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Unstable scar as a chronic wound and the possibility of Marjolin ulcer onset

Nestabilna brazgotina kot kronična rana in možnost nastanka Marjolinovega ulkusa

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Abstract

Marjolin ulcer is a rare, highly aggressive type of squamous cell carcinoma. It emerges from chronic wound after a burn. Our goal was to point out the danger of malignant transformation of an unstable scar as a chronic wound (Marjolin ulcer) and possible options of treatment in our hospital and other hospitals in the world. At the University Medical Centre Ljubljana, Clinical Department of Plastic, Reconstructive, Aesthetic Surgery and Burns in the last 13 years we operated on 5 patients due to an unstable burn scar manifested as a chronic wound. We reviewed English literature on the topic of ulceration of the unstable chronic scar.

Marjolin ulcer is a preventable epithelioma alteration. Every large wound that is left for secondary healing has a potential to develop into a chronic wound that can ulcerate and change into a malignant lesion. This is most often seen in burns and scars. If chronic wound has developed, biopsy and treatment are needed. Treatment was most effective when done as soon as possible and when there was no malignant alteration of the wound.

Izvleček

Marjolinov ulkus (MU) je redka, vendar izjemno agresivna oblika ulcerativnega ploščatoceličnega karcinoma, ki nastane iz kronične rane, najpogosteje po opeklinski poškodbi. Naš cilj je opozoriti na nevarnost maligne preobrazbe nestabilne brazgotine kot kronične rane (nastanek Marjolinovega ulkusa) ter možnosti njenega zdravljenja pri nas ter drugod po svetu. V Univerzitetnem kliničnem centru Ljubljana na Kliničnem oddelku za plastično, rekonstrukcijsko, estetsko kirurgijo in opekline smo v obdobju zadnjih 13 let obravnavali 5 bolnikov, operiranih zaradi nestabilne brazgotine, ki se je izkazovala kot kronična rana. Za potrebe članka smo opravili pregled angleške literature na temo ulceracije nestabilne opeklinske brazgotine.

Marjolinov ulkus je epiteliomska sprememba, ki jo je možno preprečiti. Vsaka večja rana, ki se prepusti sekundarnemu celjenju, ima potencial za razvoj v kronično rano, ki lahko ulcerira in vodi v maligno spremembo. Še posebej moramo biti pozorni pri opeklinskih ranah ter brazgotinah. Če se pojavi kronična rana, je potrebna biopsija in kasnejše zdravljenje. Uspešnost zdravljenja je bila največja, kadar se je rana obravnavala, še preden se je preobrazila.

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1 Introduction

Marjolin ulcer (MU) is a rare, highly aggressive type of squamous cell carcinoma (1,2), most often occurring at locations of chronic irritation and scarring (3). It was first described by the French surgeon Jean Nicholas Marjolin in 1828 (3). It is a malignant transformation, occurring on scarred tissue or chronically inflamed skin tumours (4). It is most often related to a burn scar, from which 2% of all squamous cell carcinoma grow (1). It has also been described as occurring with other types of chronic wounds, such as bed sores, trauma wounds, osteomyelitis and other (3). Generally, the malignant transformation of a burn scar most often occurs on the lower limbs (3,5,6), especially in joints – knees, elbows, hips or broader in the groin (5,7), less often on the head or the neck (6). The main histological type of MU is the squamous cell carcinoma (8), with the basal cell carcinoma and melanoma also registering frequently (4,9). The exact mechanism of how the malignant transformation is formed is not known (9). Main risk factors for the developing the carcinoma are: prolonged healing of a burn wound, wounds that are not healing, unstable, ulcerating scars, and recurring injuries (1,10). MU most often arises from unstable deep wound scars (unstable scars generally manifest with poor healing and by forming granulation tissue that is quick to bleed (3)), and which were left to heal by secondary intention (11).

MU is divided into 2 types, depending on the interval from the burn to the occurrence of the transformation: acute, which occurs within one year, and is more frequent in superficial burns (10), and chronic, which occurs after more than 1 year (1,8). We mostly deal with the chronic type, which occurs 20–40 years after the burn (12). The latent period until the onset of the transformation depends on the age at which the burn injury occurred. A lower age means that the time to the malignant transformation will be longer (10). MU signs and symptoms include changes to the scarring, visible tissue hyperplasia, skin ulcers and moribund bleeding (9), and a sudden onset of pain (12). When the scalp is affected, it can also result in damage to the bone (8).

Clinically, MU is divided into two major morphological groups: flat, indurated, ulcerated variety, which is more frequent, and the exophytic, i.e. papillary variety. Typically, the edge of the ulcerated lesion is everted, and the floor has poor granulation tissue (10).

The most important diagnostic approach is a biopsy of the wound, which must include tissue from the centre and at the edges (7).

MU has a high indication of recurrence at the same location, as well as metastases elsewhere (brains, lungs, liver, kidneys, lymph nodes (4)), which spread through the lymph system. The best indicator is the histology stadium: grade I (well defined) has a lower probability of metastatic spread, while with grade II (medium defined) and III (poorly defined) the probability is much higher (12). A higher histology stadium, the location of the tumour on a lower limb, a diameter above 10 cm, and alterations to local lymph nodes at diagnosis point to a poor prognosis (5).

Therapy of choice is a wide local excision, followed by wound covering with skin grafts or flaps (6). When the carcinoma spreads to the bone or the joint, amputation is needed (9).

2 Discussion

At the Clinical Department of Plastic, Reconstructive and Aesthetic Surgery of the University Medical Centre Ljubljana, we treated 5 patients with an unstable scar in the past 13 years, which was in most cases the result of a burn injury, and had manifested as a chronic lesion. We have collected the patient data into tables. We conducted a review of English-language

Figure 1: Patient with a basal cell carcinoma on the head after being burned, manifested as MU (Archives of the Clinical Department of Plastic, Reconstructive, Aesthetic Surgery and Burns, the University Medical Centre (UMC) Ljubljana).

literature available from the PubMed and Ovid databases on ulceration of unstable burn scarring (MU) and its treatment.

Four patients had a chronic wound with an inflamed component, while one patient showed clinical signs of malignant ulceration (Figure 1). With 2 patients, biopsy samples were taken for further diagnostics. With each patient an anamnesis was taken, along with a status with an examination of local lymph nodes and medical imaging. One patient was transferred to the Institute of Oncology by the epithelial multidisciplinary team for potential radiation therapy. One patient received a skin graft surgery, one a local skin flap surgery, and one a multiple Z-plasty surgery, while the final two patients were operated on using microsurgical reconstruction. 10 years after the surgery at the same location, the patient with a basal cell carcinoma developed a chronic, ulcerated, exacerbated, superficial and deep nodular dermatitis, which was registered with a histopathological examination. Consequently, we performed another microsurgical reconstruction. The therapy is shown in Table 1.

We most often decide for a wide local excision and a histological examination. We follow the principle of the plastic surgery soft-tissue reconstruction scale, so the method of choice is to cover with a skin graft. For improved quality of the graft we generally opt to use a dermal substitute (maltiderm, integra), which is grown in and then covered with a skin graft. This type of reconstruction provides better and higher-quality results. Using local flaps is also an option, if adjacent skin is undamaged, or if it is even plausible, considering the location of the chronic lesion. One of the options is also stretching the skin in order to obtain a skin cover, if the adjacent skin is flawless, not infected and scarred. In exceptional cases we can also use a free flap; however, all microsurgical indications and requirements must be met.

As additional therapy we can in exceptional cases also utilize a hyperbaric chamber or instal a negative pressure wound therapy system. The final option for therapy, when we cannot provide a sufficient safety edge, is amputation.

A chronic wound following a burn injury (Figure 2) may, when not treated properly and left to healing by secondary intention, transform into a malignant tumour. The longer the ulceration is present, the higher the probability for cell dysplasia (2). This is a transformation of epithelioma that takes place at the location of a burn scar, most likely from chronic irritation.

Squamous-cell carcinoma, developing at the location of a chronic wound, is much more aggressive and metastases faster than a primary skin tumour; a fast and exact diagnosis, followed by therapy, is therefore essential (2,3). Diagnosis must certainly include a biopsy of the wound and a histological examination, as well as an examination of local lymph nodes. The literature otherwise agrees that a biopsy must be conducted on all suspicious changes that do not heal within 3 months (2). We decide on the therapy after considering the histological results and the size and location of the lesion.

A wide excision (2 cm at least) for le-

Figure 2: Patient with a chronic wound as an unstable scar in the knee area after burn injury (Archives of the Clinical Department of Plastic, Reconstructive, Aesthetic Surgery and Burns, UMC Ljubljana).

sions where lymph nodes are not affected, and there are no remote metastases, is sufficient (1). When the lesion also includes bones or joints, the limb must be amputated (4). Ogawa et al. recommend amputation in grade II or III lesions and wide local excision for very small or grade I lesions (4). Amputation with grade II and III lesions is also recommended by Lifeso and Bull (12). According to the literature, wounds above the joints are generally first covered by full-thickness skin grafts, which are 1 year later corrected with a free flap (5). Elsewhere, split-thickness skin grafts or free flaps are generally used (4). Microsurgical procedures and free flaps are most often used as the primary choice to cover the site, if it is large after the lesion excision (11).

When lymph nodes are affected, or when remote metastases are detected, this requires a wide excision, removal of the lymph nodes, radiation therapy and chemotherapy (5).

Literature is divided on lymph node removal. Novick et al. believe that prophylactic lymph node removal is required with all MU of lower limbs (8), while others find that lymph node removal should be decided after reviewing the histology results (12).

One of the options is also radiation therapy. According to Ozek et al., exclusive radiation therapy is suitable with inoperable metastases in lymph nodes, with a tumour of diameter above 10 cm, and lesioned lymph nodes, with grade III after removing the metastasis in lymph nodes, with grade III and a diameter above 10 cm, and when the malignant lesion is on the head or the neck and the lymph nodes were already removed (8). Esther et al. recommend prophylactic radiation therapy of the lymph nodes at the location of the malignant lesion (12).

The early stages of the disease especially require a fast and decisive treatment (surgical therapy), if we want to achieve a high percentage of success (13). Literature is not in agreement about recommended approaches for the best results with advanced disease (5,13). The fact remains that most people with an advanced disease (tumour diameter above 10 cm) die even with combined therapy (excision, lymph node removal, radiation therapy and chemotherapy), as Eser et al. have established (13). This means that combined therapy is only successful in early stages of the disease (5).

When focusing on our results, we can see that despite the sample being small, the most important factor is fast diagnostics and early surgical therapy. The patients we diagnosed at the right moment, when the wound had not yet malignantly transformed, and on whom we only conducted a surgical excision, showed the best results. The most important factor in preventing a malignant transformation

is to cover every deep burn with grafts or flaps as soon as possible, and not to leave it to heal by secondary intention (8).

3 Conclusion

MU is an epithelioma lesion that can be prevented. In this case, the most important role is played by proper wound care. Every major wound left to healing by secondary intention has the potential to develop into a chronic wound, which can ulcerate and lead to a malignant lesion. We must be especially careful with burn wounds and scarring that are subject to chronic irritation. If a chronic wound develops, regular controls with a specialist are needed, as well as a potential biopsy. We decide on the therapy after considering the histological results and the size and location of the lesion, and the therapy must be completed quickly and decisively. The success rate of the therapy in Slovenia and abroad was the highest when the wound was not yet malignantly transformed. The lesions diagnosed at a later time have a much worse result of therapy. There is no clear indication which type of operation we have to choose, and what additional conservative therapy is best.

The patients have agreed to the publication of this article.

Table 1: Skin changes in different patients, their type of surgery and surgical outcome.

How major is the skin lesion and its location	Operation type	Therapy result
Unstable scarring (hypocellular scarring – sample obtained with biopsy) in the area of the popliteal region after a burn injury	excision, multiple Z-plasty	primary healing
Chronic ulcer with accompanying secondary vasculitis and hypertrophic scarring in the popliteal region after recurring needle injuries	excision, skin xenograft, skin graft, using a negative pressure system for improved growth	primary graft growth
Basal cell carcinoma on the head temporally left after a burn injury	excision, microsurgical flap	primary growth of the flap, radiation therapy, relapse, repeated microsurgical flap
Extensive chronic ulceration with fibrinous exudate to the right in the region of olecranon region, condition after mental implant with chronic rheumatism	excision, local remote axial flap	primary growth
Infected chronic wound (sample, obtained from biopsy) in the left carpal region after burn injury	excision, free microsurgical flap	primary flap growth

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