

Squamous Cell Carcinoma Arising in Burn Scar

S.P. Hong, M.D., S.S. Lee, M.D., J.M. Chae, M.D.
E.S. Chang, M.D. and C.H. Chung, M.D.

Department of Pathology, Keimyung University School of Medicine

Treves and Pack¹⁾ in 1930 estimated that about 2% of burn scars undergo malignant change and they found that these usually occurred in the extremities and scalp. Males outnumber females in a ratio of 3 to 1 in burn scar cancers and all races have developed such tumors. Lawrence²⁾ in 1952 accepted only 99 cases of burn scar cancer in his review but it seems certain that these are considerably commoner than this figure would indicate. These cancers are usually squamous in type and almost always arise in large deep burn scars which were never grafted and were slow to heal. A few basal cell carcinomas have been reported in more superficial scars usually on the face or neck. A few cases of fibrosarcoma have been reported also but here the differential diagnosis of so-called spindle-cell squamous carcinoma is always present³⁾. Recently Sarma and Weilbaecher⁴⁾ reported a case of squamous cell carcinoma arising in a burn scar in an amputation stump was reported. Authors experienced 13 cases of burn cancer and the clinico-pathologic characteristics were reviewed.

MATERIALS AND METHODS

The records of 13 patients who developed cancers in burn scars and who were treated on Keimyung University Donsan Hospital in the past 10 years were reviewed. No attempt was made to determine the instance of malignant ulcers in all burned patients. While it was not possible to ascertain the details of initial treatment in each case, no skin graft following the burn was done in any patients.

Clinical information regarding patient's age and sex, tumor location and size, as well as symptoms and treatment were obtained. In all cases, no follow-up was available.

RESULTS

There were 10 men and 3 women patients. The age of the 7 patients when burned was 2~9 years. The average age at diagnosis of malignant degeneration was 49 years (26~73 years) (Table 1). The average

Table 1. Age and sex incidence of burn scar cancer

Sex Age	Male	Female	Total
21-30	1		2
31-40	1	1	2
41-50	2		2
51-60	5	1	6
61-70	1		1
71-80		1	1
Total	10	3	13

Table 2. Interval between burn to cancer diagnosis

Sex Interval	Male	Female	Total
0-10	1		1
11-20	3		3
21-30	2	1	3
31-40	1		1
41-50	2		2
51-60	1		1
Unknown		2	2

lag period from burn to cancer diagnosis was 31 years with a range of 10 to 56 years (Table 2).

Ten of the lesions occurred in the lower extremities; one on the upper extremity; one on the sacral region; and one on the hip (Table 3). The gross characteristics were mostly huge ulcerating tumor with surrounding cicatrically burned skin (Fig. 1) or occasionally grayish white, fungating tumor. The type of cancer in all cases was a well differentiated squamous cell carcinoma (Fig. 2).

Table 3. Location of burn scar cancer

Location	No. of cases
Lower extremity	10
Knee	4
Lower leg	3
Foot	2
Thigh	1
Upper extremity	1
Arm	1
Sacral region	1
Hip	1

The edge of the tumor ulcer showed areas of pseudoepitheliomatous hyperplasia. Occasionally it was very difficult to differentiate well differentiated squamous cell carcinoma arising in a chronic burn scar from pseudoepitheliomatous hyperplasia, especially in small biopsy specimens. The main point of differential diagnosis is thought to be deeply infiltrating nests of squamous cell carcinoma. Regional lymph node metastases were found in 2 patients, and bone and lung metastases in one patient.

DISCUSSION

Cancers arising in burn scars are often locally extensive and destructive but usually do not metastasize. In a few instances local lymph node metastases and even hematogenous metastases are reported, but these are unusual.

These tumors are usually well-differentiated and slow-growing⁵⁾. Malignant degeneration of burn scars was described by Marjolin in 1828. Marjolin's



Fig. 1. Characteristic appearance of an ulcerative squamous cell carcinoma arising in an old burn scar (also called Marjolin's ulcer).

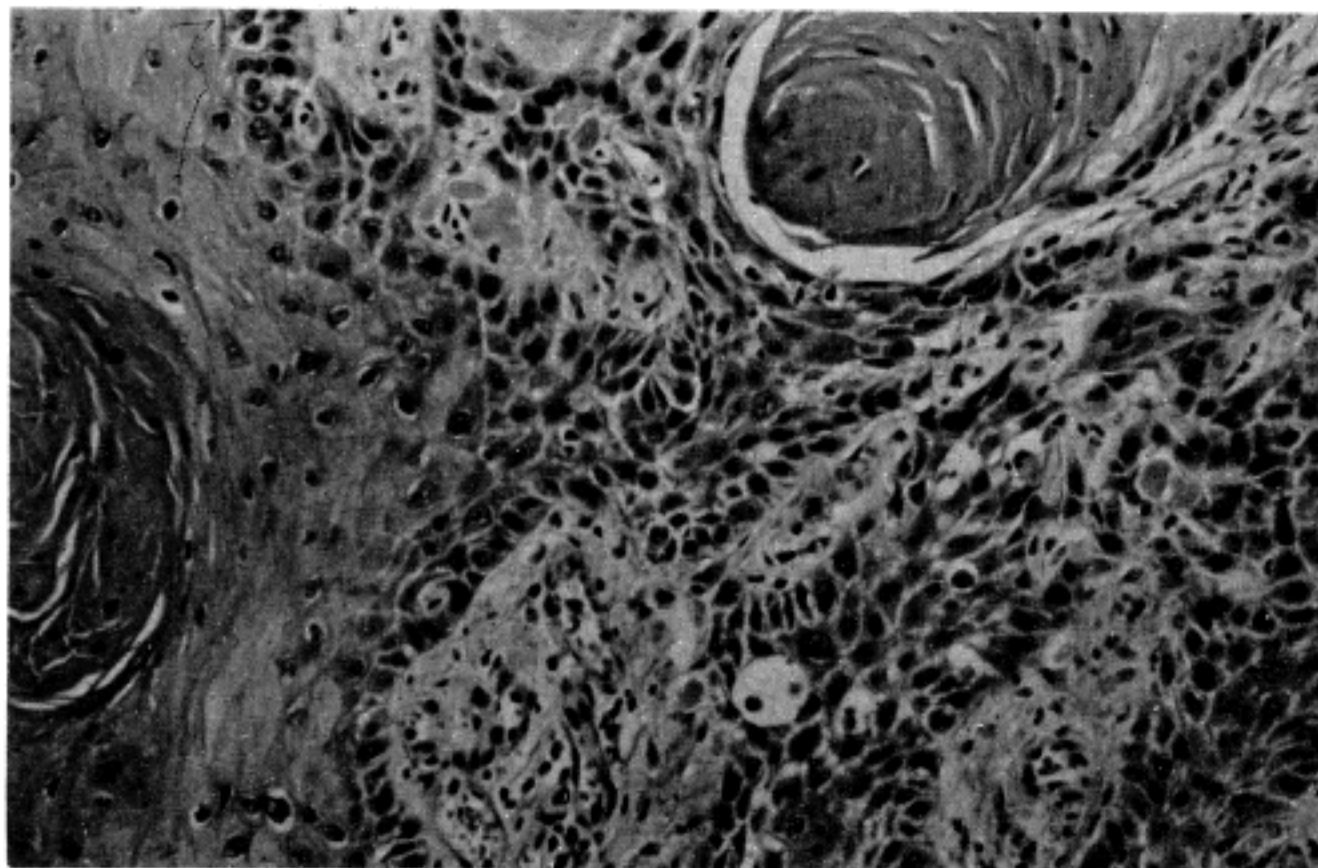


Fig. 2. Microscopic section of a well differentiated squamous cell carcinoma arising in a chronic burn scar. Histopathology is that of any typical squamous cell carcinoma (H & E, x100).

ulcers are most commonly squamous cell carcinoma. Marjolin's ulcers are usually of low pathologic grade, metastases occur and the prognosis may be poor⁶⁾.

The classic article on burn scar carcinoma was written by Treves and Pack¹⁾ in 1930. Their data and those of others agree with ours with respect to latent period, anatomic site and age of the patient.

Lawrence²⁾ has reported that the length of the latent period (or time interval from burn to cancer) is inversely proportional to the age at the time of the burn. The frequency of squamous cell carcinoma arising in previously burned skin has been stated to be about 2 per cent. Lawrence²⁾ found the mean latent period to be 32 years from a review of 82 cases in the literature.

The average lag period in our series was 32 years. However, no reports exist showing the incidence of burn scars that undergo malignant degeneration.

Many authors including Treves and Pack¹⁾ and Glover and Kiehm⁷⁾, feel that burn scar cancer does not arise in burns that have been primarily grafted.

Bowers⁸⁾ and Sevitt⁹⁾ have stated that cancer arising in burn scars usually does not metastasize, and Mouly⁹⁾ reported that burn scar carcinomas were unlikely to give rise to lymphatic spread.

However Treves and Pack¹⁾ reported a 20% incidence of metastases from burn scar carcinoma. In our experience metastases have been present in 15% of the patients studied, and chronic burn scar carcinoma must be regarded with a poor prognosis, especially when found in the extremities.

Of special interest is the lag period—the time of the burn to the development of cancer. The age of the scar is more important than the age of the patient. Horton and Crawford¹⁰⁾ emphasized that the long lag period may result in legal complications when liability is involved. Although these tumors are typically low grade and late to metastasize, they may carry a poor prognosis.

This is believed to be related to the fact that the tumor is somewhat confined due to obliteration of lymphatics by the dense scar tissue in which it arises. The poor prognosis is perhaps due to the late stage

reached before treatment.

The unique difference between burn scars and scars of other wounds is that the scar is spread out on the surface whereas scars of incisions punctures and lacerations extend into the deeper tissues. In burns the amount of epithelial regeneration is much greater. Scar tissue resulting from burns undergoes greater contraction and may continue for many weeks. As a result the cicatrix pulls and puckers neighboring tissues while the scar itself grows thicker.

The amount of scar tissue contraction varies with the extent, depth and location of the burn. Emphasis is placed on contractures and tension of scars because it is such conditions that ulceration is easily provoked.

Treves and Pack¹⁾ add that scar tissue is poorly vasculized because dense fibrosis obliterates many of the blood vessels and that the resultant imperfect nutrition of the scar is responsible for the ease with which ulceration occurs. The dry thin and delicate epithelium covering the scar is easily destroyed by trauma to which it is frequently subjected because of the elevation of the scar. The normal skin is not so readily injured because it is elastic and because of its ability to glide over the underlying subcutaneous tissues thereby avoiding the full brunt of a blow. In adherent scars this protective mechanism is lost and the epithelium is abraded by relatively slight injuries.

Each successive abrasion ulceration or fissure heals with increased difficulty and regenerated epithelium is progressively inferior.

Finally persistent stimulation to the marginal epithelium for regeneration and repair with constant frustration may lead to a loss of tissue restraint and eventually to neoplastic change⁶⁾.

Other causative factors in the development of carcinoma in burn scars may be movement over a joint or across a flexural crease or fold. Mouly⁹⁾ has pointed out the propensity of burn scar cancer to

arise in the flexion creases of the limbs.

Prolonged pruritis may result in repeated trauma because scratching the area rubs off the thin epithelial covering, leaving small denuded areas which may coalesce to form an ulcer. Infection and prolonged suppuration also may play a role.

This hardly seems justified when radical measures are employed to remove the lesions and if they can be diagnosed early. In all probability, we shall see a diminished number of cases, since burns are almost routinely being skin grafted and since antibiotics and chemotherapy are so successful in preventing or curing chronic infections.

Moreover, such premalignant lesions as old burn scars which are extensive and subject to irritation should preferably be removed surgically if possible.

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또는 누관(瘻管)에서 생김은 잘 알려져 있다. 화상반흔에서 생긴 암은 대부분이 분화가 좋은 편평상피암으로 천천히 자라나 때로는 전이를 일으켜 예후가 불량하기도 하다.

에서 화상반흔에서 생겼다고 간주된 편평상피암환자 13예를 임상병리학적으로 분석하여 다음과 같은 성적을 얻었다. 남녀환자비는 10:3으로 남자에 호발하였고 화상후 암이 진단된 평균기간은 31년이였다. 호발부위는 하지가 가장 많았다. 전이는 3예에서 보였다. 조직학적 유형은 전예에서 잘 분화된 편평상피암이였다.

== 국문초록 ==

화상반흔에서 생긴 편평상피암 13예

계명대학교 의과대학 병리학교실

홍 승 표 · 이 상 종 · 채 종 민
장 은 숙 · 정 재 홍

악성종양이 화상반흔, 만성궤양, 상처부위나 동(洞)

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