

Pathophysiology of skin alterations



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Skin Alterations

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Abstract

Human skin is the largest multifunctional organ of the body, and knowledge of its structure and function is essential to clinicians and researchers. The skin has two layers, the epidermis and dermis, separated by a basement membrane zone. It provides protection, sensation, thermoregulation, biochemical/metabolic, and immune functions. Key and emerging concepts important to understanding pathophysiological mechanisms for practicing clinicians are: knowledge of differences between acute and chronic wounds; ability to evaluate depth and extent of injury; and understanding stages of healing versus zones of activity.

Discussion: Explain pathophysiology of broad categories of skin alterations (e. g., minor, traumatic, burns, benign, parasitic, pressure ulcers, cancerous, infectious, and inflammatory). Also discuss causative agents, assessment data (what it looks like, pathophysiological changes, and presenting symptoms).

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Skin Alterations

This paper will cover minor wounds, burns, pressure injury, and cancer with variations in skin color, as well as the causative agents and assessment data.

Minor Wounds

Minor skin wounds occur as the result of unanticipated trauma and may include lacerations, abrasions, blisters and more serious wounds such as skin tears and bites.

Lacerations are often irregular shaped wounds with ragged skin edges and typically have deeper skin damage and bruising noted. Abrasions are known as grazes and are more superficial wounds in which the top layer of the skin is removed by sliding across a rough surface and usually contains some dirt and sometimes even particles of what scraped it. Blisters are the result of friction of between the top two layers of the skin, or coming in contact with something hot, removing the top of the blister, puncturing the blister, or draining the fluid will cause the area to heal more quickly, and will require a protective dressing afterwards. A cut or incision usually has clean edges as a result of the cause of injury, for example a sharp knife. If it is a deep wound it can bleed profusely and nerve and muscle damage can occur. Human and animal bites are of special concern, especially in puncture wounds, as bacteria from the mouth can enter the wound resulting in an increased risk of tetanus and infection. Most animal bites are from pets, usually dogs and cats, and can cause abrasions, deep scratches, and lacerations as well as puncture wounds. Cat bites and scratches are considered more serious due

to the high incidence of infection due to the germs that are in their mouth and under their claws.

Infection is the largest risk of minor traumatic wounds as they often contain debris and bacteria from the cause of the injury.

The treatment from a minor traumatic wound is to clean the wound and surrounding skin, removing any debris and other foreign material. Abrasions require thorough irrigation as ground dirt is frequently embedded in these wounds. Apply an antiseptic solution to cleanse the wound using chlorhexidine, povidone-iodine and normal saline.

Surgical wounds that have been stitched together, just clean the old blood prior to the application of a dry dressing.

The most important thing is to try to determine the cause of the injury or the object which caused the injury and when the injury occurred. Wounds greater than six to eight hours old have an increased risk of infection. With all traumatic injuries assess the patient's tetanus status and ensure they have adequate coverage. Following this an assessment of the wound can be made for the location, size, and depth and any additional trauma to underlying structures such as muscle, tendon, nerve, vascular and bone. Animal bites must be monitored for 24-48 hours for signs of infection. Precautionary antibiotic may be administered.

Burns

Burns can be sustained in a number of ways with children and the elderly where it is the most common. Scalds involving hot liquids are the most

common type of burns. In adults, flame burns are more prevalent and other causes can include chemical contact, electrical, friction damage, and sunburn.

The seriousness of a burn injury depends on several factors including the size, depth of the burn, the location of the burn, and the age and general medical condition of the burn patient. Clinical studies suggest that about 95% of all burns are relatively minor, however about 5% require hospitalization and highly specialized treatment. The severity of a burn determines the type of treatment it requires. There are 5 recognized grades of burns, minor/superficial, superficial partial thickness, mid dermal partial thickness, deep dermal partial thickness, and full thickness, which has replaced the first, second and third degree terminology used before.

Minor/Epidermal is characterized by red, painful, usually not blistered, and will heal within approximately 7 days with no scarring. Superficial dermal is characterized by blistered with pale pink base, very painful and usually heals by epithelialization in 10 – 14 days with no scarring. Mid – Deep dermal is characterized by blotchy, red or white base +/- blisters, no capillary return, predominantly painless, prolonged healing with possible scarring and contracture, and heal in 14 – 28 days. Full thickness is characterized by leathery, white or charred, painless, and prolonged healing with scarring and possible loss of function.

The clinical objectives for management of burns are stabilize the patient, cool the wound, debride devitalized (necrotic) tissue, protect from infection, and close the wound by first or second intention healing or by grafting.

The impact of first aid cannot be overemphasized with rapid, effective first aid helping to prevent further damage and deeper tissue loss. Burn wound conversion refers to the process whereby tissue damage can extend to deeper layers resulting in prolonged healing. This increases the risk of complications post healing such as contraction and keloid or hypertrophic scarring.

Pressure Ulcers

. A Pressure Injury is a wound caused by unrelieved pressure of tissue compressed between a bony prominence and an external surface which is classified according to the extent of tissue damage. Synonymous terms include pressure sores, bedsores, and decubitus ulcers. As a result of unrelieved pressure, the network of vascular and lymph vessels supplying oxygen and nutrients to the tissues can be occluded. Several factors are involved in determining if a Pressure Injury will develop and include: duration of pressure, intensity of pressure, and the ability of tissue to tolerate pressure (tissue tolerance). However, there is no universal agreement as to the length of time and the intensity of pressure before tissue damage occurs. Other major factors include: shear, friction forces, and moisture. Pressure Injuries affect people who are largely immobile. They are most common amongst the elderly, but can effect anyone who is confined to a bed or wheel chair. On average 10% of hospitalized patients can develop a pressure ulcer during their stay. Recent prevalence studies undertaken in several major Australian teaching hospitals identified the prevalence rate of pressure ulcers as being between 5. 4% and 15. 6%. The most common positions for

pressure ulcers are Sacrum/tail bone, Heel, Ischia/buttocks, and Greater trochanters/hip

Pressure injury classification are classified according to the level of tissue damage that has been sustained and staging system is used. There are 4 stages of pressure injuries, and are as follows. Stage one is described as intact skin with observable changes including areas of persistent redness. Stage two is described by partial thickness skin loss involving epidermis and or dermis. Stage three is described by full thickness involving damage or necrosis of subcutaneous tissue that may extend down to, but not through, underlying fascia. Stage four is described as full thickness skin loss with extensive tissue destruction to muscle, bone, or supporting structures, tendon, and joint capsule, and may have undermining or sinus formation.

The primary treatment and objective for management of pressure injuries are: reduction of pressure and shear forces, management of exudate, prevention of contamination leading to infection, creation of a moist wound environment, and to minimize the frequency of dressing changes, which is generally more cost effective, and provide more rapid healing and less disruption to the patient.

Skin Cancer.

Skin cancer occurs when errors occur in the DNA of skin cells. The mutations cause the cells to grow out of control and form a mass of cancer cells. Cells involved in skin cancer begin in your skin's epidermis. The epidermis provides a protective cover of skin cells that your body continually sheds.

The epidermis contains three main types of cells: the squamous cells that lie

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just below the outer surface and function as the skin's inner lining, the basal cells, which produce new skin cells, sit beneath the squamous cells, and melanocytes which produce melanin, the pigment that gives skin its normal color, and are located in the lower part of your epidermis. Melanocytes produce more melanin when you're in the sun to help protect the deeper layers of your skin. Where skin cancer begins, is determined by its type and will also determine the treatment options. Skin cancer is the abnormal growth of skin cells that most often develops on skin exposed to the sun. But this common form of cancer can also occur on areas of your skin not ordinarily exposed to sunlight.

There are three major types of skin cancer — basal cell carcinoma, squamous cell carcinoma and melanoma.

You can reduce your risk of skin cancer by limiting or avoiding exposure to ultraviolet (UV) radiation. Checking your skin for suspicious changes can help detect skin cancer at its earliest stages. Early detection of skin cancer gives you the greatest chance for successful skin cancer treatment.

Skin cancer develops primarily on areas of sun-exposed skin, including the scalp, face, lips, ears, neck, chest, arms and hands, and on the legs in women. But it can also form on areas that rarely see the light of day like your palms, beneath your fingernails or toenails, and your genital area.

Skin cancer affects people of all skin tones, including those with darker complexions. When melanoma occurs in people with dark skin tones, it's more likely to occur in areas not normally exposed to the sun

Ultraviolet light and other potential causes

Much of the damage to DNA in skin cells results from ultraviolet (UV) radiation found in sunlight and in the lights used in tanning beds. But sun exposure doesn't explain skin cancers that develop on skin not ordinarily exposed to sunlight. This indicates that other factors may contribute to your risk of skin cancer, such as being exposed to toxic substances or having a condition that weakens your immune system.

Risk factors

Factors that may increase your risk of skin cancer include:

- Fair skin. Anyone, regardless of skin color, can get skin cancer. However, having less melanin in your skin provides less protection from damaging UV radiation. If you have blond or red hair and light-colored eyes, and you freckle or sunburn easily, you're much more likely to develop skin cancer than is a person with darker skin.
- A history of sunburns. Having had one or more blistering sunburns as a child or teenager increases your risk of developing skin cancer as an adult. Sunburns in adulthood also are a risk factor.
- Excessive sun exposure. Anyone who spends considerable time in the sun may develop skin cancer, especially if the skin isn't protected by sunscreen or clothing. Tanning, including exposure to tanning lamps and beds, also puts you at risk. A tan is your skin's injury response to excessive UV radiation.
- Sunny or high-altitude climates. People who live in sunny, warm climates are exposed to more sunlight than are people who live in

colder climates. Living at higher elevations, where the sunlight is strongest, also exposes you to more radiation.

- Moles. People who have many moles or abnormal moles called dysplastic nevi are at increased risk of skin cancer. These abnormal moles — which look irregular and are generally larger than normal moles — are more likely than others to become cancerous. If you have a history of abnormal moles, watch them regularly for changes.
- Precancerous skin lesions. Having skin lesions known as actinic keratosis can increase your risk of developing skin cancer. These precancerous skin growths typically appear as rough, scaly patches that range in color from brown to dark pink. They're most common on the face, head and hands of fair-skinned people whose skin has been sun damaged.
- A family history of skin cancer. If one of your parents or a sibling has had skin cancer, you may have an increased risk of the disease.
- A personal history of skin cancer. If you developed skin cancer once, you're at risk of developing it again.
- A weakened immune system. People with weakened immune systems have a greater risk of developing skin cancer. This includes people living with HIV/AIDS and those taking immunosuppressant drugs after an organ transplant.
- Exposure to radiation. People who received radiation treatment for skin conditions such as eczema and acne may have an increased risk of skin cancer, particularly basal cell carcinoma.
- Exposure to certain substances. Exposure to certain substances, such as arsenic, may increase your risk of skin cancer

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