Life Without Skin

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Writer's Comment: *When given a prompt to write a scientific article, I knew immediately that I wanted to focus my paper on the physiology and treatment of burns. I volunteer in a rehabilitation unit that houses patients with serious medical conditions, including patients with serious burns. Initially, I had a visceral reaction when I saw someone covered in severe burns. I couldn't look at their skin without cringing. As weeks passed, I began to focus less on the skin itself, and more on the patients' individual stories and the progress they made in rehab. I was truly inspired by each patient's perseverance to survive and the body's ability to heal itself. In writing this paper, I was able to research the physiological aspects of burns while watching patients experience the emotional healing process that will continue long after the skin has healed. I would like to thank the rehab therapists for sharing their knowledge with me and all the burn patients, especially "Tom," for their inspiration.*

Instructor's Comment: *I still remember the moment when Hana brought a draft of this paper into office hours to see if she was "on the right track." Not only was the essay nearly perfect, I thought right then that it was a strong candidate for* Prized Writing. *My 104F students write a standard scientific article as the first major assignment. Then they move into a case study/interview so they practice giving health science issues "characters" the audience can learn from and connect to. Hana instinctively understood the importance of humanizing complex issues and reaching her audience with strong, clear prose.*

—Karma Waltonen, University Writing Program

I sit with Tom's* hand in my hands, massaging each joint from his wrist out to his fingertips. I am a certified massage therapist, but this massage is like no massage I've ever given; his hand is like no hand I've ever touched. His skin is crusted, black, purple, and red, covered in scabs. Often a scab breaks open and blood spills onto the floor. With every touch, he squirms in pain. I look at his face–the same discolored, crusted skin. He has a patch over one eye for protection; his eyelid no longer exists. I am not supposed to ask Tom questions about how he came to be like this, in fear of a sudden emotional reaction hindering the healing process. However, as if reading my mind, Tom looks back at me with his uncovered eye and says, "I went back in the house to save my dogs."

Tom is a patient at the UC Davis Medical Center, currently in the physical and occupational therapy rehabilitation unit, admitted for severe burns. I volunteer here. Patients who occupy this unit live in the hospital. They are healthy enough to be discharged from the intensive-care unit, but not yet healthy enough to function on their own at home. All kinds of patients are admitted into this rehab, but the patients who always stand out to me, that really tug at something inside me, that make me hurt for them, are those who have been admitted for severe, full-body burns. Maybe I feel this way because we all know how badly a tiny burn from a hot pan hurts. Maybe the feeling is purely a reaction to seeing the damage; even looking at their skin can make my whole body hurt. It could be because that even after they heal, they will never be the same, physically or mentally. Whatever the reason, I often wonder how these patients came from the initial trauma to becoming healthy enough to be in rehab, and when they leave here, what is next for them?

Determining Severity

Burns originate from chemicals, electricity, and of course, fire. They are measured in three degrees, to match the three layers of skin. In a first or second degree burn, no skin graft is needed because the remaining layer of skin can generate new skin cells and gradually rebuild the skin. In a third degree burn, however, skin grafts are necessary because all three layers of skin are gone and even some of the tissues and nerve endings have been destroyed. Tests that use skin color and pain sensitivity determine the degree of the burn. Although third degree burns are the most severe,

* Name has been changed to protect patient privacy.

they are painless because the burn has penetrated so deeply that the nerve endings have been burned off (Furnas 16).

Tom's burn is a mixture of different degrees of burn. It originated from a house fire that he accidentally started when he was drunk. According to the therapists I work with, his case is common. Burn victims are typically very young and do not know any better, very old and do not realize what they are doing, or, as in Tom's case, drunk. Tom is twenty-two years old, although there is no visible way to tell his age with his facial skin missing.

One of the therapists told me that Tom has a 39% burn; a 60% burn is almost always fatal. The percentage of a burn is roughly determined by the "Rule of 9s," which assigns 9% to each arm, and 9% to the front and back of the legs, torso, and head (Furnas 15). The therapist also explained to me that the "Rule of 9s" is just a generalization; severity cannot solely be determined by this factor. The placement of the burn and the individual's reaction is of utmost importance. For example, one patient recently was admitted to rehab with only a 7% burn, however, the burn was on his face and had damaged several important nerves causing him to lose function of one side of his body. The same concept is true for someone who experiences a burn from smoke inhalation; this type of burn is more serious and causes more complications (such as respiration problems) than burns in other areas would. Despite how something looks on paper, it is not certain how the injury will manifest in each patient.

Initial Shock and Care

As I massaged Tom's hand and he squirmed in pain, I only witnessed the aftermath of the pain he went through. What could it possibly have been like for him as he was burning? What happened in the hospital afterwards? What steps were taken to save his life?

When a patient first arrives at the hospital, they go to the burn unit. The burn unit is kept at a high temperature because the patients no longer have the temperature regulation provided by the skin and are often cold. When they arrive, they are in shock. In *Burn Unit*, Barbara Ravage describes shock as "not enough blood to meet the body's oxygen needs, which leads to cell death and eventually tissue damage and organ failure" (Ravage 31-32). With so much skin missing, the body loses massive amounts of blood, along with the nutrients necessary to keep the tissues and organs alive. Sometimes too much blood is lost and death occurs. For

those who live through this initial stage, the doctors first give the patient an IV of fluids, making sure that the output of fluid does not exceed the input. They monitor urine, blood pressure, and blood count. They give the patient antibiotics immediately to prevent sepsis, an infection of the blood. Burn victims are particularly prone to sepsis because the skin, the major organ that protects us from external bacteria, is missing and/or damaged (Furnas 3-5). Blood transfusions are sometimes used but are not immediately necessary (Furnas 24).

In the first few days after the burn occurs, the skin begins to heal into eschars–leathery, inelastic slabs of scarring. As fluid is restored, the body initially accumulates edema, fluid retention that makes the body appear puffy. An escharotomy is sometimes required to make sure that blood reaches the distal parts of the body. In this procedure, the doctor slices the eschar to allow for more mobility for the fluid to move to other parts of the body. After about four days, the edema naturally subsides, at which point doctors take careful considerations not to let patients become dehydrated or go back into shock (Furnas 19).

To speed up the healing process, burn patients are encouraged to eat a high protein, high calorie diet. Protein is especially important because nitrogen, a substance in the body's waste products and one of the main components of high protein foods, is excreted more in burn victims as the body tries to remove all of the waste and heal itself (Furnas 10). Sometimes burns affect a patient's mouth, throat, or intestines. In this case, nutrients are administered through a feeding tube.

Rebuilding Skin

As the body heals from the inside out with proper fluids and nutrition, doctors attempt to heal the skin as well. Dressings of gauze and silver nitrate are applied to burns to prevent and eliminate contamination. Silver nitrate is unique because the ions in silver prevent bacteria from developing resistance. While the dressings are sufficient for lesser degree burns, third degree burns require a skin graft as quickly as possible to prevent infection (Furnas 39). The ideal situation for a skin graft is to remove healthy skin from somewhere else on the patient's body and insert it in the damaged area. Sometimes there is not enough healthy skin to act as a donor site, so other materials may be temporarily used as the patient's skin heals enough to be used as a donor site. Pigskin can be used to keep the area moist and away from harm until a donor site is available for use.

Biobrane, a substance made from silicone and nylon, can be placed over the site. As the skin heals underneath, it rejects the Biobrane until eventually the skin is healthy enough and the Biobrane is peeled off. A final option is an allograft, a piece of skin from a human cadaver. The body does not realize that the allograft is foreign until a few weeks later, buying time for the donor site to heal enough to be grafted (Ravage 216-218).

One expert explains that in regards to skin, "healing is all about the delicate balance between construction and destruction" (Ravage 193). She goes on to describe four stages of skin healing. Initially, the skin coagulates to stop fluid loss. Next, the wound is cleaned to allow for new skin to grow. Then reconstruction of the skin begins. Scars are formed, either from new skin or from two edges of healthy skin healing together. Lastly, blood supply and nerve innervation return to the damaged area. When the skin begins to bleed and sensation returns, it's healing (Ravage 193).

Rehabilitation

When the skin grafts are healed enough so that the patient is no longer at serious risk of infection, they can be discharged from the burn unit. This is the point at which the patients are able to come to the rehab units of the hospital, such as the unit where I met Tom. The major job of the therapists is to restore the patients to basic functional living outside of the hospital. Occupational therapists work often with the patient's hands, helping them to grasp to make things such as brushing teeth and holding toilet paper possible. One concern of the therapists is that as the skin heals it tightens too much around the joints and the joints no longer have the freedom to move. Scar tissue massage, like the massage I preformed on Tom's hands, is used to loosen the skin to allow for more freedom in the joints. When this technique doesn't work, they resort back to cutting the skin to create more freedom for what's underneath.

The job of the therapists does not stop skin-deep. Often the nerve endings to certain tissues have been damaged so the patient can no longer feel or move certain muscles. This can be the result of the burn, or in Tom's case, a complication of hospital care. Tom was kept in the burn unit too long in one position and developed peripheral neuropathy, a loss of movement and sensation in the hands and feet. The therapists work to create movement in the muscles in an attempt to stimulate the damaged nerve endings so that they can heal themselves. Sometimes it works, but sometimes the damage is too deep to ever regain function.

Emotional Healing

When the patients are physically able to leave the hospital and return to life at home, their work is far from over; "emotional healing takes a long time, longer than the physical healing, and there is no surgery to speed up its progress" (Ravage192). Tom's story makes this all too clear. In his hospital room, there are pictures on the wall of him before the fire. In them, he looks young, handsome, and carefree. There are also pictures of him with his girlfriend. I met her in the earlier part of his hospital stay, but she has stopped coming. The therapists talk with Tom about where he wants to live when he leaves the hospital; he is doing well but still needs help going to the bathroom. Tom says he can't live with his dad because his dad thinks it's gross to help his son use the bathroom.

I cannot fathom being in Tom's situation. It is impossible to do almost everything that was previously effortless. Simple pleasures such as lying in the sun and having sex are now horrifically painful. Girlfriends and even parents are no longer there. Appearance, something our society holds above all else to determine an individual's value, is forever altered; "[scarring is] what sets burn survivors off from other people, what makes it impossible to ever forget what happened" (Ravage 204). No one will ever look at you again without wondering what happened. You can never look in the mirror again without remembering.

Tom's sister ended up moving away from her father and into her own apartment to care for her brother. She was in the hospital everyday with him, learning the techniques the therapists and nurses used to keep his burns and muscles healthy. The day Tom left the hospital with his sister, he said he was nervous but excited to be entering the real world again. As he left, he looked back and smiled. I had never seen him smile before; I didn't even know his skin could do that yet.

Works Cited

Furnas, David W. *A Bedside Outline for the Treatment of Burns.* Springfield: Charles C Thomas, 1969.

Ravage, Barbara. *Burn Unit: Saving Lives After the Flames.* Cambridge: Da Capo Press, 2004.