Intramuscular Metastasis of Cutaneous Squamous Cell Carcinoma: A Case Report

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Cutaneous squamous cell carcinoma (SCC) is a common cancer. Although most patients with primary cutaneous SCC have an excellent prognosis, for those with metastatic disease, the long-term prognosis is poor. The most common sites of metastasis are regional lymph nodes, lung, liver, brain, skin, and bone. However, metastatic soft tissue SCC from cutaneous lesions is extremely rare, with only two reported cases. We report a case in which the patient had a primary SCC lesion on his left palm in 1986. A second primary SCC on his left forearm was confirmed in 2001, with subsequent metastasis to the proximal muscles and bone invasion in spite of the initial wide excision.

Key Words: cutaneous squamous cell carcinoma, intramuscular metastasis
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Cutaneous squamous cell carcinoma (SCC) is not an uncommon skin lesion, especially in Caucasians. The 5-year rate of metastasis from primary cutaneous lesions is 5% [1]. The incidence of metastasis increases when the lesions are > 2 cm in width or 4 mm in depth, are locally recurrent tumors, have poor histologic differentiation, are found on the ears or lips, or occur within scars or on non-sun-exposed skin, or when there is histologic evidence of perineural involvement or SCC occurs in immunosuppressed patients [2,3]. The most common site of metastasis is a regional lymph node, while intramuscular metastasis is quite rare. Bramhall and Varma reported a case of intramuscular metastasis to the forearm from SCC on the dorsal hand after wide excision and skin grafting [4]. The lesion presented as cellulitis and a positive axillary lymph node. Radiotherapy was the preferred treatment. Kim et al reported a patient with a history of scalp SCC and two kidney transplantations requiring long-term immunosuppression who developed intramuscular metastasis to the left proximal arm [5]. This patient underwent shoulder disarticulation and axillary node dissection without radiotherapy or chemotherapy. He remained disease-free at 8 months. Due to the rarity of intramuscular metastasis from cutaneous SCC, we present this case for discussion.

Case Presentation

A 64-year-old man presented with a 3-month history of a soft tissue mass on his left forearm. He visited our department in July 2001 because of recent rapid growth and tenderness. An unhealing ulcer on his left palm had first brought him to our department in 1986. Wide excision with a reverse forearm flap closure was performed for pathologically proven SCC (Figure 1). Multiple erythematous papulae had been noted over his trunk and extremities in recent years, but pathology

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proved them to be pre-malignant lesions only. A new erythematous ulcerative lesion (3.5 x 3.5 cm) was noted on his left forearm 2 years before this presentation and biopsy later revealed SCC. Wide excision with a 2 cm margin and a split-thickness skin graft were performed in April 2001. The skin graft healed uneventfully, but a left forearm soft tissue mass with tenderness was noted by the patient 3 months after the operation (Figure 2). Physical examination revealed a 6 x 5 cm fixed, hard mass on the left forearm near the elbow, with no broken skin or lesions over the skin graft or the skin above the soft tissue mass. No palpable lymph node over the axilla was found. Magnetic resonance imaging (MRI) of the forearm showed that the tumor was surrounded by the radius and ulna (Figure 3). The tumor was some distance from the previous skin graft and there were no structural abnormalities between the skin graft and the tumor mass. Angiography showed a hypervascular soft tissue tumor involving the flexor and extensor muscle group of the forearm. Wide excision was proposed, but failed due to invasion of the bone. Frozen section showed intramuscular SCC. Upper arm amputation was ultimately preferred. The pathologist noted no cancer cells between the area of the skin graft and the intramuscular lesion. Direct invasion was excluded. Pathology demonstrated that the intramuscular tumor was composed of squamoid cancer cells with keratinization and formation of keratin pearls focally, intense necrosis, and bone invasion (Figures 4 and 5). After the operation, the patient was transferred to an oncologist for systemic chemotherapy. The patient remained disease-free at 22 months.

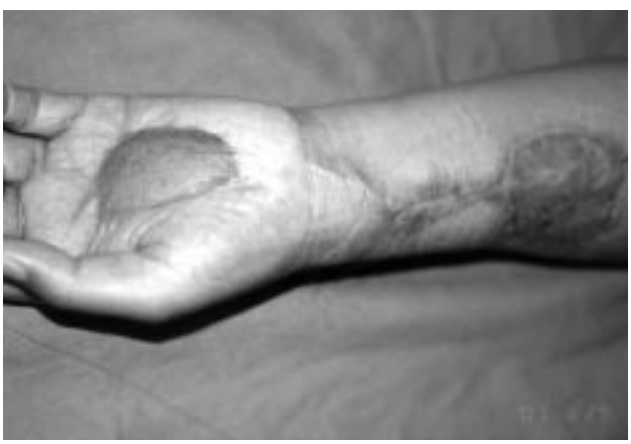

Figure 1. *Volar side of the left hand shows a reverse forearm flap reconstruction of palm squamous cell carcinoma.*

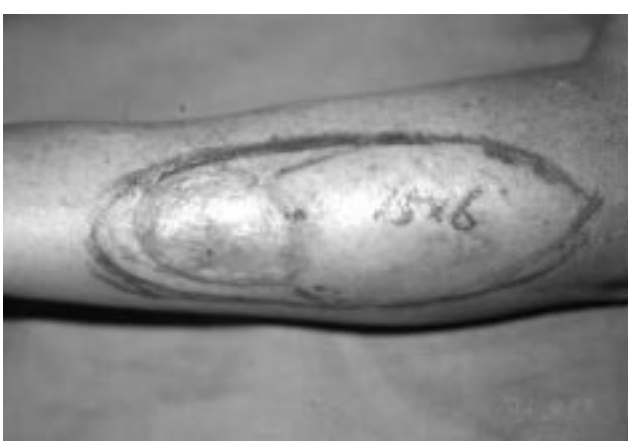

Figure 2. *Dorsal side of the left forearm shows a healed skin graft and a soft tissue mass with no skin lesion above the mass and an intact skin graft. Markings show the planned wide excision that failed due to bone invasion.*

Discussion

Mohs' surgery affords a 96.9% 5-year rate of local control in patients with primary cutaneous SCC at any site except the lips or ears. In contrast, the 5-year rate of local control with other forms of treatment is 92.1% [1,2]. However, the 5-year survival rate of metastatic

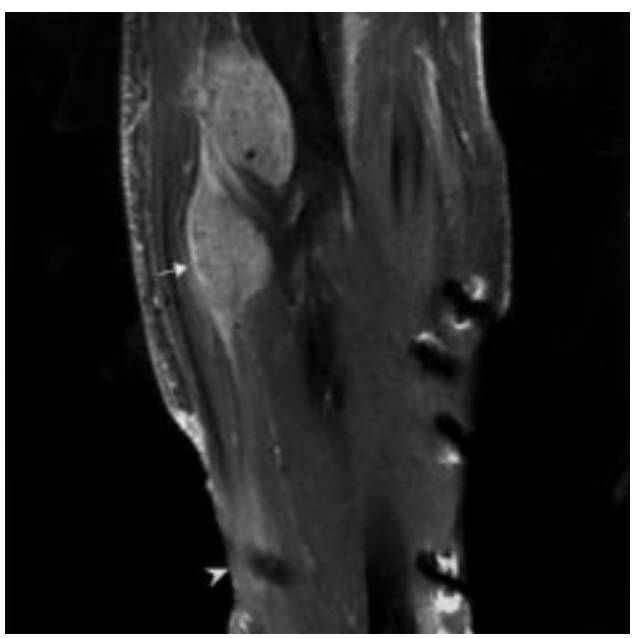

Figure 3. *Sagittal, enhanced T1-weighted magnetic resonance image shows a 6 x 5 cm enhanced tumor (arrow) attached to the radial shaft. Normal tissue intervenes between the previous skin graft (arrowhead) and the intramuscular mass. The artifact is due to a surgical clip over the skin graft.*

SCC is only 43.6% [1]. This is quite different from the excellent prognosis for primary cutaneous SCC.

We were concerned about the route of metastasis. The modes of spread mentioned by Mohs include expansion and infiltration, shelving or skating, conduit spread, and metastasis [6,7]. In our case, there was no tumor cell infiltration of subcutaneous fat, no evidence of a muscle plane or periosteum plane for shelving, and no tumor cells over the perineural or perivascular space on histology. Metastasis may have occurred by hematogenous or lymphatic spread since it occurred at a distance from the previous lesion and soft tissue mass.

The reasons for the rarity of intramuscular metastasis from cutaneous SCC are unclear. It has been reported that the milieu of skeletal muscle tissue may not be optimal for tumor cell viability because of the difficulty of expression of cellular adhesion molecules, variable turbulent blood flow, and the higher level of lactic acidosis within highly mobile skeletal muscle tissue [8,9]. From the molecular perspective, the process of metastasis involves an intricate interplay between cell adhesion, proteolysis, migration, and angiogenesis [10]. In angiogenesis, the interaction of cancer cells with endothelial cells through adhesion molecules is critical for the generation of functional vascular networks that will nourish cancer cell nests and promote in vivo tumor growth [11]. High levels of adhesion molecules are demonstrated in patients with metastatic cancer [12]. In conclusion, the expression of adhesion molecules is important in angiogenesis, but it is difficult in the microenvironment of skeletal muscle due to high mobility. This may be the reason why metastatic deposits rarely develop to a microscopic size in skeletal muscle.

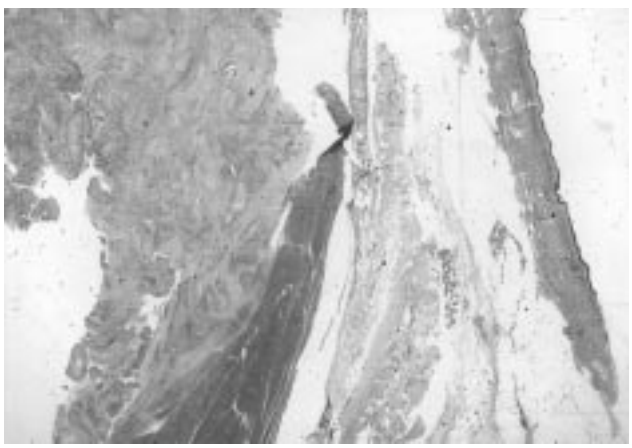

Figure 4. *Intramuscular squamous cell carcinoma. Cancer cells are inside the skeletal spindle cells. The skin and subcutaneous fat are intact. (Hematoxylin and eosin, original magnification x 2.)*

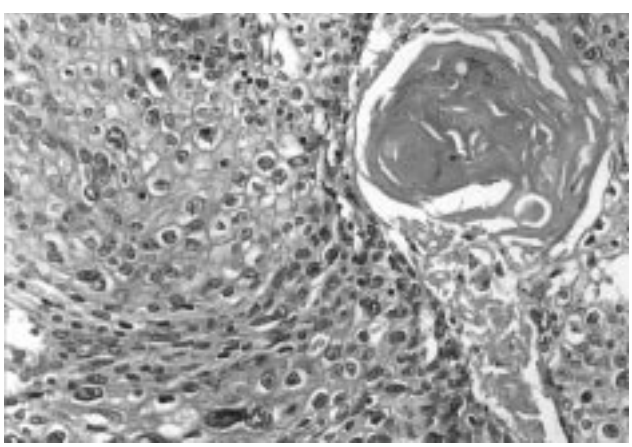

Figure 5. *Keratin pearl formation. (Hematoxylin and eosin, original magnification x 40.)*

Intramuscular metastasis developed after tumor excision with skin graft in a previous case [4] and our case. In neither case did the skin graft break down, nor was there local recurrence. The immobility of the skin graft may make tumor cell nest angiogenesis possible in the highly mobile muscle. The initial relatively ischemic skin graft wound has even less possibility of spreading, although the mechanism is unclear.

Diagnosis of intramuscular metastatic SCC is difficult. Kransdorf et al suggested that MRI is a preferred modality for the evaluation of soft tissue masses [13]. There is, however, no defined differential of intramuscular metastatic SCC and soft tissue sarcoma by such imaging. Ultimately, biopsy remains the only method of diagnosing a highly suspicious lesion. A thorough history of cutaneous SCC may be the key to suspecting a metastatic lesion.

Due to the rarity of intramuscular metastasis from cutaneous SCC, there is still much to be learned about its treatment. In our patient's case, axillary lymph node dissection was not performed due to lack of clinical evidence of lymph node metastasis. However, the oncologist suggested chemotherapy because of the possibility of distal metastasis.

In summary, for cases with large or deeply invasive cutaneous SCC, complete resection of the tumor mass is recommended. Physical examination should then be performed regularly to assess the possibility of local or regional recurrence, including lymphadenopathy. If a soft tissue mass develops in a patient with a history of cutaneous SCC, metastasis should be assumed, unless

biopsy proves otherwise. Glass and Hoover reported that 12% of their patients with cutaneous SCC had new SCC, 43% had new basal cell carcinoma, and 2% had melanoma [14]. In a population-based study in Sweden, Wassberg et al found that patients with SCC, compared with the general population, have an increased risk of developing new primary cancer [15]. Long-term follow-up is necessary for early detection of new lesions. However, because of the rarity of intramuscular metastasis, what constitutes optimal management is still not known, and multimodal treatment, including chemotherapy and radiation, must be considered.

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