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## **Mycobacterium ulcerans skin ulcers: review of surgical management**

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**Abstract** *Mycobacterium ulcerans* infection causes debilitating ulceration of the skin and subcutaneous tissue. Until 1993, this infection was not a major health problem in Ghana. In 1993, there was a major outbreak in the Ashanti Region of Ghana, in the Amansie West District in the village communities of Tontonkrom [1, 2]. Unfortunately, pharmacological treatment of this disease is not effective. Traditional methods of wound care such as the use of Eusol or Acriflavine lotion do not promote healing. Surgical management involves radical excision of the ulcer with meticulous haemostasis and coverage with a split-thickness skin graft (STSG) or local skin subcutaneous flap. Successful covering of the ulcers, proper splinting and physiotherapeutic exercises in the affected limbs prevented the contracture deformities other associated with the disease. This report reviews the management of 240 patients surgically treated at the Komfo Anokye Teaching Hospital (KATH) and at two nearby hospitals from 1994 to 1997 with a 2- to 5-year follow-up.

**Keywords** *Mycobacterium ulcerans* skin ulcer · Buruli ulcer · Radical excision · Skin grafting

### **Introduction**

*Mycobacterium ulcerans* belongs to the same group of micro-organisms that cause tuberculosis and leprosy. Historically, the disease has several names, including Buruli ulcer, Bairnsdale ulcer and Kumusi ulcer. The first two names are now commonly used. The disease was first described in the Bairnsdale District of Victoria, Australia in 1948 and in the Buruli county in Uganda in East Africa in 1953 [3, 5]. There is a possibility of ambiguity of these geographical names, so it is better to refer

to the disease as *Mycobacterium ulcerans* skin ulcer (MUSU). This disease has been noted to be common in many tropical and subtropical regions, especially in river or swampy areas where the water is stagnant or slow flowing [3, 4, 5].

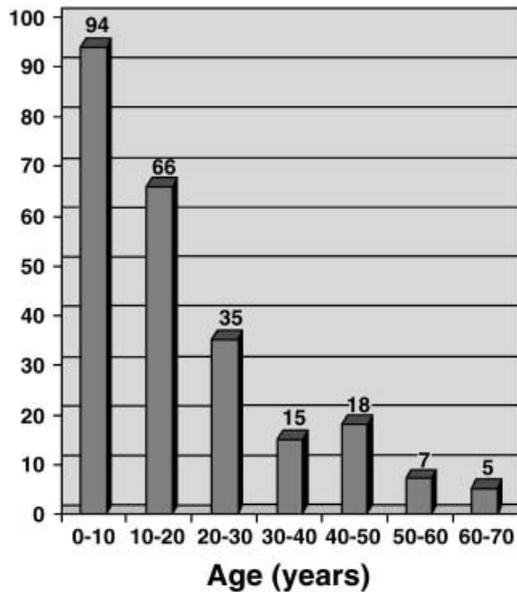
### **Material and methods**

From 1994 to 1997, 240 MUSU patients were surgically treated at KATH and two nearby hospitals. All cases were clinically diagnosed (Fig. 1): chronicity of wound, characteristic undermined edges, necrotic slough, surrounding inflammation and induration, failure to respond to traditional wound dressings and antibiotic therapy. On the basis of analysis of the information provided by the patients or their accompanying relatives, half the number (i.e. 120) in the series were treated with anti-tuberculous chemotherapy but

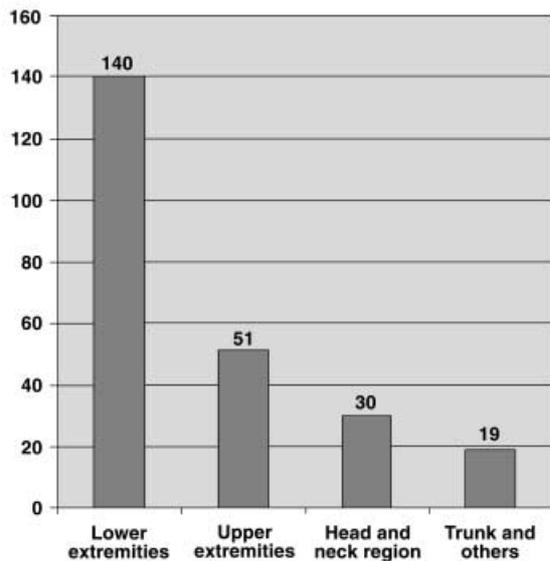


**Fig. 1** Classic *Mycobacterium ulcerans* skin ulcers (MUSU)

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**Fig. 2** Age distribution of 240 *Mycobacterium ulcerans* skin ulcer (MUSU) patients



**Fig. 3** Anatomic site of *Mycobacterium ulcerans* skin ulcers (MUSU; n=240)

without success. A positive Ziehl-Neelsen stain for acid-fast bacilli was obtained in two thirds of the patients (i.e. 160); the rest (80 patients) had negative results. An incisional or excisional biopsy for histopathology in all the 240 patients confirmed the clinical diagnosis. Wound swabs were taken for culture and sensitivity tests in all patients; they all showed secondary bacterial infections, which were treated with the relevant antibiotics.

The surgical procedures carried out in the patients included:

1. Wide excision of the ulcers where applicable
2. Sharp débridement of overgranulated ulcers
3. Complete haemostasis
4. Split-thickness skin grafting (STSG)
5. Local transposition of skin for subcutaneous flap cover in some cases



**Fig. 4** Six weeks after excision and split-thickness skin graft (STSG) of a *Mycobacterium ulcerans* skin ulcer (MUSU) on the right upper extremity



**Fig. 5** *Mycobacterium ulcerans* skin ulcer (MUSU) on the left upper extremity treated by split-thickness skin graft (STSG)

In patients in whom optimum haemostasis could not be achieved, skin grafting was delayed for about 48 h. Both recipient and donor sites were dressed with Sofratulle gauze dressings. The recipient site dressings were changed on the fourth or fifth postoperative day, while the donor sites were changed at about the 14th day.

## Results

Of the 240 patients treated, 144 (60%) were children (0–14 years). The general sex distribution was also significant: 70% males and 30% females. Figure 2 shows that 67% of patients were of school age (5–20 years) in



**Fig. 6** Result of split-thickness skin graft (STSG) after 13 months in a 20-year-old woman



**Fig. 7** Results 1 year after a *Mycobacterium ulcerans* skin ulcer (MUSU) in a 42-year-old woman on the right lower extremity was radically excised and covered with split-thickness skin. The patient still has a mild knee joint contracture

the endemic village communities. Figure 3 shows the anatomic sites of the ulcers; 58% were located on the lower extremities. Representative cases are shown in Figs. 4, 5, 6, 7 and 8. Before grafting was performed, repeated excision or débridement of the ulcers was



**Fig. 8** Results 15 months after excision and split-thickness skin graft (STSG) of an extensive *Mycobacterium ulcerans* skin ulcer (MUSU)

required in 10% ( $n=24$ ). Once the ulcers were clean and grafting or flap coverage had been performed, primary healing was noted in 90% ( $n=216$ ) of the grafts; only 34 of them needed secondary grafting, due mainly to bacterial infection or simply mechanical (iatrogenic) errors during dressing. There were no flap failures. Striking cases among those who had flap cover were lesions on the left lower eyelid ( $n=6$ , 2.5%). After its excision, the defect was covered with an Indian forehead flap. Its pedicle was divided after 3 weeks. The patients generally remained in hospital for 2 weeks after the last operation.

Two patients with lesions of the face and around the eyes came for long periods of follow-up (33 months). These were necessary because the lesion extended into the right eye in both patients, causing blindness. One eventually required enucleation of the affected eye.

The follow-up period for half of the patients mainly involved physiotherapy to improve function of their affected extremities. After 1 year, two patients developed minor ulcers on the right leg distal to the previously surgically treated lesions. It was difficult to decide whether to classify them as recurrences of the initial lesions or as totally new lesions.

## Discussion

Non-surgical treatment of MUSU, such as daily wound dressings and anti-tuberculous chemotherapy, has not been effective. Wound dressings with acetic acid 2% lotion cleansed wounds faster because acetic acid kills *Pseudomonas* infection, a common secondary infection of most hospital wounds (nosocomial infections). None of the ulcers in this group healed with traditional methods of wound dressing, which is why they were managed operatively. At present, operative treatment seems to be the best option for managing these ulcers. Nevertheless, this method can be cumbersome in some cases, as demonstrated by some partial graft failure. After discharge,

the patients were followed up over long periods to determine whether there were recurrences or new lesions developed.

A protocol for the management of MUSU may help in the endemic areas. Instead of several months (or even years) of traditional wound dressings, which lead to little or no improvement, provisions should be made for their early surgical management. It will therefore be necessary to train district hospital doctors to perform débridement and/or tangential excisions of the ulcers and STSG. Similarly, the district hospital doctors should be taught to carry out simple excision of the Buruli ulcer nodules. Excision of nodules with primary closure and excision and grafting of small ulcers would play an important role in preventing the otherwise large ulcers which were seen in the majority of this series of 240 patients.

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### Conclusion

Surgical treatment of MUSU is the preferred form of treatment, with radical excision of the ulcer followed by STSG or subcutaneous flap coverage of the wound using local skin.

The patients stay in hospital for about 2 weeks after the final operation. This reduces the cost of hospitalization.

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