

## Case Report

# A Case of Skin Ulcer in Severe Acute Malnutrition Treated with Hyperoil®

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## Background

Malnutrition is complex condition which has social repercussions and is associated with medical disorders [1].

In Sub-Saharan Africa, malnutrition is a relevant emergency, directly or indirectly responsible for 35% of child mortality [2].

According to the World Health Organization (WHO) standards, SAM in 6-60 months old infants and children is defined by a very low weight for height (below -3z scores of the median WHO growth standards), by visible severe wasting (Mid-Upper Arm Circumference (MUAC) less than 115 mm), or by the presence of nutritional edema (clinical sign). These standards are appropriate for infants and children of different ethnic groups.

SAM is characterized by edema, irritability, anorexia, ulcerating dermatoses, and an enlarged liver with fatty infiltrates. Sufficient calorie intake, but with insufficient protein consumption, distinguishes it from Moderate Acute Malnutrition (MAM, below -2z scores of the median WHO growth standards). MAM rapidly improves, whereas children affected by SAM are apathetic, with swollen abdomen, and have a poorly responsive immune system [1].

Generally, SAM can be treated by adding protein to the diet; however, it can have a long-term impact on a children's physical and mental development and they can fall victim to untreatable infections and that, in severe cases, might lead to mortality. In fact, two types of Protein-Energy Malnutrition (PEM) have been described: kwashiorkor and marasmus. Kwashiorkor occurs with fair or adequate calorie intake but inadequate protein intake, whereas marasmus occurs when the diet is inadequate in both calorie and protein intakes [3].

Children having SAM or MAM, defined according with WHO standards, are followed and treated at the Nutritional Recovery Centre

## Abstract

A 3 years old baby with complicated SAM and extended exudating, smelling, advanced and infected lesions on both lower legs has been treated with Hyperoil Mgel gauzes at NRC. Surprisingly, in few days her trophic lesions recovered avoiding keloids and cutaneous discoloration.

**Keywords:** Severe acute malnutrition; Edema; Kwashiorkor; Skin ulcer; Child; Hyperoil®

(NRC) run by the P.M.I. "Filles de St. Camille" in Zinviè (Benin) and supported by Helios Med and InterMed in educating and treating malnutrition, in order to reduce its their impact on child mortality.

The staff of Helios Med and InterMed, two Italian non-profit international health organizations, uses to go periodically to Zinviè where they built up a wound care centre and in their short missions train local health care providers working there. Training includes the preparation of ozonated water by bubbling O<sub>2</sub>-O<sub>3</sub> in a 2,000 ml glass bottle for five minutes at the concentration of 30 µg/ml to clean ulcer bed and perilesional area; antiseptic treatment of the wounds with ozone therapy, being the standard protocol applied for the treatment of Buruli Ulcer [4]. Since 2013 they introduced an alternative wound local treatment, already used in 2012 in the Democratic Republic of Congo to treat the Buruli Ulcer [5,6], named Hyperoil®, a hypericum flowers (*Hypericum perforatum*) extract in neem oil (*Azadirachta indica*) produced by RIMOS srl Mirandola (MO) - Italy: it was the only available antiseptic. It was available in oily, gel and medicated gauzes formulation (Medical Device Class IIB CE0476), and it has already been used in complicated diabetic foot ulcers [7].

## Case Presentation

18 months old female with complicated SAM (WHO Z-score < -3), attended the NRC. The local assistant (Sister Emilienne) rated her overall clinical status as a very critical, with high death risk because of extended, exudating, smelling, advanced (2 months) edema and infected lesions on both lower legs.

To contrast F's severe conditions, the standard hyperproteic feeding treatment (multivitamin, nistatine, amoxicilline) as promoted by the WHO guidelines [8] was immediately started leading to the clinical recovery of F in 4 weeks.

Lower legs lesions were cleaned with ozonated water [9,10] by Sister Emilienne and treated with Hyperoil® medicated gauzes, kindly



**Figure 1:** Before the first application of Hyperoil® medicated gauze. Wounds in the legs have edema, exudate secretion and perilesional skin inflammation. The wound in the left leg has fibrin. The wound in the right leg has extended skin discoloration.

donated by Helios Med Onlus.

Sister Emilienne observed an unexpected improvement of lesions (Figure 1) 2 days after the first dressing. More in detail, she reported reduced fibrin (Figure 2A), edema, inflammation and exudate secretion, perilesional skin recovery (Figure 2B), smell disappearance and cleaned wound bed.

The child continuously improved her general health status during the first week she underwent the best clinical treatment as well as the lower legs lesions. She reached the complete wounds recovery in 3 weeks, without any local skin discoloration.

Sister Emilienne, having a vast experience in children with SAM, was really surprised of this outcome because of the critical health conditions of the patient.

## Management

The lower limb ulcer bed cleansed with ozonated water, the ulcers were treated with Hyperoil® medicated gauzes applied (Figure 1) every day for the first week and every three days until complete healing. The change of the dressing was atraumatic.

The perilesional area was carefully cleaned with normal Ringer solution and gauze with a few drops of Hyperoil® oil. The ulcer bed and edges were cleaned from exudates and fibrin residuals as well as the necrotic materials were removed with a gauze soaked with Hyperoil® oil.

In addition, to avoid infection, the ulcers were covered with gauze bandage to protect the ulcer from dust and dirt and to maintain the dressing in the appropriate zone.

Surprisingly, 2 days after the first application with Hyperoil® medicated gauzes, ulcer bed, edges, skin hypochromia were reduced with improvement of surrounding skin trophism (Figure 2B). Also the wound bed in the left leg showed an improvement in the same time with a reduction of fibrin (Figure 2A).

The ulcers were completely cleaned after the first week of therapy showing a partial re-epithelialization in two weeks without secondary infection, and the complete healing in three weeks in both legs.



**Figure 2:** Two days after the first application of Hyperoil® medicated gauze. The wounds in the legs show reduced edema, inflammation and exudate secretion. A. The wound in the left leg has a cleaned bed with almost complete fibrin disappearance. B. The wound in the right leg has improved the wound bed and perilesional skin with recovery local skin coloration.

## Discussion

Hyperoil® medicated gauzes proved to be a new therapeutic approach for the local treatment of ulcers in children with severe malnutrition, especially in areas with limited resources. Indeed, mother's residential and household feeding characteristics appear to influence children's nutritional status. In Benin, in fact, acute malnutrition remains an important killer of children under five years of age. The under-5 mortality rate was around 90 deaths per 1,000 live births in 2012 while the infant mortality rate was 59 [11]. However, Benin still has a long way to go to achieve the Millennium Development Goal of eradicating extreme poverty and hunger.

FAOSTAT [12] highlighted a decreasing percentage of children under 5 years of age who are underweight moving from 26.8% in 1996 to 18.0% in 2014. Also the prevalence of undernourishment (3 years average) declined from around 28.0% in the mid-90s to less than 10.0% in 2013. More in detail, at the time of this case report, the underweight prevalence in children under 5 in rural areas was 22.5%, but the percentage of severe acute malnutrition in children under 5 was 7.5% [8]. In fact, malnourished children from 6 months up to 7 years attend the NRC because their mothers are not able to feed them, due to local food taboos and/or to a new pregnancy that made mothers stop breastfeeding.

In isolated areas like Wawata-Zounto, Sèdjè, Kpatchame that are the villages served by the NRC in Zinviè, blood and urine tests used to measure the patient's levels of vitamins, minerals, and waste products were not available and also clinical nutritionist or dietician were not there to confirm the presence of malnutrition. Thus, diagnosis had to be performed on Body Mass Index (BMI) according to WHO standards [1] and measuring the circumference of the upper arm.

Malnutrition has a skin manifestation as a consequence of kwashiorkor and marasmus.

Especially in the case of kwashiorkor, alimentation based on carbohydrates determines an increase in insulin production with a consequent reduction in protein synthesis. Previous studies [13] showed that in kwashiorkor collagen maturation is altered and that some amino acids in skin are lower than usual (in particular glycine). Cutaneous lesions in this condition begin with dark patches on

juncture surfaces especially on ankles, knees, elbows and wrists. Then, lesions become desquamating with skin loss and tend to spread also in other body areas [3]. In particular, the granulosum and spinosum layers are involved and characterized by strong atrophy.

Heliskov et al. suggested a classification for cutaneous changes in SAM [14]. They identified 5 signs (telogenic effluvium, pigmentary changes, ichthyosiform skin changes, lichenoid skin changes and various stages of bullae-erosions-desquamation) that can exist in both edematous and non edematous forms of SAM. These signs should be considered as a valid parameter to evaluate lesion severity and to choose the right medical approach.

Lesions usually recover after a correct diet assessment but they still represent a loss in skin barrier capacity, making infection easier to set in and retarding patient healing.

According to WHO indications, lesions have to be treated applying paraffin gauzes and antimycotic creams for almost two weeks and zinc or castor oil treatment after 1% potassium permanganate bath. To avoid skin and, consequently, systemic infection, lesions should be sterilized and patient needs to receive systemic antibiotic therapy [8].

Having a cheap and simple-to-be-transported therapeutic option as Hyperoil® to treat patients with ulcers due to SAM, could give to trained health care providers a new topical treatment. This approach to children with SAM ulcers, including nutritional education, could permit in allows SAM ulcers treatment and control.

## Conclusion

The surprising outcome observed in the treatment of lower legs lesions due to SAM with Hyperoil® suggests its use as a new possible local therapeutic option to reduce the risk of secondary infection due to ulcers and to avoid systemic antibiotic therapy.

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