

Case Report

Freeze branding: a novel injurious mechanism for humans

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Abstract: Freeze branding was first performed in 1966 to identify animals for agricultural purposes, and remains relevant today in veterinary medicine. In contrast, human branding for aesthetics, punishment, identification, and purported medicinal benefits is standardly performed through transfer of thermal energy via heat. Uniquely, this case report documents the first description of freeze branding as a mechanism of injury in humans resulting in a 0.25% total body surface area mixed partial thickness/full thickness forearm burn that was managed non-operatively with out-patient daily wound care over six-months without morbidity. The overall clinical management of freeze branding injuries, anticipated sequelae, and co-morbid diseases will be discussed to provide an educational foundation for future clinical encounters.

Keywords: Freeze branding, cold injuries

Introduction

Freeze branding or cryobranding for cattle identification was first described in 1966 [1]. Currently, freeze branding is prevalent in animal husbandry, but has not been documented in the human medical literature. Branding for humans for aesthetics, punishment, identification, and purported medicinal benefits has been documented previously through the transfer of thermal energy transfer from heat. The purpose of this clinical case report is to describe the first freeze branding injury in humans; to familiarize health care providers with this mechanism of injury, and to discuss sequelae from this injury. No statistical analysis was performed on this isolated case presentation.

Case presentation

A 33-year-old woman with a past medical history significant for major depressive disorder and tobacco use presented to the US Army Institute of Surgical Research Burn Center (USAISR) out-patient clinic on post-injury day 18, with a 0.25% total body surface area freeze branding wound of the anterior forearm

(**Figures 1, 2**). The branding iron was cooled 5 minutes in a coolant mixture of dry ice and isopropyl alcohol at an unknown temperature; subsequently, the brand was applied to her skin for 10 seconds. The patient attempted local wound care after the injury; however, she was referred to the USAISR secondary to delayed wound healing.

On presentation to this Institute, the wound demonstrated a mixed deep partial and full thickness injury, in various stages of healing without evidence of cellulitis. A dressing composed of a hydrophilic polyurethane matrix with a semi-permeable film backing was applied (PolyMem, Ferris Mfg. Corp., Fort Worth, TX), followed by coverage in Kerlix gauze and Surginet stocking.

Photographs from post-injury day 7, post-injury day 18, post-injury 26, and post-injury month 6 are presented (**Figures 3-6**).

Discussion

Motives for human branding include aesthetics, punishment, identification, and purported medicinal benefits [2-5]. Branding may be performed

Human freeze branding injuries

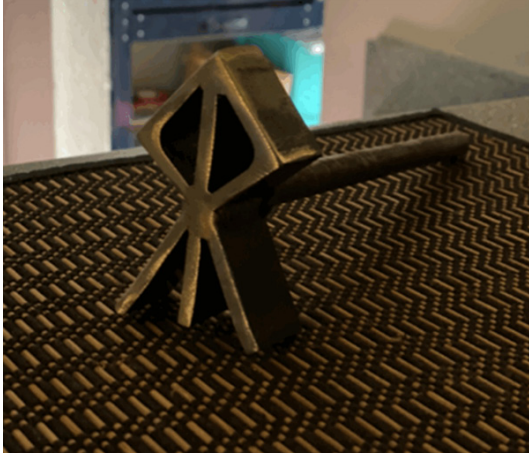


Figure 1. Freeze branding instrument.



Figure 2. Post-injury.

by heat, solar radiation, striking, electrocautery, laser, chemicals, or freezing [6].

Freeze branding has not been reported previously in the human medical literature. The veterinary literature first described freeze branding for identification of cattle and seals in 1967 [7, 8]. Protocols for freeze branding have been published by several veterinary institutions and commercialized entities [9-11]. Freeze branding is intended to destroy the underlying pigment cells in the hair follicle, which are then replaced with white hair follicles. The white hair follicles against the colored background make it easy to identify the selected animal. Furthermore, freeze branding, if per-



Figure 3. Post-injury day 7.



Figure 4. Post-injury day 18: Initial presentation at USAISR.

formed correctly, does not cause as much pain and is not as injurious to the surrounding tissue as hot branding. The copper or bronze irons are cooled to -100°C to -300°C . The coolant can be a composite of dry ice and alcohol, 95% alcohol, or liquid nitrogen. The healing process typically lasts for six to eight weeks. Importantly, the temperature of the freeze branding, the amount of contact time with the skin, and the thickness of the skin are all important variables that determine the depth of injury.

In this patient's case, the ten-second contact time of a branding iron cooled with dry ice and isopropyl alcohol was likely excessive and resulted in a third-degree injury requiring a pro-



Figure 5. Post-injury day 26, one week follow-up at USAISR.



Figure 6. Six month follow-up.

longed healing time. However, the temperature of the iron nor dry ice reservoir were not measured prior to application.

This case highlights a novel mechanism of injury that may be unfamiliar to many providers. Physicians who see patients after freeze branding injuries should be cognizant of the potential sequelae of these wounds, to include cellulitis or other wound infections. Physicians should also be aware that patients who perform branding are at a higher risk of certain behaviorally related issues, such as sexually transmitted diseases, suicidal ideation, and illicit substance use [2].

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Disclosure of conflict of interest

None.

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