated form. This is in contrast to the papillary form that appears firm and cauliflower-like. These may appear red with telangiectasias and exhibit surface bleeding (3). Patients usually complain of local pain and insignificant bleeding, with severe symptomatology being the exception rather than the norm (15).

## Histology

Histologically, there is an acanthotic epithelium with disruption of the basement membrane, and dermal invasion with invasive squamous cell carcinoma. Invasion through the basement membrane is not present with *in situ* squamous cell carcinoma. Variable hyperkeratosis and parakeratosis are evident. A relatively marked inflammatory response is characterized by lymphocytic infiltration. Epithelial horn-pearl formation can be seen in a well-differentiated squamous cell epithelium. An increased number of atypical cells, greater degree of anaplasia, and an increased number of mitotic figures all indicate poor differentiation (1, 4, 10, 15).

Less differentiated epithelial cells correlate with a more aggressive tumor, according to Broder's grading system (1). Broder's grading system separates carcinomas from I to IV. The system begins at grade I with this lesion having the least amount of mitotic figures and anaplasia. As mitotic figures and anaplasia progress, the grading system correlates with this increase. Therefore, grade IV is the most aggressive and undifferentiated carcinoma (1, 15).

Differential diagnoses should include basal cell epithelioma, senile or actinic keratosis, pseudoepitheliomatous hyperplasia, keratocanthoma, malignant melanoma, eccrine poroma, verruca plantaris, deep mycoses, pyogenic granuloma, amelanotic melanoma, and Bowen's disease (squamous cell carcinoma *in situ*) (1, 2, 11).

## Treatment

It is essential that the physician consider the possible differential diagnoses and initiate an early biopsy and the necessary treatment. Treatment of these tumors include surgical excision and primary closure, radiation therapy, curettage, electrofulguration, cryosurgery, and Mohs' chemosurgery. The eradication of the cancer must be the primary consideration of the physician (3, 15-21).

## Case Report

A 38-year-old black male was seen in the Podiatry Clinic at Westside Veteran's Administration Medical Center, Chicago, for a lesion located on the plantar aspect of his left foot. The patient related that the lesion had been present for approximately 6 years, and had recently undergone a change in color from tan to pink. In terms of size, he stated that the lesion had an insidious onset and a progressive but gradual increase in dimension since he first noticed it 6 years ago. He had never experienced pain from this lesion, but, due to its size, he did complain of mild discomfort while wearing shoes. The patient recalled a history of a puncture wound to the left foot approximately 11 years ago prior to noticing the lesion. He remembers a scar located where the lesion is now.

The only treatment he had received for the lesion was self-treatment, consisting of foot soaks and triple antibiotic ointment. He had a prior 20-year history of drug abuse and a current history of alcoholism. He was on no medications and had no known allergies. Other than the lesion and his current history of alcohol abuse, he appeared to be in apparent good health.

Physical examination of the lesion revealed a mass approximately 4 × 4 cm., protruding 2 mm. from the plantar aspect of the left foot (Fig. 1). The mass was multilobulated with a well-demarcated hyperpigmented border. The lobes of the lesion were pink, and nonul-

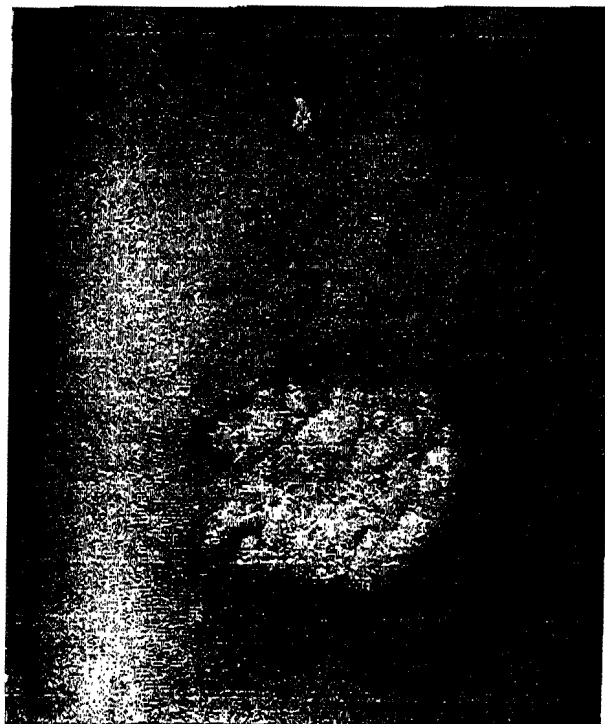


Figure 1. Presentation of squamous cell carcinoma on the plantar aspect of the foot.

cerative. The lesion was covered by very mild hyperkeratosis, and there was neither erythema nor edema noted in this area. No pain could be elicited through direct or medial-to-lateral palpation. Radiographically, there was no bone involvement. There was no popliteal or inguinal lymph adenopathy.

A 0.6-mm. punch biopsy was performed at the periphery and revealed histologic changes associated with squamous cell carcinoma. The Surgical Oncology Department was consulted, and the decision to admit the patient and perform a wide excision of the lesion was made. The excision removed the lesion, as well as approximately 3 cm. of surrounding skin and soft tis-



Figure 2. Papillary hyperkeratosis, acanthosis of squamous epithelium and unremarkable dermis (H & E 4 × 1.25 magnification.)



Figure 3. Parakeratosis, hyperkeratosis and acanthosis of squamous epithelium. (H & E 10 × 1.25 magnification.)

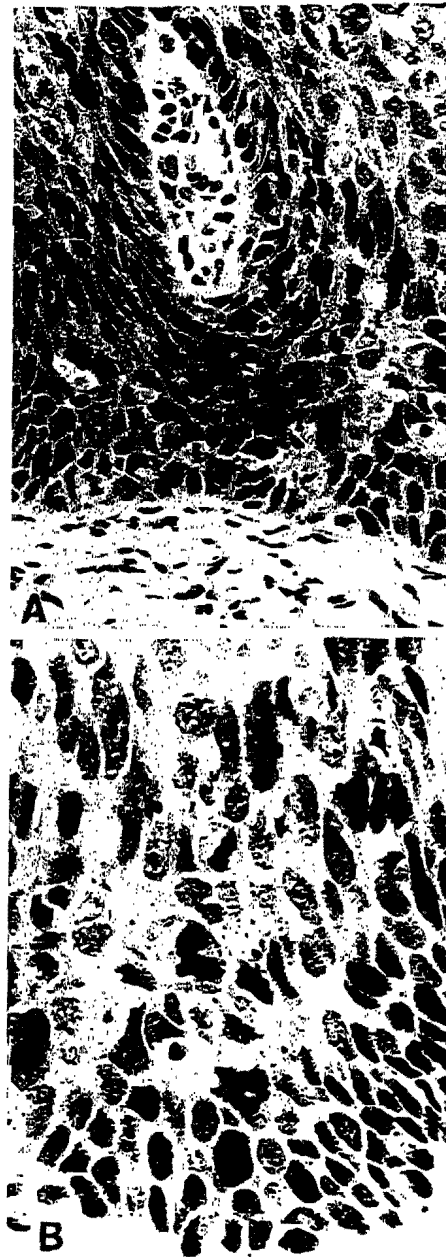


Figure 4. A and B. Lack of organization of basal layer and atypical squamous cells throughout the epidermis. These atypical cells are pleomorphic, hyperchromatic, have increased nuclear to cytoplasmic ratio and atypical mitotic figures. Significant is the presence of an intact basement membrane. (H & E 20 × 1.25 magnification.)

sue. A split-thickness skin graft was taken from the contralateral thigh and placed over the wound. The tissue specimen was sent to pathology, where the diagnosis of squamous cell carcinoma was again confirmed (Figs. 2-4). The surgical margins were found to be free of tumor changes.

The patient was followed-up by the Surgical Oncology Department to determine if any metastasis had occurred. No metastases were found and the prognosis for the patient was good. The patient healed without complications (Fig. 5). Eleven months after surgery, the patient had no local recurrence of the carcinoma. A nontender scar remains.

### Summary

The literature is replete with a wide array of various synonyms for squamous cell carcinoma. Numerous causative agents have been cited as etiologic factors. Studies have differed as to the incidence of this carcinoma.

Clinically, squamous cell carcinoma can appear as either papillary or ulcerative. It is important that careful and accurate histologic review of tissue samples be performed to arrive at an accurate diagnosis since there are many differential diagnoses to consider with this entity. The authors have presented a brief literature review and also a clinical case study of squamous cell carcinoma.



Figure 5. Two weeks postoperative: islets of skin graft present with a healthy bed of granulation tissue evident.

### Acknowledgments

The authors thank the Pathology Department at the Westside Veteran's Administration Medical Center for the preparation of the histologic slides as shown in this paper. The authors also thank Ronald Johnson, DPM, at the College of Podiatric Medicine and Surgery, and Chrystalla Daly, DO, in the Pathology Department at The University of Osteopathic Medicine and Health Sciences, Des Moines, Iowa for their assistance in the preparation of photomicrographs and the legends that appear in this article.

### References

1. Sauer, G. C. *Manual of Skin Diseases*, 5th ed., p. 309, J. B. Lippincott, Philadelphia, 1985.
2. Neufeld, R. I., Kurtzer, C. M., Estersohn, H. S., Napoli, J. D. Verrucous squamous cell carcinoma of the foot: a rare case history. *J. A. P. M. A.* 75:300, 1985.
3. Steinhart, A. N. Squamous cell carcinoma of the sole: case presentation and review of the literature. *J. A. P. M. A.* 70:330, 1980.
4. Lund, H. Z. How often does squamous cell carcinoma of the skin metastasize. *Arch. Dermatol.* 92:635, 1965.
5. Levy, M., Glubo, S. M., Lenet, M. D., Sherman, M. Squamous cell carcinoma on the plantar surface of the foot. *J. A. P. M. A.* 72:471, 1982.
6. Galinski, A. W., Williams, J. E., Geduldig, S. B. Squamous cell carcinoma: a review of the literature and case report. *J. A. P. A.* 71:505, 1981.
7. Galinski, A. W., Shapiro, L. J., Waldman, M. Squamous cell carcinoma of the foot: a report of two cases with nail bed involvement. *J. A. P. A.* 66:550, 1976.
8. Wolf, W. B., Cohen, C. S. Intraepidermal squamous cell carcinoma (Bowen's disease of the dorsum of the foot). *J. A. P. A.* 68:688, 1978.
9. Wyngaarden, J. B., Smith, L. H. (ed.) *Cecil Textbook of Medicine*, 17th ed. pp. 2272-2297, W. B. Saunders, Philadelphia, 1985.
10. Robbins, S. L., Cotran, R. S., Kumar, V. *Pathologic Basis of Disease*, 3rd ed., p. 1266, W. B. Saunders, Philadelphia, 1984.
11. Brietstein, R. J., Hugar, D. W. Squamous cell carcinoma: comparative study and case presentation. *J. A. P. A.* 65:120, 1975.
12. Hoerr, S., Warren, S. A study of pathologically verified carcinoma of the skin. *Surg. Gynecol. Obstet.* 69:726, 1939.
13. DeMuth, R. J., Snider, B. L. Primary squamous cell carcinomas of the plantar surface of the foot. *Ann. Plast. Surg.* 14:310, 1980.
14. Levene, M. Distribution of skin tumors of the sole of the foot. *Br. Med. J.* 19:1519, 1958.
15. Spinosa, F. A. Squamous cell carcinoma of the plantar aspect of the foot. *J. Foot Surg.* 26:253, 1987.
16. Goldner, R. The diagnosis and treatment of skin cancer involving the foot. *J. A. P. A.* 70:325, 1980.
17. Whelan, C. S., Deckers, P. J. Electrocoagulation and curettage for carcinoma involving the skin of the face, nose, eyelids and ears. *Cancer* 31:159, 1973.
18. Helm, F. Treatment of skin cancer. *Cutis* 7:49, 1971.
19. Osborne, E. Treatment of malignant cutaneous lesions. *J. A. M. A.* 154:1, 1954.
20. Lubritz, R. R. Cryosurgical management of multiple skin carcinomas. *J. Dermatol. Surg. Oncol.* 3:414, 1977.
21. Mohs, F. E. Chemosurgery: microscopically controlled surgery for skin—past, present and future. *J. Dermatol. Surg. Oncol.* 4:41, 1978.