

---

## Brief Report

---

# An Overview of Heel Marjolin's Ulcers in the Orthopedic Department of Urmia University of Medical Sciences

Ahmad Shahla MD\*

---

**Marjolin's ulcer is defined as a malignant, ulcerating neoplasm occurring in cicatricial tissues. The cancer is usually a well-differentiated squamous cell carcinoma. Wide resection is complicated with a recurrence rate of 20% to 50% and a metastasis rate of 54%. Therefore, we chose amputation as the modality of treatment for heel Marjolin's ulcers in Urmia and presented their results in this study.**

**During the last 10 years in Urmia, nineteen cases of heel Marjolin's ulcers has been detected. About 47% were due to childhood burn. Malignancy was mainly squamous cell carcinoma. The mean latent period of malignant transformation was 11 years. All cases were treated with amputation, without any recurrence or metastasis in an average four-year follow-up period.**

**The squamous cell carcinoma of Marjolin's ulcer has the worst prognosis in comparison with other squamous cell carcinomas and it requires an aggressive treatment.**

---

*Archives of Iranian Medicine, Volume 12, Number 4, 2009: 405 – 408.*

---

**Keywords:** Amputation • heel chronic ulcer • malignancy

### Introduction

The term "Marjolin's ulcer" is often used to describe the formation of epidermoid carcinoma in the scar tissue of chronic ulcers and can have an aggressive course. Malignant degeneration of burn scars has been recognized since the early 19<sup>th</sup> century.<sup>1</sup> In 1828, Jean Nicholas Marjolin first described a villous lesion in postburned scar tissues. In 1850, Robert Smith recognized the malignant potential of these ulcers. In 1903, DaCosta first used the term Marjolin's ulcer and explained that when a carcinomatous change takes place in a chronic ulcer, indurations usually begin from around the margin and spread slowly. It is rare for the entire margin of a large ulcer to transform into a malignant disease.<sup>2</sup> Today, the term "Marjolin's ulcer" is used to cancers arising from scars of old

burns, venous insufficiency ulcers, pressure ulcers, traumatic wounds, cystostomy sites, scarring from lupus, amputation stumps, chronic lymphedema, chronic pilonidal sinuses, hidradenitis suppurativa, chronic ulcers of leprosy, necrobiosis lipoidica, and chronic osteomyelitic fistulae. These cancers are usually well-differentiated squamous cell, but may be basal cell or melanoma.

Ulcer features that are suggestive of malignant transformation include a chronic ulcer of greater than three months' duration, excessive granulation tissue beyond margins, everted wound edges, recurrent breakdown of ulcers after healing, static nonhealing ulcers after appropriate treatment, and ulcers that increase in size or pain despite appropriate therap.<sup>3</sup> Biopsy is the definitive diagnostic tool. Lawrence<sup>4</sup> suggested that specimens be taken from both the center and the margins of suggestive lesions.

The exact cause of Marjolin's ulcers is not known. The longer the duration of chronic ulcers, the more likely it is for a malignant transformation to occur. The mechanism by which chronic ulcers transform into malignancies is not well known. However, several theories have been postulated. One theory suggests that burn exudates, which

---

**Author's affiliation:** \*Department of Orthopedics, Imam Khomeini Hospital, Urmia University of Medical Sciences, Urmia, Iran.

**Corresponding author and reprints:** Ahmad Shahla MD, Department of Orthopedics, Imam Khomeini Hospital, Urmia University of Medical Sciences, Urmia, Iran.

Tell: +98 -441- 346-99-31; Fax: +98- 441- 346-99-35

E-mail: a\_shahla@umsu.ac.ir

Accepted for publication: 15 April 2009

contain endogenous growth-promoting factors, may act as a co-carcinogen and subsequently lead to tumor development.<sup>5</sup> It has also been postulated that with chronic irritation and repeated damage of the ulcer, there is continuous mitotic activity as the epidermal cells attempt to resurface the open defect. This cycle of damage, irritation, and repair especially in flexion creases, can lead to a malignant transformation. Implantation of epidermal cells into the dermis from trauma, which can result in foreign body reaction and subsequent alteration of the normal regenerative process, has also been hypothesized to be a mechanism for malignant transformation.<sup>1</sup> Infection might serve as a co-carcinogen in a scar tissue. It has also been suggested that patients with an inherent immune deficiency are at higher risk for developing malignant ulcers.<sup>1</sup>

This study evaluated heel Marjolin's ulcers in Urmia University of Medical Sciences.

### Patients and Methods

This retrospective cross-sectional study was performed in Shaheed Motahhari Hospital, affiliated to Urmia University of Medical Sciences, Urmia, Iran. Since all heel Marjolin's ulcers were treated by amputation, we overviewed the lower limb amputation cases between 1996 and 2006 and selected heel malignant ulcers. Etiology, latent interval, and kind of malignancy were recorded. Although most patients were in contact with us for

stump and prosthesis control, we called all patients and visited them again for probable recurrence and metastasis.

### Results

Nineteen cases of heel Marjolin's ulcers (11 males, eight females, 10 right sided, and nine left sided) were detected. Baseline data regarding patients' information are presented in Table 1.

Most cases were ulcerations of childhood burn cicatrices (47%). The youngest patient was an 11-year-old boy and his right heel meningocele-related trophic ulcer had transformed into malignancy within three years. There was no Marjolin's ulcer on the diabetic foot.

The mean latent period for malignant transformation was 11 years. Patient's age at the time of injury influenced latency time, which was inversely proportionate to patient's age at the time of injury (Figure 1).

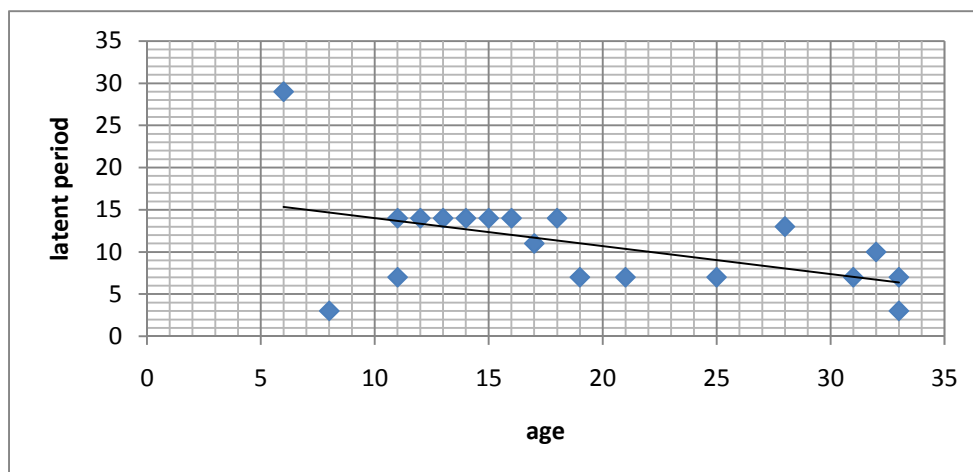
Diagnoses were revealed with biopsy from different parts of the margin and the center of the ulcers. In two cases, first reports of biopsy were negative. They were repeated after three months and yielded positive reports. Pathology reports were 17 squamous cell and two basal cell carcinomas.

We treated all patients with below knee amputation. Wide resections were impossible in all cases because of the ulcer and calcaneus contact and the secondary problem of wound closure. One-

**Table 1.** Patients' information.

Number	Age (year)	Gender	Etiology	Interval (year)	follow-up (year)	Pathology report
1	11	Male	Trophic sore	3	5	SCC
2	28	Female	Burn	7	7	SCC
3	35	Female	Burn	29	3	SCC
4	27	Female	Burn	14	4	SCC
5	32	Female	Burn	14	3	BCC
6	38	Male	Flap failure	7	3	SCC
7	29	Female	Burn	14	5	SCC
8	26	Male	Heel osteomyelitis bullet wound	7	6	SCC
9	25	Female	Trophic sore	14	3	SCC
10	28	Female	Scare of mine crushed wound	11	7	SCC
11	18	Male	Burn	7	5	SCC
12	28	Male	Trophic sore	14	4	SCC
13	36	Male	Heel osteomyelitis bullet wound	3	3	SCC
14	32	Male	Burn	7	2	SCC
15	30	Female	Burn	14	1	SCC
16	26	Male	Burn	14	3	BCC
17	40	Male	Scare of mine crushed wound	7	4	SCC
18	41	Male	Scare of mine crushed wound	13	3	SCC
19	32	Male	Scare of mine crushed wound	10	2	SCC

SCC=Squamous cell carcinoma; BCC=Basal cell carcinoma.



**Figure 1.** Relationship between age at the time of diagnosing the previous injury and the latent period of malignancy.

to seven-year follow-up (mean: 4) did not reveal any recurrence or metastasis. An 18-year-old man with a burn ulcer had groin lymph node metastasis in the primary examination whose lymph nodes were excised beyond amputation. He underwent radiotherapy.

## Discussion

An estimated 1.7% of chronic wounds undergo malignant degeneration.<sup>1</sup> Most lesions of Marjolin's ulcer occur on the extremities (60%) with ulcers on the head and face occurring less frequently (30%) and those on the trunk that are the least frequent (10%).<sup>6</sup> Attempts were made to classify Marjolin's ulcers into two subgroups: scars that undergo malignant transformation less than one year after the initial injury and scars that degenerate after one year.<sup>7</sup> The results of this study showed an average latent period of 11 years. According to Lawrence, the latent period of ulcers originating from burn scars was inversely proportionate to the age at which the burn scar occurred. In our study, this was also true not only for burn scars but also for all other types of ulcers.<sup>4</sup>

The majority of reported cases in the literature are squamous cell carcinoma, but other types of malignancies such as basal cell carcinoma, and melanoma can also be seen although they are rare.<sup>8</sup> The reports of 19 cases of this study were 17 squamous cell and two basal cell carcinomas. Lifeso and Bull<sup>9</sup> used a three-grade histopathologic classification: grade I (well differentiated), grade II (moderately differentiated), and grade III (poorly differentiated). These squamous cell carcinomas usually have one of two the predominant clinical

morphologies of either an exophytic growth or indurated ulcer. It is known that the biology of the squamous cell carcinoma originating in these lesions is more aggressive than other primary squamous cell carcinomas. Novick et al.<sup>10</sup> reported a 54% incidence of metastasis from lower extremity lesions. Metastasis to the brain, liver, lung, kidney, and distant lymph nodes have been reported.<sup>6</sup>

For the treatment of Marjolin's ulcer, wide local excision with a margin of at least one centimeter of healthy tissue should be performed. Amputation is indicated when wide local excision is not possible due to deep invasion, bone or joint involvement, infection, or hemorrhage, or when excision would cause major functional disability. Regional lymph node dissection is indicated when nodes are palpable. Lymph node dissection in the absence of palpable nodes, however, is controversial.<sup>3</sup> Lifeso and colleague stated that wide excision could be unreliable for grade II and III diseases; therefore, amputation and prophylactic node irradiation are recommended.<sup>9</sup> Reports have shown that other methods of ensuring complete local excision are also useful, including the Mohs micrographic surgery technique.<sup>3</sup> Recurrence incidence ranges from 20% to 50%. Most recurrences are seen within three years of excision.<sup>7</sup> The five-year survival rate is about 40–60%.<sup>10</sup>

In this study, all 19 cases of heel Marjolin's ulcers were treated with below knee amputation. Inguinal lymph nodes were excised in only one palpable case. He was an 18-year-old male with an 11-year latent period of the burn scar. We had no recurrence or metastasis in a mean four-year follow-up. The squamous cell carcinoma of

Marjolin's ulcer has the worst prognosis in comparison with other squamous cell carcinomas and requires an aggressive treatment with amputation to decrease recurrence and metastasis rates.

## References

- 1 Trent JT, Kirsner RS. Wounds and malignancy. *Adv Skin Wound Care*. 2003; **16**: 31 – 34.
- 2 DaCosta J. Carcinomatous changes in an area of chronic ulceration, or Marjolin's ulcer. *Ann Surg*. 1903; **37**: 496 – 502.
- 3 Moises M, Robert A. Marjolin's ulcer: report of two cases. *Wounds*. 2006; **18**: 65 – 70.
- 4 Lawrence E. Carcinoma arising in the scars of thermal burns: with special reference to the influence of the age at burn on the length of the induction period. *Surg Gynecol Obstet*. 1952; **95**: 579 – 588.
- 5 Fleming M, Hunt J, Purdue G, Sandstad J. Marjolin's ulcer: a review and re-evaluation of a difficult problem. *J Burn Care Rehabil*. 1990; **11**: 460 – 469.
- 6 Treves N, Pack GT. The development of cancer in burn scars. An analysis and report of 34 cases. *Surg Gayne Obs*. 1930; **51**: 749 – 782.
- 7 Thio D, Clarkson JH, Misra A, Srivastava S. Malignant change after 18 months in a lower limb ulcer: acute Marjolin's revisited. *Br J Plast Surg*. 2003; **56**: 825 – 828.
- 8 Alconchel MD, Olivares C, Alvarez R. Squamous cell carcinoma, malignant melanoma and malignant fibrous histiocytoma arising in burn scars. *Br J Dermatol*. 1997; **137**: 793 – 798.
- 9 Lifeso RM, Bull CA. Squamous cell carcinoma of the extremities. *Cancer*. 1985; **55**: 2862 – 2867.
- 10 Novick M, Gard DA, Hardy SB, Spira M. Burn scar carcinoma: a review and analysis of 46 cases. *J Trauma*. 1977; **17**: 809 – 817.