Current Concepts in the Management of Marjolin's Ulcers: Outcomes From a Standardized Treatment Protocol in 16 Cases

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Marjolin's ulcer is a malignant lesion observed in chronic wounds and in areas where the integrity of the skin is compromised because of any one of several reasons. The aim of this study was to define etiology, topography, and histopathology for Marjolin's ulcer and its surgical management. Sixteen cases were diagnosed and treated as Marjolin's ulcers. The mean age was 57.1 years (range, 32–85 years) and 15 of the patients (93.75%) had history of ulcer of 30 years or more. In 10 cases (62.5%), Marjolin's ulcer occurred after a flame burn and in 6 cases (37.5%) after a scalding burn injury. In six cases (37.5%), there was history of chronic trauma due to contact with the clothing. Primary lesions were at the leg, gluteal region, thigh, scalp, trunk, and hand in four (25%), three (18.7%), two (12.5%), two (12.5%), three (18.7%), and two (12.5%) cases, respectively. Amputation was carried out to treat two cases, and repair of the defects with partial-thickness skin grafting was performed in 14 cases after tumor resection on the skin. Superficial inguinal lymph node dissections were performed in four cases with tumor in the thigh and a positive inguinal lymph node. Squamous cell carcinoma was diagnosed in 14 cases (87.5%) and basal cell carcinoma in two cases (12.5%) postoperatively. The authors conclude that diagnosis and surgical planning based on the recent literature must be carried out even more intensively to improve the prognosis of Marjolin's ulcer. (J Burn Care Res 2010;31:776–780)

Marjolin's ulcer occurs as a result of malignant transformation of burns, chronic nonhealing wounds, long-term fissures and ulcers, lupus vulgaris and vaccine scars, osteomyelitis zones, and radiotherapy areas.[1–6] Marjolin's ulcers occur frequently as squamous cell carcinoma (SCC) and rarely as basal cell carcinoma (BCC) and melanoma.[6–8] The prognosis of the SCC that develops from burn scars is worse than carcinomas that develop due to other etiologic reasons. The pathogenesis of SCC that develops from burn scars is not entirely defined.[9]

In the literature, there are some arguments about the treatment protocol and prognosis of Marjolin's ulcer. Features such as the size of the primary tumor, distance of the metastatic lesions from the primary tumor, depth of the lesions, and degree of differentiation are important factors.[1,10] Surgical treatment and adjuvant treatment modalities are also discussed in the literature.[11] To our knowledge, there is no consensus on planning the surgical margin in the treatment of Marjolin's ulcers. In this article, we evaluated 16 cases of Marjolin's ulcer according to their etiology, topography, and histopathology; established a surgical plan; and developed an algorithm that may improve treatment of Marjolin's ulcers.

METHODS

Sixteen cases were diagnosed and treated as Marjolin's ulcers in the Dicle University Department of Plastic, Reconstructive, and Aesthetic Surgery and Burn Center, during the period from May 2005 to December 2009. Detailed histories and previous operative reports of the cases were taken, and local and general physical examinations were performed.

The demographic characteristics of each patient, the length of the latent period between the burn in-

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jury and carcinoma development, tumor location, biopsy results and histopathological examination, dimensions of the tumor mass, surgical methods used and options for the lymph node dissection, complications, and secondary surgical interventions were noted. Medical histories revealed that empiric dressings had been applied to the wound. Pathological examinations were performed for each case on all resected surgical specimens. Surgical treatments, follow-up after surgery, and prognoses were recorded prospectively.

RESULTS

Sixteen cases of Marjolin's ulcer, 10 men and 6 women, were evaluated. The age range was 32 to 85 years (mean 57.1 years), and 15 of the patients (93.75%) had an ulcer history of 30 years or more. The results are summarized in Table 1.

Clinical Appearance

In 12 cases (75%), the lesions were ulcerated, had irregular margins, and were pink in color; fibrotic zones were observed in the ulcer area (Figure 1). In four cases (25%), the lesions were exophytic and fragile, appearing to swell out of the skin, with irregular margins (Figure 2). Tumors were on average 17.6 cm^2 (between 8 and 40 cm^2) in size.



Figure 1. A case with a lesion of the lower extremity characterized by ulceration.

Histopathology

The diagnoses were verified by incisional biopsies in all cases. SCC was diagnosed in 11 cases (68.7%), BCC in 2 cases (12.5%), and pseudoepitheliomatous hyperplasia in 3 cases (18.7%). In the postoperative histopathological evaluation of the cases, SCC was

Table 1. Demographic characteristics of each case

Patient No.	Sex	Age (yr)	Occupation	Burn	Time (Years Ago)	Localization	Lesion Appearance	Sunlight	Contact of the Clothes	Surgery (Years Ago)	Recurrence (Times)
Squamous cell cancer											
1	M	62	Farmer	Flame	60	Left thigh posterior	Ulcerated	−	−	50	2
2	M	70	Farmer	Hot water	60	Right pretibial	Exophytic	−	+	−	−
3	F	45	Housewife	Flame	40	Right knee posterior	Exophytic	−	−	−	−
4	M	55	Farmer	Flame	50	Left hand dorsal	Ulcerated	+	−	−	−
5	M	51	Housewife	Flame	42	Left tibia posterior	Ulcerated	−	−	3	3
6	M	46	Civil servant	Hot water	35	Trunk	Ulcerated	−	−	−	−
7	M	58	Civil servant	Flame	35	Trunk	Ulcerated	+	−	−	−
8	F	64	Housewife	Flame	35	Left gluteal	Ulcerated	+	+	−	−
9	M	32	Unemployed	Hot water	20	Left arm	Exophytic	+	−	12	1
10	F	49	Housewife	Hot water	35	Right gluteal	Ulcerated	−	+	−	−
11	M	55	Farmer	Flame	45	Right thigh	Ulcerated	−	+	−	−
12	M	62	Farmer	Flame	35	Trunk	Ulcerated	−	−	−	−
13	F	85	Housewife	Hot water	45	Scalp	Ulcerated	+	−	−	−
14	F	54	Housewife	Flame	30	Leg	Ulcerated	−	+	−	−
Basal cell cancer											
15	M	73	Trade	Flame	70	Right gluteal	Exophytic	−	+	−	−
16	F	53	Housewife	Hot water	40	Scalp	Ulcerated	+	−	−	−

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Figure 2. A case characterized by exophytic lesions.

diagnosed in 14 cases (87.5%) and BCC in 2 cases (12.5%).

Surgical Intervention

Amputation was performed to treat two cases (with bone and joint invasion), and repair of the defects with partial-thickness skin grafting was performed in 14 cases after tumor resection on the skin. We performed the resection with a minimum margin of 3 cm. A superficial inguinal lymph node dissection was performed in four cases with tumor in the thigh and a positive inguinal lymph node (Figure 3). There were no findings of tumor metastasis to the distal solid organs, such as liver, lung, and bone.

Follow-Up and Recurrence

The mean length of hospitalization was 19.5 days. Compression garments were used for 3 months postoperatively. Four cases were referred in the radiotherapy program. At the end of the follow-up period (mean 4.2 years), ulcerations were found in one case, which suggested recurrence.

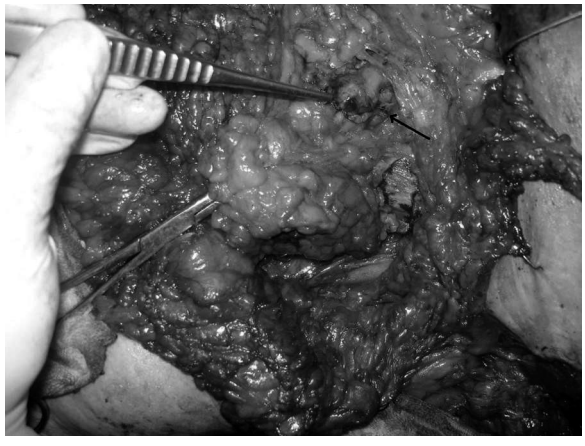


Figure 3. Intraoperative appearance of a case in which superficial inguinal lymph node dissection was performed (arrow: pathological lymph node).

DISCUSSION

Marjolin's ulcer is an aggressive malignant lesion that occurs at skin zones that have withstood long-term irritation.[2,12–16] Most cases admitted to health care facilities have a malignant transformation that occurred 20 to 30 years after the initial injury.[17–20] In the cases included in our study, the average age of the patients was 57.1 years, and 15 of the patients (93.75%) had an ulcer history of 30 years or more.

Marjolin's ulcer frequently occurs in the unstable scar of a full-thickness burn,[8] which are not grafted.[6,14,15,21–24] The medical histories of 81.3% of our cases showed that burn defects had not been repaired and had been left for secondary healing. The lesions of the cases in our study were mostly located in topographic zones where clothing might cause trauma, such as on the thigh and leg. This supports the idea that chronic trauma is a potent inciting factor.

Marjolin's ulcers may appear as different histological types.[14] According to the literature, SCC is diagnosed in 75 to 96% of cases with Marjolin's ulcers, and BCC is diagnosed in 1 to 25% of the cases.[14,21,25,26] In our study, SCC was diagnosed in 14 cases and BCC in 2 cases after resection. On the other hand, it is noteworthy that three cases that were diagnosed with pseudoepitheliomatous hyperplasia preoperatively were found to have SCC postoperatively.

In Marjolin's ulcer, the treatment is planned according to the clinical evaluation, biopsy, and computed tomography results.[4,21] To ensure successful treatment, a detailed clinical and histological evaluation must be carried out, and the most appropriate and radical treatment must be thoroughly planned (Figure 4).[7] In Marjolin's ulcers located on the extremities, we advocate magnetic resonance imaging to determine the degree of deep soft tissue invasion. The biopsies must be obtained from many spots in the lesion and at an appropriate depth for an accurate diagnosis to be achieved.[21,27] It has been mentioned in the literature that biopsy material must sufficiently engage the lesion.[28] However, as far as we know, sufficient data to support standardized biopsy criteria are not available. According to our current clinical experience, excision biopsy should be performed first, if possible. However, use of excision biopsy is limited by the size of the primary tumor. If the tumor is <2.5 cm in diameter, then a biopsy from two different randomly selected tumor zones is sufficient; if it is be-

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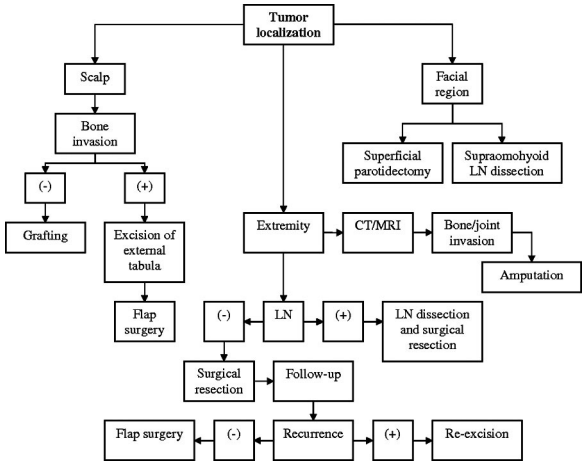


Figure 4. Tumor evaluation and treatment planning.

tween 2.5 and 5 cm, then a minimum of four biopsies (from the 3, 6, 9, and 12 o'clock locations) should be obtained. In lesions >5 cm across, we recommend a minimum of six biopsies (from the 2, 4, 6, 8, 10, and 12 o'clock locations). We believe that this method may increase the likelihood of correctly diagnosing the lesion. Nevertheless, further investigations may be focused to determine the minimum number of biopsies needed.

The size of the primary tumor and existence of distant metastases are the factors reported in the literature that are especially important for excision margin size and surgical planning.[1,10,23,24,28–30] It is recommended that the excision margin should be between 2 and 4 cm.[30] The surgical margin planned in cases with a trunk or extremity tumor should be a minimum of 3 cm, which is supported by some reports in the literature.[31] From our clinical experience, we suggest that resection should be performed with a minimum margin of 3 cm, while taking into consideration the size of the primary tumor and other etiological parameters (exposure to sunlight, trauma, and use of compressive garment).

Medical histories revealed that recurrence was observed in three cases (18.75%); recurrences were observed and operated on at different facilities before their referral to our facility, and the surgical excision margins of those cases varied from 1 to 2 cm. We have determined that the recurrence rate correlated with the margin degrees that were considered as the basis in the previous surgical treatments. We performed excision of the tumor with 3- to 5-cm margins. After excision, partial-thickness skin grafts were placed to follow the recurrence. The cases in our study were followed for a period of about 4.2 years and except for one case, there were no recurrences. This result shows us that the possibility of a cure can be achieved with an aggressive approach in the treatment of Marjolin's ulcers. To prevent return of malignancy, we recommend infection prevention, early skin grafting, early surgical intervention, and strict follow-up for the specified period.

On the basis of our clinical experience, we emphasize some criteria for surgical planning depending on the tumor location. Tumor excision and grafting with a split-thickness skin graft should be followed for at least 6 months. The postoperative cosmetic appearance of these cases should be of secondary importance only. If recurrence is not observed at the end of a 2-year follow-up period, electively cosmetic surgery may be conducted when necessary. Microsurgery and tissue transfers may be required depending on the defect created after excision, especially in the large resections required for Marjolin's ulcers. If an inguinal lymph node is positive in patients with Marjolin's ulcers located on a leg, then inguinal dissection may be recommended. However, if nodes are negative, it is recommended that cases be monitored with close follow-up after wide excision and grafting. If an axillary lymph node is positive and the tumor is located on an upper extremity, then axillary dissection should be performed. In cases of aggressive progression in Marjolin's ulcers of the thigh, prophylactic inguinal lymph node dissection must be performed even if there is no positive lymph node.

We conclude that surgical planning, which was carried out based on recent published reports, must be carried out more intensively. This study, to the best of our knowledge, is among the larger series in the literature. We also recommend that a treatment protocol for Marjolin's ulcers should be followed to increase the success of treatment.

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