

## EFFECTIVENESS OF BIO-CELLULOSE IN LYELL SYNDROME TREATMENT (Clinical case)

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### ABSTRACT

*The skin is the largest organ of the human body consisting of several layers possessing different properties and performing different physiological functions. The loss of skin integrity caused by a trauma or disease may provoke acute physiological and immune disorders that may even be fatal. Therefore, there are many benefits when choosing the right material, such as pain and patient discomfort reduction; reduce fluid loss through the wound; anti-infection; support of the epithelialization process, and reduces treatment costs.*

*In this report, we would like to introduce the effective treatment of Biocellulose biofilm through a severe Lyell syndrome patient.*

**Keywords:** Lyell, treatment

### 1. INTRODUCTION.

Lyell's syndrome or Toxic Epidermal Necrolysis (TEN) is a severe allergic reaction caused by an abnormal immune response of the body to some drugs or metabolites of medicine. Clinically characterized by extensive necrosis of epidermal cells, separate from the mesoderm, formation of multiple vesicles with lesions over 30% of body surface area. Lyell syndrome often causes many serious and life-threatening complications. The incidence of TEN is very low: 2/1 million person/year, however, the mortality rate is quite high, up to 30% - 40% [1].

The infection at the epidermal detachment area is the main cause of death for patients with Lyell's syndrome. Therefore, according to all recommendations in the world, patients with Lyell's syndrome must be treated in the intensive care units of Burn centers/hospitals and must be treated comprehensively, prevent systemic infections, remove allergens, and infusions according to the Parkland formula like the treatment for burn shock.

The wounds caused by Lyell's syndrome are recommended to be treated as burn wounds, include: clean the wound, covering the epidermal shedding area, preserve the remaining epidermis, and dressing changes

At ICU, a 22-year-old female patient got severe Lyell's syndrome with a lesion area of 95% of her body surface area. The patient was treated according to the recommended regimen. In particular, the

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Ngày nhận bài: 10/1/2023; Ngày nhận xét: 15/1/2023;

Ngày duyệt bài: 19/1/2023

<https://doi.org/10.54804/yhthvb.6.2022.187>

patient used *Biocellulose* biofilm to cover the wound with good effect. After 9 days of active treatment, she was discharged from the hospital and all his wounds healed

## 2. CASE REPORT

A 22-year-old female patient has had a fever for no reason since October 17, 2022. Her family bought antipyretics (Paracetamol), and antibiotics (Zinnat) drug and she took medicine at home without a doctor's direction. After 3 days, she began to have a high fever again, the highest temperature measured was 40°C, and taking antipyretics did not help. At the same time, there is congestion and a rash all over the body; then the formation of multiple vesicles, they broke, epidermal shedding, revealing red congestive background.

On October 23, 2022, she was taken to the ICU department at Le Huu Trac National Burns Hospital with fatigue, full-

body edema, high fever of 39.5 degrees Celsius, rapid breathing with frequency 25 times/minute, tachycardia with 112 times/minute and blood pressure: 120/68mmHg. Topical: 95% body surface area (except hairy skin), combined with oral and genital mucosal lesions. Epidermal shedding areas include legs, back and buttocks, revealing red congestive background. The wound exudes a lot of fluid, has a foul smell, and bleeds easily (Fig 1).

The patient's tests on admission showed many abnormalities: decreased WBC: 4.1 G/l, increase blood viscosity: Red blood cells: 5.95, hemoglobin: 153g/l, hematocrit 50%, decreased albumin: 30.4g/l, Glucose in the blood increased 14mmol/l, elevated liver enzymes: GOT 47.8U/l, GPT 51.2U/l, electrolyte disturbances (Na<sup>+</sup>: 127 mmol/l), metabolic acidosis BE -9mmol/l, HCO<sub>3</sub>-12mmol/l, high lactate: 4.3mmol/l.



**Fig 1. The patient's local lesion on admission**

The patient's blood was taken for a test to identify drugs that can be used therapeutically without causing an allergic reaction. The patient was actively treated with intravenous fluids, albumin infusion, sedation, systemic analgesia, strong antibiotics, broad spectrum (according to cytotoxic test results), and intravenous corticosteroids and maintained continuously with a dose of 2mg/kg. The patient was isolated and nursing care level I: 01 patient/01 room, control room temperature,

humidity, rotate, ulcer prevention. Active nutrition by the gastrointestinal tract and intravenous. In particular, the wound was cleaned immediately on admission, covered with *Biocellulose* biofilm, and changed every 2 days (Fig 2).

After 2 days, the patient's condition improved: no more fever, reduced edema, and congestion, breathing better, frequency 18-20 times/minute, pulse rate decreased 80-85 times/minute, normal blood pressure. The wound was changed for the second

time, the exudation was reduced, don't have any new epidermal shedding. Especially, the *Biocellulose* biofilm adheres tightly to the wound base, helping the wound to dry, clean, and reduce congestion; the patient feels comfortable, and pain relief and we can see the epithelialization below the biofilm. The dressing change is carried out simply by removing the old gauze and covering it with

clean dry gauze on the outside, covered with a bandage.

In the following days, the patient continued to change the dressing every 2 days and gradually removed the biofilm at the wound sites that had healed and then left open. And after 9 days, the lesion was completely healed, the patient's condition was stable, and the patient was discharged from the hospital (Fig 3).



**Fig 2. Dressing change with Biocellulose biofilm**



**Fig 3. Skin lesions were completely epithelial and healed after 9 days of treatment**

### 3. DISCUSSION

Lyell is a rare medical syndrome characterized by lesions of the skin and mucous caused by drug allergy or infection. Recent studies showed that Stevens-Johnson syndrome (SJS) and Lyell

syndrome (TEN) belong to the same disease, but differ in the extent of skin lesions and were classified [2]:

- Stevens-Johnson syndrome is a mild form of TEN with a lesion area < 10% of body surface area.

- Borderline syndrome between SJS and TEN: skin lesions from 10 - 30% of body surface area.

- Lyell's syndrome (TEN): Skin lesions >30% of body surface area.

Toxic Epidermal Necrolysis is a rare but severe form of hypersensitivity inflammatory reactions to multiple offending agents including drugs: antiepileptic drugs (Phenytoin, Phenobarbital), sulfonamide antibiotics, nonsteroidal anti-inflammatory drugs (paracetamol), anti-gout drugs (allopurinol) [3], [4].

The severity and mortality of patients with Lyell's syndrome were assessed using the SCORTEN scale base on factors such: Age, malignancy, heart rate, epidermal shedding area, blood urea, blood glucose, and blood bicarbonate. The higher the patient's SCORTEN score, the more severe the disease: 0 - 1 point the mortality rate is 3.2%; 2 points are 35.3%; 4 points are 58.3%, and from 5 points or more, the mortality rate is 90% [5]. Below is a table to evaluate the SCORTEN score of our patient.

Risk factors	Point		Patient
	0	1	
Age	< 40	> 40	0
Malignancy	No	Yes	0
Heart rate	< 120	> 120	1
Epidermal shedding area	< 10%	> 10%	1
Ure	< 10mmol/l	> 10mmol/l	1
Glucose	< 14mmol/l	> 14mmol/l	1
Bicarbonat	> 20mmol/l	< 20mmol/l	1
Total			5

The patient's SCORTEN score was equivalent to the most severe and has a mortality risk of over 90%.

Thus, the patient was admitted to the hospital in a very severe condition with a high risk of death. We have taken blood for cytotoxicity tests to quickly determine drugs that can be used for patients.

We immediately cleaned the wound and cover the epidermal shedding area with *Biocellulose* biofilm to help protect the wound, prevent infection, reduce fluid loss, relieve pain, and support the epithelialization. The use of advanced materials was very important in the treatment of skin lesions caused by Lyell's syndrome. Rajput R. (2015) used topical antibacterial drugs such as silver nitrate 0.5%, and chlorhexidine 0.05% for wound

dressing and therapeutic baths. The author also recommends using bio-skin to cover the epidermal shedding area [6].

Patients with severe Lyell syndrome were recommended to be treated in burn centers to prevent infection from the wound and change dressings according to the dressing change protocol for burn wounds. The selection of materials or temporary biofilms was very important because it is also the treatment according to the pathogenesis: pain relief decreased inflammatory response and decreased fluid loss through the wound. Using the right biofilms would contribute to accelerating wound epithelialization, reducing hospital stays, thereby reducing the risk of infection and reducing treatment costs for patients.

Madry R. et al (2011) used the Suprathel® application to cover patients

with Lyell's syndrome and found better pain relief, good anti-infection, and healing time after 21 days [7]. With *Biocellulose*, the effect was more than expected, after 9 days of treatment, the wound had epithelialized and completely healed.

For the prevention of systemic infections, we actively used a combination of strong, broad-spectrum antibiotic regimens to prevent infections for patients based on cytotoxicity test results: Meropenem 03g/day combined with Fosfomycin 08g/day.

The issue of using corticosteroids in the treatment of Lyell's syndrome was still controversial. According to some authors, corticosteroids could delay wound healing, increase the risk of infection, obscure the early signs of sepsis, and gastrointestinal bleeding, and increase mortality. If corticosteroids are used, it's should be initiated at an early stage and decreased the dose rapidly [8].

Our patient was admitted to the hospital on day 3, which is the early stage of the disease, so corticosteroids are indicated. The dose used in this case is 2mg/kg body weight. After 4 days, the patient's general condition improved, and the dose was adjusted to 1mg/kg body weight, on the 6th day it was 0.5mg/kg body weight and on the 7th day, the corticosteroids were stopped.

In addition, intravenous immunoglobulin is also recommended at a dose of 0.2 to 0.75g/kg. In the acute phase of Lyell's syndrome, some supportive measures can be applied such as dialysis, and plasma separation. However, our patient has no indications for dialysis or plasma separation. Therefore, we only increased the infusion to detox, changed the dressing, kept the wound clean, and covered the material to support epithelialization, the wound healed gradually, and the tests also returned to normal after the treatment

#### 4. CONCLUSION

- Lyell's syndrome is a severe allergic reaction, mainly caused by drugs.

- Timely assessment of the condition and stage of the disease to have an appropriate treatment strategy is very important.

- Patients with Lyell syndrome should be treated in burn centers and use biofilms to cover the wound, which has good analgesic, prevent infection, and accelerates the epithelialization

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