Management of the Skin and Soft Tissue in the Geriatric Surgical Patient

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KEYWORDS

• Skin • Burns • Geriatric • Wound healing • Chronic wounds

KEY POINTS

- Aging leads to intrinsic skin changes resulting in thinning, loss of dermal appendages, and increased fragility that increase the risk of injury and impair wound healing; the aging process can be accelerated by extrinsic factors such as exposure to sunlight.
- Disease processes that are more prevalent in the elderly, such as malnutrition, diabetes mellitus, treatments for malignancy, and vascular disease, all impair tissue repair.
- There are functional changes in aging that predispose the elderly to increased risk and an impaired ability to handle major wounds.
- Chronic wounds such as pressure ulcers and venous stasis ulcers are extremely difficult to treat.
- There are many ways to prevent chronic wounds in the elderly.

INTRODUCTION

The demographics of the United States population is shifting so that people are living longer while the birth rate has decreased. It has been predicted that by the year 2050 nearly one-third of the population will be older than 55 years.[1] Medical care will shift to treating this geriatric population so that all caregivers will need to know how to manage problems of the elderly. As people live longer the effects of aging on the tissues persist, so one must know what kinds of medical challenges will dominate care. The effects of aging on the skin are well known. The elderly not only suffer from skin changes; other illnesses such as diabetes mellitus and vascular disease affect normal wound healing. The effects of drugs that treat malignancies and other chronic illness also have profound effects on healing. Chronic wounds, such as pressure ulcers and venous stasis wounds, are more common in the elderly. One must know about these "never event" wounds to help prevent and treat them. This review describes the

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Surg Clin N Am 95 (2015) 103–114
http://dx.doi.org/10.1016/j.suc.2014.09.008 **surgical.theclinics.com**
0039-6109/15/$ – see front matter

effects of aging and the environment on the structure of skin. The effects of common medical problems, malnutrition, diabetes mellitus, vascular disease, burns, and common treatments for wounds are discussed. A description of common chronic wounds is presented to assist in developing strategies for prevention and treatment.

SKIN CHANGES IN THE ELDERLY

Aging has profound effects on the skin.[2–7] The rate of change with aging is affected by both intrinsic and extrinsic factors. Intrinsic factors are those changes that occur in all people as they age, being essentially those factors that exist "within our bodies" in everyone who ages. Extrinsic factors are the "outside" changes resulting from exposure to the elements in the harsh environment. The most significant agent of change to the skin is exposure to ultraviolet light. The extrinsic factors accelerate the degenerative changes that occur naturally. It is clear that protection from the sun will slow down the classic aging changes of the skin.

Aging affects all components of the skin. The epithelium tends to thin out with aging, but this is contrasted with thickening of the epidermis with stress or sun exposure. The junction between the epidermis and dermis flattens. The reduction of size of the normal hills and valleys of the rete pegs leads to an increased risk for shearing injuries (blisters) of the epidermis. There is a reduction in the number of skin adnexa: hair follicles, oil glands, sebaceous glands, and other adnexa. With fewer glands for lubrication, the skin becomes drier and more prone to cracking. Lower lipid content in the stratum corneum reduces the barrier function of the epidermis. It is common knowledge that there is a reduction in hair follicle numbers, especially in the scalp, with aging. There are also fewer hair follicles throughout other parts of the skin.[6] Because the rate of re-epithelialization of partial-thickness wounds depends on the density of hair follicles, a reduction in their numbers slows the ability to resurface a wound. The skin re-epithelializes from both the epithelial edge of the wound and the skin adnexa.[8] The cells in the basal cell layer of the epithelium at the site of injury migrate across the viable wound edge. These basal epithelial cells are only capable of covering 1 to 2 cm from the wound edge, so the rest of the healing in a full-thickness wound is from contraction and scar formation. If the wound has hair follicles or other skin adnexa (partial-thickness), the keratinocytes migrate from the remaining adnexa (hair follicles) to resurface the wound. The greater the density of the hair follicles, the more rapid is the rate of healing. For instance, a superficial wound in the scalp will heal within 4 to 5 days as opposed to 2 to 3 weeks on the lower leg. As one ages, the hair follicles tend to degenerate so that a superficial wound in hairless skin is incapable of re-epithelialization. Caregivers will say that they "converted" to a full-thickness wound but in essence, the wound did not have the dermal adnexa needed to re-epithelialize.

The dermis is the main target of ultraviolet light damage.[2] There is loss of the normal cells populating the dermis, namely fibroblasts and immune cells, which impair the skin's immune function. The dermis also becomes thinner and has significant alterations in the structure of its collagen. The collagen becomes larger, more fragmented, and more disorganized. Elastin persists but becomes more fragmented. Skin loses its tensile strength and is more prone to tearing.[9] It is well known that skin becomes looser, more wrinkled, and sags with the passage of time. One advantage of looser skin, however, is that the elderly can "contract" a full-thickness wound with less interference of function (contracture).

There are many other changes in the skin with aging. There tends to be a loss of sensation that occurs in a distal to proximal fashion, especially with cold/warm