Murayama et al., J Clin Case Rep 2019, 9:2
DOI: 10.4172/2165-7920.10001216

Journal of Clinical Case Reports

Case Report Open Access

Cement Burn of the Skin During Total Hip Arthroplasty: A Case Series

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Abstract

Bone cement which can reach temperatures of >100°C, is commonly used to fix the femoral stem in total hip arthroplasty (THA). However, reports on skin burns due to bone cement are rare. The primary purpose of this article is to report these rare cases to prevent these complications. Two cases were simultaneous bilateral THA (case A and B) and two cases were unilateral THA (case C and D) are discussed in this case report. In these cases, the maximum thickness of excessive bone cement was >10 mm.

Keywords: Cement burn; Bone cement; Total hip arthroplasty; Case series

Introduction

Hip replacement is a surgical procedure in which the hip joint is replaced by a prosthetic implant, that is, a hip prosthesis. Hip replacement surgery can be performed as a total replacement or a hemi replacement. Where the damaged bone and cartilage is removed and replaced with prosthetic components.

Case Series

From January 1 to September 30, 2018, a total of 841 primary THA procedures were performed in our hospital via a direct anterior approach. Of these, bone cement (COBALT® G Bone Cement System; Zimmer Biomet, Warsaw, IN, USA) was used for stem fixation in 312 cases. In these cases, uncemented cup and polyethylene acetabular liner were used. Two cases were simultaneous bilateral THA (case A and B) and two cases were unilateral THA (case C and D). Case A was a 63-year-old man, Case B was a 61-year-old woman, Case C was a 67-year-old woman, and Case D was a 69-year-old woman. All patients were classified as I in accordance to the American Society of Anaesthesiologists. The average operation time was 37 and 88 min in unilateral and simultaneous bilateral THA, respectively. The average blood loss was 300 and 768 ml in unilateral and simultaneous bilateral THA, respectively. No patient had any complaint of dermatological problem as a past medical history. After cementing the femoral component, excess cement that stuck to the bandage that covered the

Figure 1: Cement burn of the skin on the medial side of the femur on postoperative day 1. A bursa measuring 2 × 2 cm was observed after the bandage was removed.

Figure 2: Cement burn of the skin with ulceration and partial scabbing on the medial side of the femur on postoperative 6 weeks.

Figure 3: Cement burn of the skin was fully crusted after 4 months of surgery.

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Received February 22, 2019; **Accepted** February 28, 2019; **Published** March 06, 2019

Citation: Murayama K, Oinuma K, Tamaki T (2019) Cement Burn of the Skin During Total Hip Arthroplasty: A Case Series. J Clin Case Rep 9: 1216. doi: 10.4172/2165-7920.10001216

Figure 4: Excessive bone cement during THA procedure. Bone cement and drape are similar in color.

patients' body resulted in burns to the calf (case A on the left side, and simultaneous bilateral THA was performed from this side), lateral side of heel (case B on the left side, and simultaneous bilateral THA was performed from this side), lateral side of femur (case C on the left side), and medial side of the femur (case D on the right side (Figure 1). These burns approximately measured 2 × 2 cm and were not noticed until the bandages were postoperatively removed. The burns were treated with hydrocolloid dressing, followed by regular dressing changes. At 6 weeks, skin ulceration was still observed with partial scabbing (Figure 2). At 4 months postoperatively, the wounds progressively decreased in size and healed (Figure 3). Except bone cement burn, no further complications were observed during 4 months after surgery in these cases (Figure 4).

Discussion

Chemical burns due to the attachment of excessive bone cement to the skin are not commonly experienced. Burstons et al. reported cement burns of the skin during THA [1]. In this case, discarded excessive bone cement came into contact directly with the patient's skin, which caused skin burn. In our hospital, four cases of skin burn occurred in spite the use of bandages and drapes to cover the lower extremity of the patient. The exothermic phase of bone cement polymerization liberates as much as 13 Kcal (55KJ) per 100 g, and the temperature can reach up to >100°C in the laboratory [2,3]. However, the actual temperature of the bone cement surface is influenced by the volume of bone cement, duration of contact, and thermal properties of the surrounding structures [4]. *In vivo*, most of the heat is dissipated to the surrounding tissues and the implants so that the temperature likely only reaches about 40°C (range, 38°C-56°C) [4-6]. The peak temperature at the cement surface is higher for thicker mantles, from approximately 41°C for a 1-mm-thick cement layer to 56°C for a 5-mm-thick layer and up to 60°C for a 7-mm-thick layer [5]. Cement mantles are typically only 2-3 mm thick [1]. In addition, Reissis et al. reported that cells can survive temperatures of up to 48°C for 150s, but most perish upon exposure to >58°C for the same incubation period [7]. Therefore, the potential for thermal damage is an uncommon complication during standard THA procedure [1-8]. However, larger pieces of bone cement could cause severe contact burns even to the cement that is in contact with the surface of the bandage. In these cases, the maximum thickness of excessive bone cement was >10 mm. Therefore, skin burns remain a possible complication unless excessive bone cement is promptly discarded.

Conclusion

The excessive bone cement, attached to the areas of the compressed skin (heel, lateral malleolus of ankle, and calf), could be one of the reasons for delayed discovery. Similar colours of the bandage and bone cement could also delay the discovery of such skin burns. Excessive bone cement should be promptly discarded to prevent burn complications on the skin surface.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Acknowledgements

The authors would like to thank Enago for the English language review.

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