

# Thirty-one cases of Marjolin's ulcer

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## Summary

Marjolin's ulcer is a rare and often aggressive cutaneous malignancy that arises in previously traumatized or chronically inflamed skin, particularly after burns. We reviewed 264 burns cases treated in our departments to assess the frequency and clinicopathological features of this malignant complication. We found 31 cases of Marjolin's ulcer and a further 14 cases of nonmalignant ulceration at previous burn sites. Eighteen Marjolin's ulcers were located on the extremities, six on the scalp, six on the trunk, and one on the nose. Most malignancies were squamous cell carcinomas. The average time lag between the burns and subsequent malignant ulceration was 19 years. Four of the malignant ulcers had spread to regional lymph nodes, but there were no distant metastases. This study emphasizes that Marjolin's ulcer should be considered as a significant postburn complication.

## Introduction

Marjolin's ulcer is a well-defined, uncommon condition in which malignant transformation occurs in chronically inflamed or traumatized skin. This tumour was first described by Marjolin in 1828, and was subsequently described in more detail by Smith.<sup>1</sup> The term 'Marjolin's ulcer' has been generally accepted to refer to long-term malignant complications in scars resulting from burns. Clinically, reports suggest that atrophic or unstable scars tend to develop into cancer.<sup>2</sup> These lesions are frequently overlooked and are often inadequately treated. All parts of the body can be affected, but the extremities, trunk and scalp are most frequently affected. Development of malignancy tends to be slow, with an average time to malignant transformation of approximately 35 years.<sup>3</sup> Squamous cell carcinoma (SCC) is the major histological type of Marjolin's ulcer.<sup>4,5</sup> Although it is a well-defined skin tumour, its treatment is a subject of controversy. Radical excision is the treatment of choice, but there is no consensus

for lymph node dissection. The insidious nature of Marjolin's ulcer often leads to a poor prognosis, and deaths from Marjolin's ulcer are not uncommon.<sup>6</sup> In this study, we reviewed our own experience of Marjolin's ulcer over an 8-year period.

## Materials and methods

Two hundred and sixty-four burns patients were followed up in the Departments of Plastic and Reconstructive Surgery, Izmir Atatürk Training Hospital and Adnan Menderes University, between 1994 and August 2001. Of these cases, 31 had Marjolin's ulcer and 14 had nonmalignant ulceration in the burn scar. All malignant changes were confirmed by biopsy. In most cases squamous cell cancer was detected, but basal cell carcinoma and baso-squamous cell carcinoma were also found. Age, sex, time since burn was sustained, type of burn, care given after burn, medical history, time of onset of ulcer, type of ulcer, laboratory findings, histological type of ulcer determined by biopsy, and existence of nodal and distant metastases were recorded. In addition to the patients with ulcer malignancy, 14 patients with nonmalignant postburn ulceration were followed for a minimum of 24 months (mean 26 months). All patients underwent complete physical examinations. Patients with palpable lymph nodes

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underwent ultrasonography. All patients were examined for distant metastasis by routine chest X-ray, abdominal ultrasonography and computed tomography scans of the brain. In clinical management of Marjolin's ulcer, all patients underwent tumour excision and skin grafting. If nodal involvement was detected, regional lymph node dissection was performed. All patients were followed for recurrence, but only two patients had signs of recurrence and underwent wider excision and skin grafting.

## Results

Patients were aged between 15 and 67 years with a mean of 39 years. The male to female ratio was 2 : 1. The mean lag period between the sustaining of the burn and development of carcinoma ranged from 11 to 38 years with a mean of 19 years. The types of burn recorded were flame (68%), scalding (29%) and chemical (3%). There were 21 cases of Marjolin's ulcer following flame injury, of which 16 had SCC, four baso-cell carcinoma and one baso-squamous cell carcinoma. Ten patients whose burns resulted from scalding or chemical injury all had SCC. The majority of ulcers were located on the extremities (18 of 31; 58%) (Figs 1a and b). The scalp and the trunk were equally involved (Fig. 1c), with six ulcers on the scalp and six on the trunk (6 of 31; 19%). One patient had a tumour located on the nose (3%) (Fig. 1d). There was no significant relationship between the location of the Marjolin's ulcer and age or sex. In the acute stage, only five patients had received medical treatment (16%). The remainder (84%) had not sought any medical help. The size of the malignant ulcers ranged from 1 cm to 15 cm in diameter with a mean of 5 cm. Laboratory findings showed no abnormality except a high erythrocyte sedimentation rate. All patients with confirmed Marjolin's ulcers were operated on under general anaesthesia and tumour excision and skin grafting were performed in all patients. In one patient, who had a tumour on the leg, there was bone involvement and amputation was performed. Distant metastases were not detected. However, enlarged lymph nodes were found in six (19%) patients, three of whom had a tumour on the leg. The other three patients had a tumour on the hand and axillary lymph node enlargement. These patients also underwent regional lymph node dissection. In four of the lymph node dissections, the same histopathological features as found in the Marjolin's ulcer were present. Surgical margins were shown to be tumour-free. However, there were two recurrences (6%) within 2 years follow-up (mean 19 months). Both of these were located

on the extremities. They were treated with a wider excision and skin grafting. No patient died and no distant metastases occurred in 3.8 years follow-up (range 1–6 years).

## Discussion

Marjolin's ulcers are rare tumours that originate in chronically inflamed skin. The inflammation is usually caused by a burn injury. However, vaccination,<sup>7</sup> snake bites,<sup>8</sup> osteomyelitis,<sup>9</sup> pilonidal abscesses,<sup>10</sup> pressure sores<sup>11</sup> and venous stasis<sup>12</sup> may also induce this tumour. To date, few cases of burn scar carcinoma have been presented in the literature. Various aetiological factors have been implicated; these include toxins released from damaged tissue,<sup>13</sup> immunological factors,<sup>14</sup> cocarcinogens,<sup>6</sup> and miscellaneous factors such as irritation, poor lymphatic regeneration, antibodies, DNA mutations and local toxins.<sup>15</sup>

Most authors agree that prolonged healing of severe burn wounds (and therefore chronically abnormal keratinocyte cell biological activity) is the major potential risk factor for the development of scar carcinoma.<sup>1,13</sup> There is always a latent period between burn injury and appearance of the tumour, and this time lag averages 30 years,<sup>1,3,7,15,16</sup> although an acute onset may occur rarely, sometimes within weeks.<sup>16,17</sup> In our series, the time from the burn to the onset of malignancy appeared to be shorter (19 years) than the times recorded in previous studies. This may reflect the very poor access to health care for our patients after burn injury.

We also noted 14 patients (31%) with skin ulcers but without any malignant change. Pathological examination of biopsy specimens showed only chronic inflammation. These patients were strictly followed for skin cancer and overall received better wound care. They had no malignant transformation in the 8-year follow-up period.

At present there is little information about how the type of burn relates to the frequency of Marjolin's ulcer. Flame injury was the most frequent cause of burns in our series: indeed, this is the leading cause of burns in our country. Although many different cellular malignancies have been reported in Marjolin's ulcer, the usual histological finding is SCC, although baso-cell carcinoma, malignant melanoma and mesenchymal malignancy have been documented.<sup>1,16,18</sup> Nevertheless, there are no data on the relationship between the type of burn and the malignant cell type in Marjolin's ulcer. In this study, only burns caused by flames predisposed to Marjolin's ulcers with baso-cellular carcinoma.



**Figure 1** (a) Two patients with Marjolin's ulcer on the right hand. Both had positive axillary lymph node involvement. (b) Marjolin's ulcer on the leg. (c) Marjolin's ulcer on the back. (d) Marjolin's ulcer on the nose.

By contrast, SCC was the only type of malignancy observed in scalding injury. Likewise, there are few data on possible exacerbating factors such as trauma or ultraviolet radiation, both of which may be relevant given the relatively frequent localization of Marjolin's ulcer on the extremities<sup>4,6</sup> the scalp<sup>5</sup> and the neck.<sup>19</sup> In our series, 58% of cancers were located on the extremities.

Marjolin's ulcer tends to be more aggressive than other types of skin cancer, and has a higher regional metastasis and fatality rate.<sup>20</sup> Although most SCCs have a metastasis rate of 0.5–3.0%, those originating from a

burn scar have a metastasis rate averaging approximately 30%.<sup>20,21</sup> However, in our series, none of the patients had distant metastases. There were only three patients (9.6%) with true regional lymph involvement. Nevertheless, recurrence is higher than for other skin malignancies.<sup>1,4</sup> In our series, this was 6% within 2 years follow-up.

In this study, standard management of the tumour comprised excision with a 2-cm margin, and the resultant wound was grafted or covered by flaps. Indeed, wide excision (surgical margin of at least

2 cm) together with skin grafting is usually considered appropriate in the treatment of Marjolin's ulcer.<sup>1</sup> However, there is no agreement on the indications for lymph node dissection. Most studies have not supported the idea of prophylactic node dissection,<sup>22</sup> although Novick *et al.*<sup>23</sup> suggested that prophylactic lymph node dissection should be performed for tumours located on the lower extremities. In our series, pathological results for dissected material demonstrated that most patients with enlarged lymph nodes had lymph node involvement. Lymph node dissection was performed when a clinically palpated lymph node was present. Tumours on joints were repaired with flaps. Early mobilization and physiotherapy were necessary in all cases.

Although Marjolin's ulcer is rare, it does represent a significant long-term complication requiring long-term follow-up and active management.

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