Original Article

MARJOLIN ULCER: HOW MUCH OF SAFETY MARGIN NEEDS RESECTION ALONG MARJOLIN ULCER SQUAMOUS CELL CARCINOMA IN RECURRENCE CASES

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ABSTRACT

Objective: The main aim of this study was to evaluate how much of the surrounding area need to be resected to reach tumor free margin in cases of recurrent Squamous Cell Carcinoma (SCC) Marjolin ulcer. The other objective was to report the demographic characteristics, the site of development of SCC Marjolin ulcers**.**

Methodology: A total of 266 patients with ulcers created on burn scars were studied. Biopsy samples were taken from all ulcers and evaluated pathologically for chronic inflammation or SCC Marjolin ulcer. For primary SCC Marjolin ulcers a 2cm safety margin was removed, while for recurrent SCC Marjolin ulcers a 2cm safety margin was removed and assessed pathologically under frozen-section and a further 0.5cm safety margin was removed in cases of SCC involvement in any of the planes of the resected sections for reaching a SCC-clear margin.

Results: One hundred eighteen of the cases were due to chronic inflammation, and the remaining 148 cases were due to SCC Marjolin ulcers. Of this 31 cases were recurrent ones. At least one site of *all* the recurrent SCC Marjolin ulcer samples were found to be involved and required a second resection attempt for reaching a clear and a safe margin.

Conclusion: Although classically 2cm safety margin is still widely used for resection of primary SCC Marjolin ulcers, we recommend that a 2.5cm safety margin is better for resection in recurrent cases.

KEY WORDS: Recurrent Marjolin ulcers, Squamous cell carcinoma, Burn scars, Margin.

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INTRODUCTION

Marjolin ulcer is an ulcer that is created on remnants of cicatricial scars specifically on burned cicatrices.[1] Transformation of burn scar ulcers to malignant tumors was first reported in 1828 by Jean Nicholas Marjolin which was later coined as Marjolin ulcer by Decosta as Marjolin ulcer in 1930.[2] The most common type of carcinoma that develops from Marjolin ulcers is squamous cell carcinoma (SCC).[3] Compared to other type of skin cancers, SCC Marjolin ulcer has more tendency towards development of invasive malignances.[4] Marjolin ulcer account for 1.2% of all skin cancer and 2% of all squamous cell carcinoma.[5]

Hereditary is an important factor for developing SCC.[6] Individuals from northern Europe with blue eyes and thin skin are more likely to develop such cancers, whereas dark and thick skinned southern Mediterranean are less susceptible.[6] Others have suggested climatic conditions.[7] Prolonged or repeated thermal injury caused by body heating devices,[8] or decreased immunological responses.[9]

Now-a-days, generally Marjolin ulcer refers to malignant tumors arising from various types

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of cutaneous scars and chronic ulcers such as burns scars, chronic trophic ulcers, and pressure ulcers, ulcers developed due to chronic osteomyelitis, urinary fistulas and pilonidal sinuses. It can even be found in smallpox vaccination scar and radiation scars.[2] It has been suggested to resect one cm safety margin along with the tumor when surgically treating common type of SCC that did not develop from burn scars.[4] However for SCC Marjolin ulcers resection of 2-cm safety margin is recommended and the remaining defect is repaired by skin grafts or local skin flaps.[3] However there are no specific recommendation and generally accepted amount of safety margin that must be resected in recurrence cases of SCC Marjolin ulcers. Therefore, the main aim of this study was to assess how much of the safety margin needs to be resected along with the tumor in recurrent cases of SCC Marjolin's ulcers. For this purpose a Cohort study, over 15 year's period, on 31 recurrent cases of SCC Marjolin ulcers was carried out. In addition, the prevalence of the recurrence among all ulcer patients visiting our centre that developed from burn scars were also studied.

PATIENTS AND METHODS

In this Cohort study, which was carried out over 15 years (1991-2005), all patients who were admitted to Taleghani Burn Centre in Ahwaz, Iran, with ulcers that developed from burn scars were included. The age, sex, site of ulcer, time of development of ulcer after initial burn and the type of ulcer were recorded. All the patients were followed up at least five years after first observation.

Procedure for management: A punch biopsy samples, from all ulcers was sent for pathological investigation. Depending on the pathological report, appropriate intervention was undertaken: for those with chronic inflammatory ulcers, treatment was with limited ulcer resection and primary repair of the remaining defect. While in those with first-time Marjolin ulcer, a 2-cm wide excision at the margin of the ulcer was resected circumferentially around the ulcer and repaired by application of a partial-thickness skin graft after pathological confirmation of tumor-free margin and depth. For cases that were due to recurrence Marjolin ulcers a 2-cm safety margin along with the ulcers were removed and the surgical specimen was sent as frozen section for pathological investigation. Depending on the pathological report, in cases that showed tumor presence in either margin or the depth**,** a further 0.5cm of the involved site of the margin was removed. After confirmation of tumor-free margin of the second surgical specimen the defects were repaired by split-thickness skin graft. All the cases were followed for up five years for recurrence.

RESULTS

A total of 266 patients were admitted with ulcers on burn scars of whom 118 cases were diagnosed as suffering from chronic inflammatory ulcers and 148 cases were diagnosed as SCC Marjolin ulcer (Table I). Out of these 148 cases of Marjolin ulcer, 117 cases had consulted for the first time, and the remaining 31 cases were recurrent cases that were resected in other centers. The major site of the Marjolin ulcers was seen in the lower extremity 131 cases especially in publiteal fold and 16 cases in the upper extremity and in one female patient was in the abdomen scar (Table-II). The pathological report, from *all* surgical specimens taken from recurrent cases, showed at least one part of the 2-cm safety margin were still involved and required an additional 0.5-cm resection of the involved margin for obtaining a tumor-free margin.

Table-I: Number of patients, mean age, years, sex and type of pathological finding

Characteristic	*Inflammation*	*Primary Marjolin ulcer*	*Recurrent Marjolin ulcer*
Number	118	117	31
Age (mean)	45	45	47
Sex	95M	94M	25M
	23F	23F	6F

Table-II: Sites of SCC Marjolin ulcer

Site	Male	Female	Total
Upper extremity	13	3	16
Lower extremity	105	26	131
a- foot	15	2	—
b- pobliteal	95	16	—
c- thigh	3	0	—
Abdomen	0	1	1
Grand total	118	30	148

All patients were followed up for 5-10 years after resection, and none had recurrence of their tumor. Time for malignant transformation and development of SCC Marjolin ulcers after the primary burn was six to twelve years (first time cases), while this figure was three to four years in recurrent cases that were resected previously in other centers. All the cases were SCC type.

DISCUSSION

Although burn scar carcinoma occurs at any age and has no race predisposition and its occurrence has been stated to be a rare one, the exact incidence is not still known.[10] The rate of Marjolin ulcer occurrence was reported to be three times more common in men than women,[4] while in this study this ratio was 4.4. The reason, for this discrepancy may be due to genetic predisposition in male gender, as well as greater strenuous physical activity in males in relation to females, or due to exposure to harsher environmental conditions. On the other hand, the average age of development of Marjolin ulcer has been reported to be 58 years and is between 18 and 84 years.[5] In this study the average age was 45 with age range of 24 to 67. This may be due to predominant younger age of our population in this area of the world.

SCC Marjolin ulcer most commonly follows full-thickens burns in contrast to BCC which occurs in patients where the damage is more superficial and the hair follicles and sebaceous glands are still intact.[11] All our Marjolin ulcer cases were suffering from SCC type, mainly due to thermal burn such as boil water and flame and were in third degree stage, confirming previous findings.[8]

The reported time from the primary burn to the time of onset of cancer, varies greatly: It has been reported to occur within three to ten years, other studies report a range of 8 to 63 years.[8] In our study the appearance time was six to twelve years after recovery from burn injury. This variation of reported incidence may be due to many known and/or still unknown factors such as genetic differences, environment factors, and immunological status,[7] or related to the age of the victims.[12] In the latter situation, the relationship was found to be inversely proportional to the age of the patient at the time of burn injury, that is: younger age to be associated with longer latency period to produce neoplasia.[7] The mean age of our patients was 45 years, which when compared with other studies,[6,8] suggested that the age may have a role in this population.

Marjolin ulcer is created on all deep burn wound scars of third degree and in all part of body especially on flexion fold and even on scalp area.[13] In this study, 85% of the cases of Marjolin ulcer were seen on publiteal fold and other lower extremities, while in other studies this figure was reported to be between: 20% to 36% on lower extremity.[1] This discrepancy of the results may be due to higher percentage of burns in the lower extremities among our patients.

The major findings from this study, which were the main aims of this report, showed that the incidence of recurrence in cases that were apparently "not resected" by classical methods was 21%, which seems to be fairly high, especially when only two reports of recurrence has been published previously.[1,6] Furthermore, resection of a 2-cm wide excision of the recurrent cases circumferentially to the ulcer was found to be unsuitable procedure, since all the 2-cm resected safety margins in the recurrent cases were still found to be involved and necessitated a further 0.5cm excision for evidence of tumors-free margin and depth, suggesting that for safety reasons and for prevention of further complications, a 2.5-cm safety margin

need to be resected in an attempt to manage this type of cases. All these patients were followed up for at least five years (range five to eight years) with no recurrences, suggesting that this method of resection is suitable one, since the recurrences before the intervention was between three to four years after first resection.

We recommend that the wounds created on the first occasion on old burned scars are considered, after pathological investigation, as Marjolin ulcers of SCC type, which need surgical excision with 2-cm safety margin. Secondly, if the tumor is a recurrent one following a previous resection a 2.5-cm safety margin must be resected. Finally, all samples must to be sent for frozen section studies before repairing the remaining defect by skin grafts or skin flaps.

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