

Chemical Contact Burn With Ready-Mixed Concrete: A Case Report

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ABSTRACT

Chemical burns, and particularly alkali burns, constitute a very small fraction of burn unit admissions. It is generally unknown that ready-mixed concrete can cause chemical burns. However, prolonged contact with ready-mixed concrete may cause serious burns. Raising awareness of the need for taking necessary measures against burns from ready-mixed concrete among workers would be effective for the prevention of this type of burn. Here, we report a case of a full-thickness burn that occurred in a worker who was working unprotected with ready-mixed concrete.

KEY WORDS: *Full-thickness burn, Ready-mixed cement*

INTRODUCTION

Ready-mixed concrete is one of the main components used by the construction sector. Ready-mixed concrete causes an allergic reaction to the skin and may cause eczema.¹ Of note, it may also cause alkali burns due to substances added into its formula. There is not much awareness and experience among constructions workers, the general public, and health care professionals about the chemical contact burns caused by ready-mixed concrete. Here, we report a burn caused by ready-mixed concrete in a patient who was admitted to our burn unit (which has been in active service for 16 years). The patient had full-thickness contact burns that occurred while working with ready-mixed concrete. Our aim was to share our experience with this rare burn type with physicians working in burn units.

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ACKNOWLEDGEMENTS: The authors have not received any funding or grants in support of the presented research or for the preparation of this work and have no declarations of potential conflicts of interest.

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Burn Care and Prevention 2021/2: 75-77

CASE REPORT

A 48-year-old previously healthy man working as a construction worker had bought ready-mixed concrete for his household repair. While working, he had stepped on ready-mixed concrete to spread it with his boots on, and some amount of ready-mixed concrete had poured in his boots. The patient had not cared about it at the beginning; however, after he had felt increased heat in his feet, he removed his boots. While washing his feet with tap water, he noticed redness and itching on his feet. The next day, he presented to our hospital's burn unit due to darkening of the redness and new-onset pain. On physical examination, he had third-degree burns in a circular-pattern in both lower extremities below the knees involving the ankles; he also had similar burns affecting the dorsal aspect of both feet extending to the toes (Figure 1). The patient had no comorbidities in his medical history.

The patient was admitted to our burn intensive care unit (Ankara, Turkey) for treatment. His care including daily dressings and 2 debridement procedures. On day 10 after the burn incident, after granulation tissue was formed, the defects were closed with a split-thickness skin graft taken from the thigh region (Figure 1D). The patient was discharged uneventfully.

DISCUSSION

Although burns usually occur as a result of preventable causes in the household, there also exist some burn types that occur due to extremely rare causes.² Burns due to chemical causes are rare, and their treatments are less known. This reported case was our first ready-mixed concrete burn case treated at our burn unit.

We obtained information from ready-mixed concrete factories on the content of ready-mixed concrete packages and the necessary precautions; warning labels are imprinted on the ready-mixed concrete bags. The chemical content of a typical ready-mixed concrete bag used for construction work includes Portland ready-mixed concrete

FIGURE 1. Chemical Contact Burns With Ready-Mixed Concrete and Treatment**(A to C)** Burned areas of foot, ankle, and leg. **(D)** Burn wounds after graft procedure.

(clinker), chalk (limestone or CaCO_3), trass (SiO_2 , Al_2O_3 , and Fe_2O_3), and gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$). The ready-mixed concrete forms a basic solution (pH 11-14) upon contact with water. This solution has an irritant effect after contact with eyes and skin. The material is allergic and may lead to skin eczema due to its trace chromium (Cr-VI) content.

According to the manufacturers' statements, the main problem is that factories producing ready-mixed concrete add various chemicals into it to increase its liquidity, promote rapid freezing, and prevent it from being affected by cold. It is stated that addition of these chemicals may augment its effects on skin.

Contact burns created by ready-mixed concrete are characterized by allergic dermatitis as well as skin dehiscence involving the contact site, which are filled with ready-mixed concrete aggregates leading to alkali burns.^{3,4} Compared with acid burns, alkali burns form deeper, full-thickness burns that manifest later. Because patients do not initially have severe symptoms, they usually present to the hospital

later in the course. A contacted skin site produces pain, burning sensation, erythema, and vesicles. Full-thickness skin burns and necroses occur within the first 12 to 48 hours after contact.¹⁻⁴ Limestone (calcium oxide) found in the ready-mixed concrete passes through clothes when contacted and reacts with sweat on the skin, producing chemical alkali burn. Upon contact with ready-mixed concrete, users should remove all clothes immediately and wash themselves with plenty of water. The use of neutralizing agents is not recommended because these agents may react with chemicals in the ready-mixed concrete and worsen the lesions.¹⁻³ In our case, the patient had stated that he washed the contact site with tap water after contact with ready-mixed concrete.

Contact burns with ready-mixed concrete are usually seen in lower extremities, knees, hands, and fingers. The total burn area is usually not extensive, ranging from 5% to 15%.¹ In the present case, the patient had third-degree burns in both lower extremities, affecting a total area of 10%. As stated in the literature, excision and grafting are performed

in more than 75% of reported cases due to the full-thickness nature of ready-mixed concrete contact burns. The literature has also reported that, compared with other burn types, a need for a longer hospital stay and regrafting may appear in this type of burn.^{1,2} In our case, we similarly performed excision and grafting, and the patient did not need regrafting. More than half of individuals exposed to this type of burn have no knowledge of the ready-mixed concrete's burn risk and thus take no protective measures. The construction sector in Turkey is highly active. Therefore, it seems that ready-mixed concrete manufacturers should provide consumers with more clear precautions and information about the possible risks involved. We believe that the use of protective gears and taking necessary measures

can prevent such burns in both professional and nonprofessional users of these materials.

REFERENCES

1. Seyhan N, Keskin M, Savaci N. Contact with wet cement: an unrecognized cause of chemical burn. *Ulus Travma Acil Cerrahi Derg.* 2012;18(2):189-191. doi:10.5505/tjtes.2012.56254
2. Spoo J, Elsner P. Cement burns: a review 1960-2000. *Contact Dermatitis.* 2001;45(2):68-71. doi:10.1034/j.1600-0536.2001.0450020 68.x
3. Poupon M, Caye N, Duteille F, Pannier M. Cement burns: retrospective study of 18 cases and review of the literature. *Burns.* 2005;31(7):910-914. doi:10.1016/j.burns.2005.04.007
4. Catalano F, Mariano F, Maina G, Bianco C, Nuzzo J, Stella M. An unusual case of extensive self-inflicted cement burn. *Ann Burns Fire Disasters.* 2013 31;26(1):40-43.