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Burns 31 (2005) 910–914

BURNS

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Cement burns: Retrospective study of 18 cases and review of the literature

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Accepted 6 April 2005

Abstract

Subject: Cement is increasingly used in the construction industry, but the occurrence of cement burns is rarely reported. This retrospective study concerns patients treated for cement burns in our unit between 1997 and 2002.
Materials and methods: Eighteen patients 18–64 years of age, treated previously in our unit for cement burns, were interviewed by telephone for evaluation.
Results: The mean time since treatment was 39 months. Burns were predominantly seen on the lower limbs, and a third occurred during an accident on the job. All deep burns were excised, and 16 patients received grafts. Mean hospital stay was 10 days, and mean sick leave 2 months. Our study indicated that all patients were poorly informed about cement-related risks.
Discussion: Surgical treatment of full-thickness cement burns at diagnosis enables rapid healing with a minimum of sequelae and reduces the high socioeconomic costs resulting from these lesions.
Conclusion: This study indicates once again the need to improve preventive measures; which are very often inadequate because of lack of awareness of risks.

Keywords: Burns; Cement; Skin graft; Preventive measures

1. Introduction

Cement is increasingly used as a building material in the construction industry and do-it-yourself work [1–3]. Cement handling has been found to be responsible for many cases of occupational dermatitis, but cement burns have rarely been reported. However, the frequency and severity of burns are often underestimated despite the socioeconomic, occupational and personal costs involved [2–6]. The present study describes a series of 18 patients treated in our unit for cement burns between 1997 and 2002. The risks related to cement handling and the advantages of early surgical management of burns are considered, as well as the need for improving preventive measures, which are often inadequate because of lack of awareness of risks.

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0305-4179/$30.00
doi:10.1016/j.burns.2005.04.007

2. Cement burns

Cement, a solid material obtained by calcination, is composed of a mixture of silicates and calcium aluminates [6,7]. In wet working conditions, an aqueous residue of very basic lime hydrate forms on the surface and can cause burns and necrosis [3,8].

Cement burns are of three types [8–10]: chemically abrasive (the most common ones), heat-related, or blast-induced. The last two types, which can cause severe extensive burns and respiratory involvement, usually occur in industrial conditions through exposure of workers following the explosion of a kiln containing hot cement powder. These incidents are less frequent in developed countries because of better working conditions. Chemically abrasive burns result from three associated factors [6]: cement alkalinity in a wet environment, the abrasive nature of cement related to its particulate structure, and prolonged

contact time, which is the prime determinant lesion severity. Classically, these burns occur when the cement has been freshly poured and the worker remains kneeling or standing for a long time in the wet product [7].

3. Materials and methods

This retrospective study concerns patients treated in our unit for cement burns between 1997 and 2002. Eighteen exploitable cases were found by anlysis of computer data files: 16 men and 2 women (mean age 42 years, range 18–64).

Telephone interviews allowed us to fill out an information sheet concerning age, sex and occupation of the patient, circumstances of the accident, type of cement used, length of exposure, knowledge of risks, burn features, initial treatments, delay before medical and surgical management, number and type of procedures performed, and periods of hospital stay, healing, sick leave and follow-up, as well as possible occurrence of sequelae or residual problems.

4. Results (Table 1)

Mean time since the accident was 39 months (6 months to 5 years).

A third of the burns occurred during an accident on the job. In 16 cases (88.9%), burns were related to handling ready-mixed cement delivered directly to the customer by truck. In all cases, no information on cement-related risks was provided.

None of the patients knew that cement could cause burns, even though eight (44.4%) were working or had previously been working (two of the four retired persons) in an activity in which cement handling was possible. Only half of the patients were wearing protective gear at the time of the accident: boots (7 cases), knee pads (1 case), or gloves (2 cases).

The burns usually (13 cases) occurred when freshly poured cement was being spread by a kneeling worker wearing no waterproof protective gear (Fig. 1a and b). In the other cases, burns were related to cement falling into boots (4 cases) or infiltrating protective gloves (1 case).

Mean exposure time to cement was 2.5 h (15 min–8 h), and painful symptoms occurred only on the following day.

The burns concerned the knees in 13 cases (72.2%), the legs in 7 (38.9%), the feet or ankles in 3 (16.7%), and the wrist in 1 (5.6%) (Fig. 2). They were bilateral in 14 cases (77.8%).

The burns covered a mean area of 3% of total body surface (BSA), and were full-thickness in 17 cases and intermediary partial-thickness in 1 case.

The patients were seen in our unit after a mean delay of 1 week. All patients with full-thickness burns were then operated, with excision of necrotic tissues and implantation of a thin skin graft (TSG) (Figs. 1 and 3).

Three patients required two operations. Two experienced superinfection with partial lysis of the skin graft, and the third had a xenograft during the initial operation because of the poor quality of underlying tissues after excision to the fascia. In one case, graft success was optimized by application of a negative air pressure dressing, a Vacuum-Assisted Closure (VAC®).

Only the patient with 2% total BSA burns was not treated with surgery. These burns healed after 2 months when treated locally with Flammazine®.

Mean hospital stay was 10 days (1–28). Postoperative management (mean follow-up of 8 months) included nursing care until healing and prevention of any hypertrophic and contractile tendency of the burn scars by massages, physical therapy and continuous wearing of compressive clothing until healing was complete.

Table 1
Main published series of cement burn patients [3–6,8]

Series	Wilson and Davidson [6]	Feldberg et al. [5]	Boyce and Dickson [3]	Koch [8]	Spoo [4] (review of the literature)	Our serie
Study period	1981–89	1987–89	1978–95	1989–91	1960–97	1997–2002
Number of patients	16	20	20	7	47	18
Sex ratio (M/F) (%m)		19/1 (95%)	20/0	7/0	45/47(95.7%)	16/2 (88.9%)
Mean age (range)		29 (19–40)	28	48.5		42 (18–64)
Job related to cement use	87.5%	75%			53%	44.4% (8/18)
Burn site						
Knee	31.25%	25%	4.2%	85.7% (6)	43%	72.2% (13)
Legs		25%	4.2%		32%	38.9% (7)
Ankles/feet	62.5%	50%	87.4%	14.3% (1)	45%	16.7% (3)
Others	6.25% (forearm)				8%	5.6% (1) wrist
BSA (mean)		0.5–4% (2.3%)				1–7% (3%)
Operated patients	14 (87.5%)	15 (75%)	14 (58.3%)		25%	17 (94.4%)
Hospital stay (days)	13 (7–26)	15 (10–37)	12	36	21	10 (1–28)
Healing time			5.6 weeks		6 weeks	4 weeks (1–17)
Absence from work	8 weeks (4–16)		1.5 months (0.75–10)			8 weeks (2–30)