

FATE OF MARJOLIN'S ULCER- FROM SCAR TO MALIGNANCY- A CASE SERIES

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Abstract

Background: A Marjolin ulcer is a cutaneous malignancy that arises in the setting of previously injured skin, longstanding scars, and chronic wounds. The latency period from the initial injury to the development of malignancy varied in chronic ulcers according to various studies with occurrence even after 50 years. The metamorphoses from ulcer to malignant disease are typically slow and the pathogenesis is not known. Identification of risk factors and a high index of suspicion are crucial factors for early diagnosis. **Materials and Methods:** Total 8 cases histopathological diagnosed as Squamous cell carcinoma in the background of scars due to any etiology of any age or any gender were included in the study. The tissue was fixed in 10% buffered formalin and then processed by the routine paraffin embedding techniques. **Results:** The mean age was 52 years with female to male ratio of 1.7:1. In our study, 7 cases out of 8 (87.5%) had a history of burn (as a cause of ulcer) and one patient (12.5%) had a history of contracture due to injection sepsis. We found latency period between primary injuries (burn, trauma etc.) to the development of ulcer ranged from 2 years to 50 years (mean 26 years) and that of transformation of ulcer to malignancy ranged from 2 months to 3 years (mean 1.6 years). All Marjolin's ulcers developed into squamous cell carcinoma (SCC). Two cases (25%) were of well-differentiated squamous cell carcinoma (Grade 1) and six cases (75%) were of moderately differentiated squamous cell carcinoma (Grade 2). **Conclusion:** We observed burn was the most common risk factor for the development of Marjolin's ulcer. Inadequate early wound care, and healing wounds by secondary intention can lead to malignant degeneration in both burn scars and other traumatic wounds. Early and definitive wound management with skin grafting can prevent this wound transformation to Marjolin's ulcer and then further into squamous cell carcinoma.

INTRODUCTION

The term Marjolin ulcer is now similar to neoplastic changes in the transformation of chronic ulcers, sinus tracts, and burn scars.^[1] It was first described in 1828 by French surgeon, Jean Nicolas Marjolin.^[2-4] It was recognized as malignancy by Dupuytren and the term 'Marjolin's ulcer' was coined by Da Costa in 1903 for malignancies arising from burn wounds.^[5,6] Various hypotheses have been put forth for the pathogenesis in the development of malignancy like repeated reparative processes,

promoter and carcinogen theory, traumatic implantation of epithelial elements theory and chronic irritation theory.^[7] The latency period from the initial injury to the development of malignancy varied in chronic ulcers according to various studies with occurrence even after 50 years. Marjolin's ulcer in sub-Saharan Africans occurred earlier and in younger patients.^[8] Skin carcinoma is the second most common cutaneous malignancy with increased prevalence per annum. The burn scar is vulnerable to metamorphose into an aggressive type of cutaneous malignancy.^[9] The most common type of malignancy occurring in these wounds is squamous

cell carcinoma (SCC) followed by basal cell carcinoma (BCC) and sarcomas. Extremities are the most commonly involved sites followed by the head, neck region and trunk.^[10]

The metamorphoses from ulcer to malignant disease are typically slow and the pathogenesis is not known.^[11] Identification of risk factors and a high index of suspicion are crucial factors for early diagnosis. Non-healing ulcers should be consistently monitored for evidence of neoplastic change. Histopathological examination should be done for any alteration in the appearance of the wound. Early treatment of primary injury results in a better prognosis.^[12,13]

The study was done to determine the period between the formation of ulcers and to development of Squamous cell carcinoma and their risk factors.

MATERIALS AND METHODS

The study was done in the Department of Pathology at Dr Vasantrao Pawar Medical College Hospital and Research Centre, Adgaon, Nashik from January 2018 to December 2023. All cases were diagnosed histopathologically. Specimens received were either biopsy samples or wide local excision. The tissue was fixed in 10% buffered formalin and then processed by the routine paraffin embedding techniques. The surgical specimens were evaluated grossly. The sections were taken from representative areas. Sections were cut at 4-5 microns thickness and stained with haematoxylin and eosin stains. Special stains were done if required for confirmation. Data was analyzed by Excel spreadsheet; results will be documented in proportions and percentages with appropriate statistical tests by using appropriate statistical software.

Inclusion Criteria

1. All cases histopathological diagnosed as Squamous cell carcinoma in the background of scars due to any etiology of any age or any gender.

Exclusion Criteria

1. Non-confirmed cases (not proven on histopathology) as Squamous cell carcinoma with no history of scar due to any etiology.
2. Any ulcers not developing into squamous cell carcinoma.

RESULTS

Total 8 cases of Squamous cell carcinoma (SCC) which were developed on the background of Marjolin's ulcer were reported from January 2018 to December 2023. [Table 1]

In our study, the youngest patient was 28 years old and the oldest patient was 81 years old. The mean age was 52 years. In our study, 7 cases out of 8 (87.5%) had a history of burn (as a cause of ulcer)

and one patient (12.5%) had a history of contracture due to injection sepsis.

We found latency period between primary injuries (burn, trauma etc.) to the development of ulcer ranged from 2 years to 50 years (mean 26 years) and that of transformation of ulcer to malignancy ranged from 2 months to 3 years (mean 1.6 years).

In our study, all Marjolin's ulcers developed into squamous cell carcinoma (SCC). Two cases (25%) were of well-differentiated squamous cell carcinoma (Grade 1) and six cases (75%) were of moderately differentiated squamous cell carcinoma (Grade 2). We observed five female (62.5%) and three (37.5%) male patients. Female to male ratio was 1.7:1. [Figure 1]

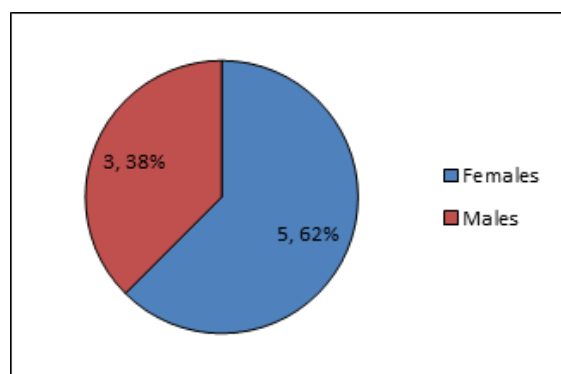


Figure 1: Gender-wise distribution of cases

In the current study, the majority of cases were located on the upper limb (50%) followed by the lower limb (37.5%) and trunk (12.5%). [Table 2]

Four cases out of 8 cases (50%) of Marjolin's ulcer showed metastasis to the lymph node. Two patients had metastasis to axillary lymph nodes and two patients had metastasis to inguinal lymph nodes. One patient had liver metastasis and one patient had brain metastasis. [Table 3]

A detailed description of the patient's status of treatment along with the follow-up is given in Table 4.

Case 1

A twenty-eight-year-old female had a history of flame burn at the age of 18 years. At the of 27 years, the patient developed a non-healing ulcer on the left dorsal aspect of the arm which increased in growth for 1 year (Figure 2). A biopsy was performed on suspicion of malignancy and diagnosed as moderately differentiated infiltrating squamous cell carcinoma (Grade 2). A wide local excision with skin grafting was done. The specimen measured 11x6.5x3.5cm (Figure 3). Mass was measuring 6.2x4.7x3.1 cm. Histopathologically it was confirmed the diagnosis given for the biopsy specimen with all surgical margins and base were free of tumor. Radiotherapy was started. After 3 months, the patient had multiple enlarged axillary lymph nodes. Lymph node block dissection was done with 6 axillary lymph nodes and 9 apical lymph nodes were removed, respectively. All

axillary lymph Nodes showed metastasis of Squamous Cell Carcinoma (6/6) and all apical Lymph nodes (9) were negative for Metastasis (0/9) (Figure 4). Patient underwent radiological investigation to confirm metastasis to other organs. There was no evidence of metastasis. Radiotherapy was continued with an increased dose and follow-up after 2 months of treatment the patient had a mass on the left shoulder. FNAC followed by a biopsy of the mass showed metastasis. The patient underwent wide excision and skin grafting. Adjuvant radiotherapy and chemotherapy were started during the study period.



Figure 2: Non -healing ulcer



Figure 3: Specimen measured 11x6.5x3.5cm

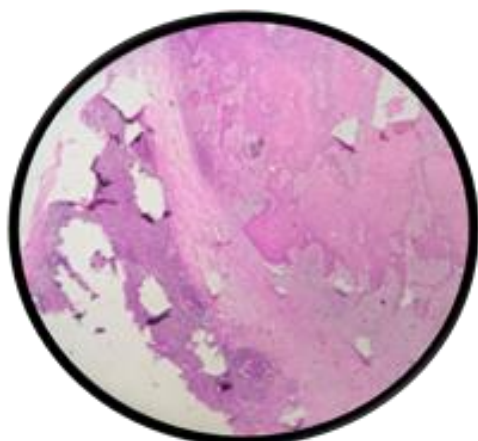


Figure. 4: Microscopy s/o moderately differentiated SCC (100x)

Case 2

A 32-year-old female presented with a non-healing and foul-smelling ulcer over the right upper limb. The patient had a history of 65% burn on the chest on a right upper limb at 23 years of age.

An ulcer was gradually increasing for 7 months. The ulcer measured 5.5x3.5x1cm. A biopsy was done and reported as moderately differentiated squamous cell carcinoma (grade 2). A wide local excision with skin grafting was done. The specimen measured 9x7.5x1.5 cm with skin attached to soft tissue. Fungating growth measured 5.5x3.5x1 cm. Microscopically it was confirmed as moderately differentiated squamous cell carcinoma (grade 2) with all resection margins and base both were free from tumor. Radiotherapy was started. Wound healed. Follow-up was done for 3 years & 7 months till the duration of the study. There was no evidence of recurrence or evidence metastasis.

Case 3

A 40-year-old female presented with an ulcer on the right subclavicular region. An ulcer was non-healing with slough and discharge. The patient had a history of burn at the age of 37 years and contracture was developed. After 2 years of latency period ulcer was developed over 1 year. A biopsy was performed on suspicion of malignancy and reported as well-differentiated squamous cell carcinoma (Grade 1). The patient was operated and the specimen sent consisted of soft tissue measuring 7.5x7x5cm with subcutaneous fat and surrounding skin. An irregular fungating mass was identified, measuring 6.5x5.5x3cm. On microscopy, it was confirmed as well-differentiated squamous cell carcinoma (Grade 1) with all resection margins and base free from tumor (Figure 5 & 6). Local irradiation therapy was started and the wound healed in 8-9 months. Follow-up was done for 4 years and 6 months. The patient showed no evidence of recurrence or metastasis till the duration of the study.

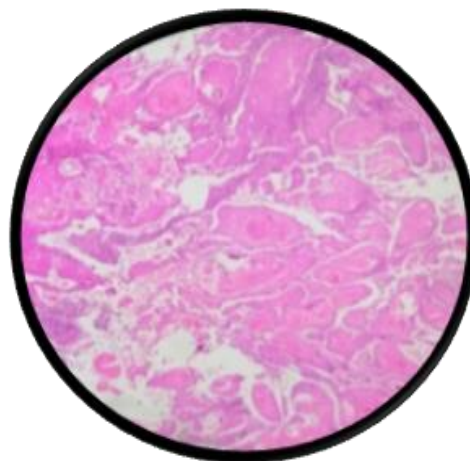


Figure 5: Microscopy s/o moderately differentiated SCC (400x)

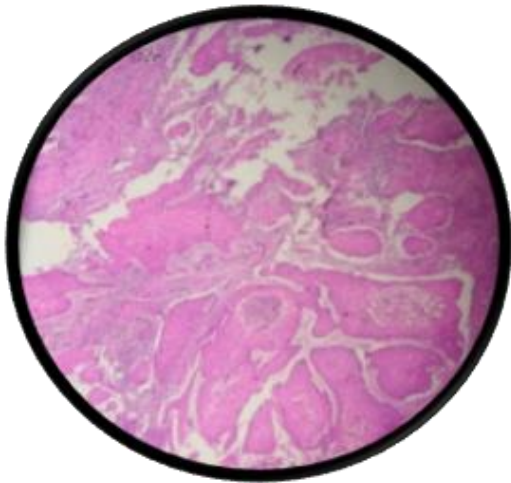


Figure 6: Microscopy s/o moderately differentiated SCC (400x)

Case 4:

A 41-year-old female came with an ulcer of size 5x4cm over her left elbow with slough and discharge for 4 months. She had a history of injection sepsis 20 years back which was healed with contracture. A wedge biopsy was performed on Marjolin's ulcer over the left elbow. Microscopic examination was diagnosed as moderately differentiated Squamous Cell Carcinoma (Grade 2). Wide local excision of the mass with skin grafting was done. The specimen sent measured 7.5x6x2.5cm with ulceroproliferative mass measured 5x4x1.5 cm. Histopathologically it was confirmed as moderately differentiated Squamous Cell Carcinoma (Grade 2) with all surgical margins and base were free from tumor. The patient was under radiotherapy treatment for 2 years. After 2 years patient had axillary lymph node metastasis but radiologically there was no sign of organ metastasis. Radiotherapy was advised with an increased dose. But afterwards, the patient was lost to follow-up.

Case 5:

A 45-year-old male presented with a non-healing ulcer covering his left ankle with foul-smelling and purulent discharge for 6 months. The ulcer was irregularly proliferative measured 18.7x8x3.4 cm. He gave a history of thermal burn at the age of 36 years of age over his left leg with an ulcer developed at the age of 44 years. A biopsy was performed on suspicion of malignancy and was diagnosed as well-differentiated squamous cell carcinoma (Grade 1). Below knee amputation was done due to a deep invasion of the lesion. Specimen sent for histopathology. It measured 21x9.3x3.9 cm with an irregular cauliflower-like growth measuring 18.7x8x3.4 cm. Histopathological examination confirmed well-differentiated squamous cell carcinoma (Grade 1). All the skin resection margins and base were free from tumor. Bone was not involved in the tumor. The patient was under radiotherapy for 2 years. Follow-up showed there was no evidence of metastasis clinically and by

radiological investigations. The patient died due to COVID-19 in the second wave.

Case 6:

A 75-year-old male known case of diabetes, presented with an ulcer proliferative mass measuring 7x5.9x4.6cm on the right lower limb. An ulcer was present for 3 years for which many local ointments were applied and medicines were taken from the primary health centre. The patient had a thermal burn on the right lower limb at the age of 43 years. After twenty-nine years of the burn, the patient developed a non-healing ulcer over scar tissue in the right popliteal fossa. A biopsy was performed on suspicion of malignancy and was reported as moderately differentiated squamous cell carcinoma (Grade 2). Radiological investigation showed no involvement of localized bone (Figure 7). Above-knee amputation was done due to a deep invasion of the lesion. The specimen sent measured 8.3x6.5x2.4cm. Microscopically it was confirmed as moderately differentiated squamous cell carcinoma (Grade 2). The patient underwent radiation therapy for 1 year and 7 months of treatment. After that patient developed a mass in the right inguinal lymph node enlargement. FNAC showed metastasis of squamous cell carcinoma. Lymph node block dissection was done. Out of three lymph nodes two lymph nodes showed metastasis. Radiation therapy was continued with an increased dose. After 2 months patient developed neck and back pain. Radiological investigations showed metastasis to the spine. The patient deteriorated and was hospitalized. Palliative treatment was started but died after 5 days of hospitalization.

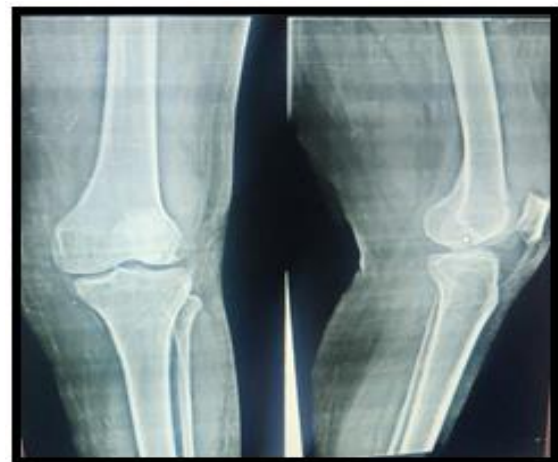


Figure 7: Localized bone not involved by tumor

Case 7:

A 78-year-old diabetic and hypertensive male on medication presented with non-healing, discharging ulcerative proliferation over the lower 1/3rd shin of the left leg for three months. The patient had a history of chemical burns on his left leg at 52 years of age. A biopsy was performed and was reported as moderately differentiated squamous cell carcinoma (Grade 2). The left lower extremity lesion was

surgically removed with a wide excision with skin grafting. The specimen showed ulcer proliferative growth with attached skin, measuring 7.5x6.6x1.8cm. Tumor measured 6.2x5x1.1cm. On microscopy it showed moderately differentiated squamous cell carcinoma (Grade 2). All Skin margins and base were free of Tumor. The patient was on radiotherapy for 6 months when he developed ipsilateral inguinal lymph node and liver metastasis. Lymph node block dissection was done. The patient was started on adjuvant radiotherapy and chemotherapy for 2 months and during the first wave of COVID-19, the patient succumbed due to respiratory failure.

Case 8:

An 81-year-old female presented with a non-healing ulcer for 6 months over her right forearm. A patient gave a history of burns over the right forearm at the

age of 30 years. The ulceroproliferative lesion measured 10x5.5x1.8cm and a biopsy was performed on suspicion of malignancy and reported as moderately differentiated squamous cell carcinoma (Grade 2). A wide local excision with skin grafting was done. Received a specimen of skin with soft tissue measured 13x7x2 cm. Histopathological diagnosis was confirmed as moderately differentiated squamous cell carcinoma (Grade 2). All surgical margins and base were free of tumor. After 1 month on first follow up radiological investigation showed metastasis to the brain. Due to the poor general condition of the patient, surgical intervention was not advised. Radiotherapy was started. Follow-up was available for 3 months and patients succumbed after 3 months.

Table 1: Data of patients with Marjolin’s ulcer transformed into squamous cell carcinoma

Sr no	Age in years	Sex	Location of tumor in the body	Cause of ulcer	Duration of development of ulcer from 1 st cause	Duration of development of carcinoma from ulcer	Size of tumor	Gross appearance of the lesion	Differentiation of carcinoma
1	28	F	Upper limb (Left arm)	Burn	9 years	1 year	6x4x3.1 cm	Ulceroproliferative	Moderately Differentiated SCC (Grade 2)
2	32	F	Upper limb (Right arm)	Burn	9 years	7 months	5.5x3.5x1 cm.	Ulceroproliferative	Moderately Differentiated SCC (Grade2)
3	40	F	Trunk (Right subclavicular region)	Burn	2 years	1 year	6.5x5.5x3 cm	Ulcer with discharge	Well Differentiated SCC (Grade 1)
4	41	F	Upper limb (Left elbow)	Contracture due to trauma	20 years	4 months	5x4x1.5 cm	Ulceroproliferative	Moderately Differentiated SCC (Grade 2)
5	45	M	Lower limb (Left foot)	Thermal burn	8 years	6 months	18.7x8x3.4 cm	Ulceroproliferative	Well Differentiated SCC (Grade 1)
6	75	M	Lower limb (Right popliteal fossa)	Thermal burn	29 years	3years	6.2x5x1.1 cm	Ulceroproliferative	Moderately differentiated (Grade 2)
7	78	M	Lower limb (Left leg)	Burn	26 years	3 months	7.5x6.6x1.8 cm	Ulceroproliferative	Moderately Differentiated (Grade 2)
8	81	F	Upper limb (Right forearm)	Burn	50 years	6 months	10x5.5x1.8 cm	Ulcer	Moderately Differentiated Grade 2)

Table 2: Distribution of cases according to the location of the tumor

Site	Frequency	Percentage
Upper limb	4	50%
Trunk	1	12.50%
Lower limb	3	37.50%
Total	8	100%

Table 3: Frequency of patients with metastasis

Sr. no	Age in years	Sex	Site	Metastasis
1	28	F	Upper limb	Axillary Lymph nodes and shoulder
2	41	F	Upper limb	Axillary Lymph nodes
3	75	M	Lower limb	Inguinal lymph node
4	78	M	Lower limb	Inguinal lymph node and liver
5	81	F	Upper limb	Brain

Table 4: Patient's status, treatment and follow-up

Sr. no	Age in years	Sex	Surgical intervention	Treatment	Duration of Follow up	Patient status
1	28	F	Wide local excision with skin grafting, and lymph node block dissection.	Radiotherapy	A) After 3 months Metastasis to axillary lymph node B) Metastasis to shoulder.	Wide local excision with skin grafting for local relapse followed by Adjuvant radiotherapy and chemotherapy.
2	32	F	Wide local excision with skin grafting	Radiotherapy	3years 7months	No evidence of recurrence or evidence metastasis.
3	40	F	Wide local excision with skin grafting	Radiotherapy	4years, 6 months	No evidence of recurrence or evidence metastasis.
4	41	F	Wide local excision with skin grafting	Radiotherapy	2 years Metastasis to axillary lymph node	Lost to Follow up
5	45	M	Below Knee amputation	Radiotherapy	2 years	Died due to COVID-19
6	75	M	Above Knee amputation	Radiotherapy	1 year and 9 months	Died due to metastasis (spine and inguinal lymph nodes)
7	78	M	Wide local excision with skin grafting, lymph node block dissection	Radiotherapy	9 months Metastasis to spine	Died due to COVID-19.
8	81	F	Wide local excision with skin grafting	Radiotherapy & palliative treatment	4 months	Died due to brain metastasis

DISCUSSION

A breach in continuity of skin due to sudden break, abrasion and inadequate personal care, leads to novel ulcer formation. Some patients face frequent healing and breaches in continuity patterns in succession. During this time, ulcers proliferate and intensify along with tenderness, pus formation, foul smell and haemorrhage. Duration of ulceration parallels to neoplastic change in chronic ulcers. The chance of dysplasia increases with prolonged ulcer formation.^[14,15] For any chronic non-healing wound in cicatrized or blemished skin, one should think of Marjolin's ulcer. This should be confirmed by histopathological examination of the tissue.^[16]

Pekarek B et al., concluded in their study that biopsy should be taken for non-healing chronic wounds.^[17] According to Enoch S et al., any wound/ulcer that has not healed after 2 to 3 weeks of conservative management is strongly suspicious of neoplastic nature.^[18] Primary health care workers should emphasize on any alteration in chronic burn cicatrix especially when it is more than a decade. This could prevent neoplastic changes in particularly over joint and bony prominences. The risk of transformation of chronic wounds to malignancy is about 2% to 6%.^[9]

Chronic irritation or repeated trauma causes atypical changes in cells along with repeated and frequent mitotic activity of regenerative and reparative processes leading to neoplastic transformation. According to some authors, cicatrized tissue has a defective immunologic response to malignant cells. Other hypotheses emphasize that scar tissue is comparatively avascular due to which there is resistance to invasion. Hence provoking localized in situ tumor development.

This could be the reason for a longer latency period for malignant transformation and delayed spread to other organs. Lymphocyte transportation can be affected due to lack of blood vessels, scarring and lymphatic obstruction. When the malignant cells enter the non-obstructed lymphatic vessel in thick scar tissue, metastasis is fairly fast.^[17]

Marjolin's ulcer is a rare type of skin malignancy associated with a previous insult.^[10] As Marjolin's ulcer is more aggressive than primary skin tumors and has more chance to metastasize, it is important to diagnose these ulcers at the early stages. The most common neoplasia arising from Marjolin's ulcer is Squamous cell carcinoma. Other malignancies such as basal cell carcinoma, melanoma, osteogenic sarcoma, fibrosarcoma, and liposarcoma are also on record.^[19]

In our study, we observed slight female predominance as female to male ratio was 1.7:1 (37.5% males and 62.5% females). A study done by Oruc M et al. also observed female preponderance.^[20] However, other studies done by Mousa AK et al., Challa VR et al, Yu N et al and Fahim EH et al observed male predominance.^[9,10,14,21]

In our study burn was the most common cause of non-healing ulcers (7 cases out of 8, 87.50%). This finding was comparable to observation in studies done by Chayla P et al., and Abdi MA et al.^[19,22]

In the current study, the upper limb was predominantly affected by causative injuries (50%). However, Mousa AK et al., Fahim EH et al., and Abdi MA et al., in their study noticed that the lower limb was more involved than other parts of the body.^[9,21,22]

In the present study, the latent period between the original injury and development of Marjolin's ulcer ranged from a minimum of 2 years to a maximum of

50 years with a mean of 26 years and that of transformation of ulcer to malignancy ranged from 2 months to 3 years with mean of 1.6 years.

Also, in our study, younger patients i.e. 28 years and 32 years old had lesser latency periods (9 years each) while patients aged 75 years, 78 years and 81 years had longer latency periods as 29 years, 26 years and 50 years respectively. However, according to Hill BB et al., as the patient was younger at the time of injury, the latency period is longer for transformation into malignancy.^[17,23]

We observed squamous cell carcinoma predominantly (75%) was of moderately differentiated squamous cell carcinoma (Grade 2). This finding was comparable to a study by Chayla P et al.^[19] A study done by Abdi MA et al., observed that 92% of the lesions were SCC and predominant SCC were well differentiated (64%).^[22] A better prognosis is observed in well-differentiated lesions because of their less aggressive nature.^[17]

In our study 4 out of 8 (50%) patients showed lymph node metastasis. A study done by Mousa AK et al. observed lymphatic invasion was more common than venous metastasis.^[9] Generally after the development of Marjolin's ulcer, it does not easily spread for a considerable duration. The lymphatic system is the predominant way of metastasis.^[24]

We observed metastasis to the liver in one patient (12.5%), bone in one patient (12.5%) and brain (12.5%). A study done by Chayla P et al., observed metastasis to the liver, bone and brain in 5(33.3%), 2 (13.3%) and 2 (13.3%) patients.^[19]

In the current study, we observed 2 cases of well-differentiated squamous cell carcinoma with no evidence of recurrence or metastasis (the first case

for 4 years and six months while the second case for 2 years of follow-up.)

The location of the tumor is predictive of metastasis and is most likely to metastasize to the lower extremities followed by the trunk, scalp, face, neck, and upper extremities.^[16]

In our study primary treatment given was surgical intervention such as wide local excision together with skin grafting (6 patients out of 8 patients i.e.75%). This is comparable to a study done by Chayla P et al (80.8%)¹⁹. A study by Fahim EH et al showed the most common surgical intervention as Split-thickness skin grafting (80%).^[21]

In our study, 2 cases underwent amputation (25%) and in a study done by Chalya P et al amputation was done in 11.5% of cases.^[19]

The treatment of Marjolin's ulcers is multifaceted. Methods of treatment of Marjolin's ulcers include wide local excision with skin grafting, block dissection of the regional nodes, amputation in advanced lesions of extremities, radiotherapy and chemotherapy given either as neo or adjuvant therapy. Wide local excision together with skin grafting is usually regarded as appropriate in the treatment of Marjolin's ulcers. Adequate surgical resection is most important to avoid local relapse and a margin of 2-5 cm has been recommended. The patient's age, size, grade and stage of the tumor, spread to distant organs adequacy of surgery and presence of local relapse are the predictive factors for the outcome of Marjolin's ulcers.^[19]

A study by Xiang F et al studied 140 cases of Marjolin's ulcer from Jan 2013 - Dec 2017 and out of these 123 cases transformed into squamous cell carcinoma. All these cases were from the Institute of Burn Research.^[24] [Table 5]

Table 5: Prevalence of Marjolin's ulcer in various studies

Sr. no	Authors	Study duration	Total cases	Total no. of patients with SCC	Most common initial insult	Common site affected
1	Mousa et al. ⁹	2013 - 2020	19	18	Burn	Lower limb
2	Challa VR et al. ¹⁰	Jan 2002-Dec 2012	14	14	Burn	Lower limb
3	Yu N et al. ¹⁴	June 2005 -Dec 2011	17	17	Burn	Lower limb and Scalp
4	Tobin C et al. ¹⁶	Not mentioned (over 15 years)	6	6	Burn	Lower extremity
5	Chayla P et al. ¹⁹	Jan 2001 - Dec 2010	56	51	Burn	Lower limb
6	Oruç Met et al. ²⁰	Jan 2000 - Mar 2015.	63	56	Burn	Lower-limb (foot)
7	Fahim EH et al. ²¹	May 2015 -Oct 2016	30	19	Burn	Lower limb
8	Bauk VO et al. ²⁵	1990 - 2003	12	12	Burn	Lower limb
9	In current study	Jan 2018-Dec 2023	8	8	Burn	Upper limb

CONCLUSION

We observed burn was the most common risk factor for the development of Marjolin's ulcer. The latent period between the original injury and development of Marjolin's ulcer ranged from a minimum of 2 years to a maximum of 50 years with a mean of 26 years and that of transformation of ulcer to malignancy ranged from 2 months to 3 years with a mean of 1.6 years.

Inadequate early wound care, and healing wounds by secondary intention can lead to malignant degeneration in both burn scars and other traumatic wounds.

Early and definitive wound management with skin grafting can prevent this wound transformation to Marjolin's ulcer and then further into squamous cell carcinoma.

Limitation of the study: It was a single-centre study.

Conflict: There is no conflict of interest.

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