FEATURE

Skin Tears: A Review of the Evidence to Support Prevention and Treatment

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Physiological changes that occur as part of the aging process put the elderly at risk for developing skin tears. Lack of consistent care in the management of skin tears in the authors' community sparked a literature search to determine best evidence for the management of skin tears. Medline® and Cochrane Library databases were searched for studies and systematic reviews on skin tear prevention and treatment. The literature suggested that the greatest number of skin tears occurs among the elderly (65 years and older). Factors reported to be associated with the occurrence of skin tears in addition to age include immobility and a history of skin tears. In the absence of systematic risk factor research, clinicians continue to report that all variables that may be associated with these wounds must be considered when assessing the elderly. Several small studies suggest that most skin tears occur on the extremities and seasonal incidence variations also have been reported. Despite consistent sample-size limitations, the results of controlled clinical studies and case series consistently suggest that education and implementation of prevention protocols reduce the incidence of skin tears in extended care facilities by almost 50%. Studies to evaluate and compare the effectiveness and cost-effectiveness of skin tear treatments are limited but when appropriate care is provided most skin tears can be expected to heal after 7 to 21 days depending on the severity of the wound. A combination of skin protection, preventive measures, and treatments that facilitate moist wound healing appear to be most effective. Risk factor and epidemiological studies as well as research to validate the existing skin tear classification system and improve clinician ability to provide evidence-based risk assessments, preventive care, and treatment are needed.

KEYWORDS: skin tear, skin laceration, xerosis, elderly skin, traumatic wounds

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In July 2003, 35.9 million people in the US — 12% of the total population — were 65 years and older. Of these, 4.7 million were 85 and older. According to US Census Bureau projections, the number of older people is expected to grow to 72 million, comprising nearly 20% of the total US population. In 2000, 420 million people — 7% of the world's population — were 65 and older. Projections indicate that by 2030 the number of elderly in the world will rise to more than 70%.[1]

In 2004, Pennsylvania made it mandatory for healthcare facilities to report skin tears to the Pennsylvania Patient Safety Reporting System (PA-PSRS).[2] Of the 2,807 reports submitted during the first year, patients over 65 years accounted for 88.2% of skin tears; the largest number of skin tears (41.3%)

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was reported in the 75- to 84-year-old group.[2] Because a lack of consistent care in the authors' facility was noted, a literature review was conducted to determine best evidence for practice in skin care management; specifically, the literature review assessed information available on the prevention and treatment of skin tears in this rapidly expanding segment of the population.

Method

Medline® and Cochrane Library databases were searched for studies and systematic reviews published in English from 1990 to 2006 on skin tear prevention and treatment using the following medical subject headings (MESH): *skin tears, skin lacerations, xerosis,* and *elderly skin.* The search targeted meta-analyses, randomized controlled trials, prospective clinical trials, retrospective studies, and systematic reviews. All articles were reviewed.

Why the Elderly are at Risk

Aging skin. With aging comes a 20% loss in dermal thickness, making the skin of many elderly adults almost transparent in appearance.[3] The subcutaneous fatty layer also becomes thinner, especially on the face, neck, back of the hands, and shins. If traumatized, these areas will absorb more energy than other parts of the body because they lack cushioning fatty subcutaneous tissue; thus, they are at increased risk for an injury such as a skin tear.[3-5] The skin has less resilience — sufficient force exerted against the skin will result in a tearing-type injury.[4]

Also, as people age, the epidermal-dermal papillae that project into the epidermis flatten, increasing susceptibility to shearing and friction injuries. The fragile epidermal-dermal junction increases the risk of blister formation,[3,4] a slowly developing phenomenon that may take some time to become clinically obvious. In the elderly, the network of blood vessels is reduced in the dermis and the vessels are altered — the slow clinical appearance of blisters is the result of the inhibited flow of vascular fluids to fill them.[4]

Elderly skin is stretched more easily because the number of elastin fibers decreases with age, reducing the ability of skin to recover its shape when stretched and causing it to sag.[5,6] With aging, the blood vessels also become thinner and more fragile. This condition, combined with decreased collagenous support to the blood vessels, leads to bruising beneath the skin known as *senile purpura.* Senile purpura affects older patients, particularly those who have had excessive sun exposure. People with senile purpura exhibit dark purple ecchymoses on the extensor surfaces of the hands and forearms[7]; a review of the literature suggests that 40% of skin tears have been associated with senile purpura.[8]

Additional changes seen with aging include decreased production of eccrine sweat glands, apocrine glands, and sebum glands, which causes dry, itchy, inelastic skin and increases the risk of shearing and friction injuries. Dry skin or xerosis can prompt scratching, which further disrupts the epidermis. In addition, decreased pain perception and tactile sensitivity, including diabetic neuropathy, make elderly people more susceptible to trauma because they are less aware that an injury is occurring or has occurred.[3,6,9] Elderly patients are also more likely to take medications that can compromise skin integrity — eg, steroids inhibit collagen synthesis and reduce the skin's tensile strength.

Skin tears. A skin tear is a traumatic wound or laceration. In the elderly, it can be the result of a minor environmental insult. Skin tears occur primarily on the extremities as a result of friction alone or shearing and friction that separates the epidermis from the dermis (a partial-thickness wound) or that separates both the epidermis and the dermis from the underlying

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KEY POINTS

- After reviewing common physiologic changes in the elderly that predispose them to the development of skin tears, the authors summarize existing risk factor, prevention, and treatment evidence.
- Although skin tears are reported to be common, current evidence about their occurrence is not available and risk factor knowledge remains limited.
- The studies reviewed suggest that most skin tears heal after 1 to 3 weeks if managed appropriately and several studies suggest that their incidence in extended care facilities can be significantly reduced through education and the implementation of prevention protocols.

TABLE 1
PAYNE-MARTIN CLASSIFICATION OF SKIN TEARS[10]

Category I – Skin tear without tissue loss
Linear: epidermis and dermis are pulled apart
Flap: epidermal flap completely covers dermis within 1 mm of wound margin

Category II – Skin tear with partial tissue loss
Scant tissue loss: <25% of the epidermal flap is lost
Moderate to large tissue loss: >25% of epidermal flap is lost

Category III – Skin tear with complete tissue loss where epidermal flap is absent

skin (a full-thickness wound). Although skin tears do not usually cause serious health problems, they can predispose persons to infection, cause discomfort, and be costly to treat.[10]

Once a skin tear is present in the elderly, the slower rate of epidermal cell turnover prolongs healing time. Alterations in collagen and protein synthesis also may contribute to delayed skin tear healing. In addition, the skin's microcirculation collapses, increasing risk of bruising and reducing blood supply to the skin (the latter can prolong healing time if a break in the skin occurs). Because of the decreased immune response of the geriatric patient, skin tears have a higher risk of becoming infected than in the non-geriatric patient.[3]

Regulatory guidelines. Events such as skin tears that impair skin integrity are of concern to clinicians, the elderly, and long-term care administrators and health surveyors. Long-term care facilities have established standards to hold institutions to high levels of quality care for their residents. Violations of these standards are labeled "F-tags" on the survey report. Two F-tags relevant to skin are F-309 and F-314. The F-309 tag states that each nursing home resident must receive the quality care necessary to attain the highest practicable well being and prevent any avoidable decline. The presence of a skin tear may be perceived as poor care. The F-309 tag requires the clinician to document the underlying condition that contributed to a wound such as a skin tear and include an assessment of the wound. The F-314 tag states that the long-term care facility must ensure that residents entering a facility without a pressure ulcer remain ulcer-free unless their condition demonstrates that the ulcer was unavoidable.[11] This also applies to skin tears. Residents identified as at risk for skin tears should be placed on a prevention protocol. If a patient develops a skin tear, standard protocols should be in place to prevent additional skin tears from occurring.

Risk Factors

Payne and Martin[10] conducted a 3-month, descriptive study in 10 long-term care facilities to describe skin tears, identify risk factors, and determine their rate of healing (see Table 1). The 10 patients with 31 skin tears studied had a mean age of 85 years and were predominantly Caucasian, female, cognitively impaired, limited in mobility, and required assistance with eating or on tube feedings. All patients also had a history of a skin tear. The majority of skin tears (20) occurred on the arms especially around the elbows where the clients were likely to be helped with position change by the care providers. Of the 31 skin tears, seven (22%) occurred on the legs and were related to bumping against wheelchairs and bedrails.

Malone et al[9] performed a 1-year retrospective chart review of all incident reports from a large long-term care facility with an average census of 350. Of the 1,598 incident reports, 491 (30%) dealt with skin trauma; of these, 321 described skin tears, for an overall incidence of 0.92 per patient per year. Most skin tears (80%) occurred on the arms — the forearm was the most common location. Of the 153 participating nurses, 48% did not know the cause of the skin tear. Known causes included wheelchairs (39, 12%), and bumping into something (40, 12%); transfers and falls accounted for 9% and 6.2%, respectively. Of the 147 residents with skin tears, 24 (19 women, five men, mean age 83.8 years) had four or more skin tears during the study and the overall incidence was approximately one per institutionalized resident per year. Based on these results, the authors estimated that at least 1.5 million skin tears occur in institutionalized elderly each year.

White, Karam, and Colwell,[12] in a retrospective chart review involving a 120-bed, long-term care facil-

TABLE 2
IDENTIFIED SKIN TEAR RISK FACTORS

Advanced age (>85 years)[9,13,14]
Gender (female)[9,10,13,14]
Race (Caucasian)[10]
Immobility (bed or chair bound)[10,13]
Inadequate nutritional intake[10,13-15]
Long-term corticosteroid use[14,15]
History of a previous skin tear[9,10,13]
Altered sensory status[13]
Cognitive impairment[10,13,14]
Stiffness and spasticity[13]
Polypharmacy[13]
Presence of ecchymosis[13]
Dependent in activities of daily living[13]
Using assistive devices[13]
Applying and removing stockings[14]
Removing tape[14]
Vascular problems[14,15]
Cardiac problems[14]
Pulmonary problems[14]
Visual impairment[14]
Neuropathy[15]
Having blood drawn[14]
Transfers and falls[16]

ity in Virginia, found that 227 skin tears occurred over 12 months. They extrapolated these findings to conclude that an average of 14% of the residents of the nursing home sustained a skin tear each month. The number of skin tears per resident ranged from one to 17 with a mean of 2.67. Of the 227 skin tears that occurred, 109 (48%) occurred in nonambulatory patients, 135 (59%) occurred on an upper extremity, and 97 (43%) were self-inflicted. Skin tear rates increased in warmer months (May through September in Virginia) and were more likely to be discovered from 6 a.m. to 11 a.m. and 3 p.m. to 9 p.m., peak activity times within the nursing home.

McGough-Csarny and Kopac[13] monitored 154 skin tears in a Veterans Affairs nursing home and nine community nursing homes. The study revealed an at-risk sample of very old, frail, elderly persons who were predominantly women, dependent in their activities of daily living (ADLs), nutritionally compromised, and suffering from dementia. Risk factors associated with skin tears included stiffness and spasticity, sensory loss, limited mobility, poor appetite, polypharmacy, use of an assistive device, presence of ecchymosis, and a history of previous skin tears. The skin tears occurred more frequently on the upper extremities and half had no tissue loss. Six risk factors were present in 65% of the sample: advanced age, sensory loss, compromised nutrition, history of previous skin tears, cognitive impairment, and dependency. More than 50% of the patients experienced bruising and poor locomotion.

Meuleneire[14] conducted a 6-month descriptive study involving 88 skin tears in 59 hospitalized elderly patients (average age 88 years). Patients at high risk were found to have vascular, cardiac, pulmonary, and eating disorders; dementia; visual impairments; and using steroids. The causes of the injuries were documented as bumping against bedrails, getting in and out of bed, furniture, falling, removing tape, taking blood samples, and applying or removing stockings.

Most elderly persons have at least one of the documented risk factors for the development of skin tears (see Table 2). However, at this time, it is not known which risk factors are independent of one another and whether one risk factor is more important than another.

Skin Tear Prevention

Assessment. All patients at risk for skin tears need to have their skin assessed regularly, such as during bath time. The skin should be inspected in good lighting and assessed for dryness, ecchymosis (bruising), edema, erythema, pruritus, and pain. The patient's extremities should be examined for color, warmth, swelling, edema, and ulcerations. Clothing should be inspected for tightness or rubbing, which can create areas of friction or shear and cause the skin to tear. Often, healthcare providers do not know what caused the skin tear — hence, all skin areas should be assessed carefully and systematically to detect areas with the potential to break down.[9]

Location. Familiarity with common locations of skin tears and knowing potential areas for injury are important to facilitate assessment and prevention. In nonambulatory patients, the arms (elbows, forearms, and hands) are common sites; in mobile patients, the legs are most often affected.[8-10,14]

Products. A variety of products such as lotions, creams, and ointments are available to treat dry skin. Before their use, it is important to ascertain that the patient does not have any sensitivities or allergies to these products.

Different product ingredients affect use. *Emollients* (emollient and moisturizer can be used interchangeably) moisten and lubricate the skin. The oil in the emollient traps the water in the skin to improve skin texture (smoother and softer). Skin that is rough and dry is more susceptible to cracking or splitting, making the skin easier to tear. *Lotions* are suspensions of oily chemicals in alcohol and water and contain two major ingredients: humectants such as glycerin that draw moisture to the skin's surface and barrier ingredients (eg, mineral oil) that trap moisture in the skin. According to a geriatric nursing guideline,[15] daily bathing and the use of non-emollient soaps has been found to dry out the skin, predisposing it to skin tears. After bathing, the elderly and their caregivers should be instructed to apply moisturizers or emollients to dry skin areas such as the arms and legs.

Elderly patients with frail skin should be handled carefully during baths or position changes, especially when being lifted.[15] Pillows can be used to support the legs and arms to avoid traumatic injury to these areas. Patients should be encouraged to wear long sleeves and pants for added protection against injury. Rooms should be lit adequately to reduce the risk of bumping into furniture or other objects.[15]

Education. It is important to educate not only the elderly but also healthcare professional staff and caregivers on the preventive measures mentioned herein, including implementing transfer techniques that prevent friction or shear. Other measures may include the use of cotton flannel sheets to prevent sliding down in bed and nonadherent dressings and gauze wraps or stockinettes to secure dressings.

Protocol change. Studies suggest that once a skin tear-related problem is acknowledged, implementation of prevention programs aimed at identifying at-risk individuals and measures to protect the skin from injury will reduce the rate of skin tears. In a 10-month descriptive study of 30 patients on an Alzheimer's Disease unit, Brillhart[16] investigated the effectiveness of a skin care program for the prevention and treatment of pressure ulcers and skin tears. The study was initiated after one patient developed a Stage IV pressure ulcer. During the study, 27 of the 30 patients did not develop any pressure ulcers or skin tears. The authors attributed the success of the program to consistent education and care under the direction of the nurse practitioner.

Bank and Nix[17] reported on the effectiveness of a comprehensive skin tear prevention program to decrease the incidence of skin tears in a 209-bed urban nursing and rehabilitation center. Strategies included staff education and the use of skin sleeves, padded side rails, gentle skin cleansers, and lotions. During the course of this 13-month post intervention study, the number of new skin tears identified each month decreased from 8.9% to 4.1%.

In a 4-month descriptive clinical product trial among residents of the 173-bed long-term care facility, Mason[18] evaluated the effectiveness of an emollient antibacterial soap compared to non-emollient antibacterial soap in reducing the incidence of skin tears. Non-emollient soap was used for the first and third months and emollient soap in the second and fourth months. In the course of the study, 43 skin tears were noted. Skin tear occurrence decreased with the use of emollient soap (37% and 33%, respectively, in months two and four) and increased with the reintroduction of non-emollient soap in month three (43% increase). However, the change in rates was not statistically significant.

Hunter et al[19] conducted a descriptive pre- and post-intervention clinical trial to assess the effectiveness of a body wash and a skin protectant on patient skin breakdown in two nursing homes. After implementing the two products, the number of skin tears was reduced from 32 (47%) to 17 (42%). The authors concluded that implementation of a skin care protocol that included using a body wash and skin protectant reduced the incidence of skin breakdown.

Cost. The effect of prevention programs on cost was examined in a 4-month, retrospective study by Birch and Coggins.[20] They assessed the effects of changing from soap-and-water cleansing to a no-rinse cleanser for bathing bedbound patients in a 72-bed, long-term care facility. Implementation of the no-rinse cleanser decreased skin tear prevalence among

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29 bedbound residents from 23.5% to 3.5%. The total number of new skin tears decreased from 13 to 1 during the study period. Decreased prevalence rates had an impact on both caregiver time and skin tear treatment cost. Although successful prevention programs would clearly decrease skin tear treatment costs, the actual cost-effectiveness of these programs has yet to be evaluated and some products may be more cost-effective than others in preventing skin tears.

Skin Tear Treatment

While some information about the effectiveness of skin tear prevention programs is available, research assessing skin tear treatments and healing is limited.[8-10,12-14,18-20] The Payne-Martin[10] classification remains the most commonly used instrument to classify or describe skin tears and is based on the level or amount of tissue loss from the skin tear — ie, without tissue loss, with partial-thickness skin loss, and with full-thickness skin loss (see Table 1). In their study, average healing times observed were 10 days for skin tears without tissue loss, 19 days when there was partial tissue loss, and 21 days for skin tears with complete tissue loss. However, the Payne-Martin classification instrument has never been validated or tested for reliability.

In a descriptive clinical trial of nursing home residents, Edwards, Gaskill, and Nash[8] compared the use of four dressings to treat 30 skin tears in nursing home residents. Three were occlusive dressings: a transparent film (Opsite™, Smith & Nephew, Largo, Fla), a hydrocolloid (Duoderm™ extra thin, ConvaTec, A Bristol-Myers Squibb Company, Princeton, NJ), and a polyurethane foam (Lyofoam™, ConvaTec). The non-occlusive dressing was comprised of steri-strips with a nonadhesive cellulose-polyester material (Melolite™, Smith & Nephew). Thirteen skin tears (43%) healed by day 7, 12 (40%) healed by day 14, and five (17%) had not healed by day 14. By day 7, four (31%) treated with the non-occlusive dressing had healed. Among the occlusive dressing group, four skin tears (36%) treated with the film dressing had healed by day 7 and none of the hydrocolloid or foam dressed skin tears were healed by day 7. However, 14 patients withdrew from the study because the staff thought the skin tears were not healing satisfactorily; 12 were being treated with the transparent film and two with the hydrocolloid. The authors concluded that wounds treated with the non-occlusive dressing healed faster. However, the authors compared the average healing times of three different occlusive to one non-occlusive dressing, potentially skewing the results.

Thomas et al[21] conducted a randomized, prospective study among 34 patients with skin tears comparing an opaque foam dressing (Flexzan™, UDL, Sugar Land, Tex) to a transparent film dressing (Opsite™, Smith & Nephew). Subjects had either Payne-Martin category II (25% to 75% epidermal skin loss) or Payne-Martin category III (100% epidermal skin loss) skin tears. Complete healing of category II and III skin tears

occurred in 16 out of 17 subjects (94%) treated with the opaque foam dressing at 21 days, compared to 11 out of 17 of the subjects (65%) treated with the transparent film.

Meuleneire[14] conducted a 6-month, descriptive product trial involving 88 Payne-Martin category I and II skin tears in 59 hospitalized elderly patients treated with a soft silicone net dressing. By day 8, 83% of the wounds had healed; the remaining 17% did not heal due to bleeding and infection. Infection occurred when there was a 6-hour delay between the time of injury and the dressing application. As a result of the study, a prevention protocol was implemented to identify high-risk populations and standardize early use of soft silicone net dressing to treat skin tears.

Milne and Corbett[22] conducted a non-randomized study to determine the effectiveness of a 2-octylcyanoacrylate topical liquid bandage in treating Payne-Martin category II and III skin tears in 20 institutionalized adults. They found that complete healing occurred in 7 days in 18 out of 20 patients (90%). According to the authors, the clear film formulation allowed for easy assessment and monitoring of the skin tear and 19 patients (90%) reported no pain.

The above data suggest that skin tears heal in 7 to 21 days, depending on the extent of tissue damage.

Many commonly used approaches to skin tear management lack evidence to support their use and not all skin tears are the same. Skin tear treatment should be based on the fragility of the elderly person's skin, the need to protect the surrounding skin, utilization of moist wound healing principles, and the extent of tissue injury. According to a review of the literature, basic care practices for the individual with a skin tear involve gently cleaning the skin tear with a mild liquid soap (slightly acidic pH) and water or normal saline[5,9] and removing blood from the underside of the skin flap before re-positioning the skin flap over the wound bed.[8,13,22,24]

Most skin tears are not amenable to repair involving suturing or even tissue adhesives. The skin is usually too thin to support a suture and the edges of the wound do not approximate well. The usual jagged, crescent-shaped, or L-shaped presentation of the wound frequently precludes repair with a tissue adhesive.[5,9,24] Ragged, devitalized edges of the skin tear need to be removed before the edges of the skin flap are approximated and secured with steri-strips. The strips should be used judiciously — traction on the skin (even from the steri-strips) can cause further damage.

Most experts on skin tears recommend use of nonadherent dressings to minimize tissue trauma and pain when the dressing is removed.[8,14,15,19] Clinicians suggest applying petroleum-based, hydrogel, or other nonadherent dressings over the skin tear.[5,23] Case studies involving hydrofiber and foam dressings also have been noted in the literature.[15,24,25] Placing an arrow on the dressing to indicate the direction of the skin tear to help minimize trauma (the dressing can be removed in the direction of the tear rather than against it) was suggested. Securing the dressing with gauze or tubular nonadhesive wraps has been suggested as a method to avoid placing tape on skin already at risk for tearing.[23] Generally, the dressing may be left in place for 5 days unless an odor or leaking drainage is noted or the dressing is loose.

Experts generally discourage use of transparent and hydrocolloid dressings because their removal can cause more skin damage and pain. In addition, it has been suggested that exudate tends to pool under the dressings, causing maceration of the skin tear wound.[26,27] If the tear has copious drainage, nonadherent gauze (eg, Adaptic, Johnson & Johnson Wound Management, a division of ETHICON, Inc, Somerville, NJ) may be placed on the skin tear and covered with absorptive gauze and netting or tubular dressing to hold it in place. The skin tear drainage subsequently can flow through the nonadherent into the absorptive gauze, decreasing maceration of the surrounding skin.

If a transparent film is used, it may be left in place but only if no drainage is noted beneath the film. An adhesive remover may be used and the transparent film should be stretched to break the adhesive seal. Alternatively, a hole can be cut in the transparent film, allowing the exudate to drain. The hole then may be covered with nonadherent gauze until the transparent film is changed.

No research is available on the number of skin tears that become infected and what treatment options are best.

Cost. Skin tear treatment cost-effectiveness studies, comparing their effect on caregiver time and dressing supplies, have not been conducted.

Conclusion

A variety of age-related changes increases the risk of skin tears among the elderly but evidence regarding skin tear prevention and management is not increasing proportionally to the population at risk for their development. In 1991, Malone et al's[9] epidemiological study found that at least 1.5 million institutionalized adults have skin tears. This study, completed more than 15 years ago, remains the most frequently cited skin tear prevalence source. Similarly, the most widely used skin tear classification system appears valid but no formal validity and reliability studies have been conducted. The literature suggests that a number of variables may be associated with the development of skin tears. However, it is not known if or how these variables predict skin tear risk, leaving clinicians to consider all known possible risk factors when evaluating their patients.

The prevention protocol studies reviewed suggest that education and implementation of prevention protocols can reduce the incidence of skin tears by at least 50% in extended care facilities. In addition, skin tear treatment studies indicate that the majority of skin tears will heal in 7 to 21 days depending on the severity of the skin tear. Skin tear treatment should be based on the fragility of the elderly person's skin, the need to protect the surrounding skin, and utilization of nonadherent dressings.

Studies to optimize the prevention and treatment of skin tears to support better evidence-based care for the elderly population are warranted. -

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