

## DECUBITI (PRESSURE SORES)

Human tissue can tolerate a relatively high level of pressure if it is distributed over a large area. If pressure is exerted, over a relatively small area for too long a period, capillary circulation will be impaired and ischemia (oxygen deprivation) of the involved tissues may result. If continued long enough, ischemia will provoke breakdown or necrosis of the involved tissues. The resultant ulcers are called *decubiti* or *pressure sores*.

The *decubitus ulcer* is generally a product of nursing neglect of patients suffering from a lack of sensory awareness. The majority of victims come from the population suffering from central nervous system injuries (cerebral vascular accident, loss of consciousness or spinal cord injury) and the aged infirm. Essentially, *decubiti* occur when the patient is allowed to sit or lie in one position (unmoving or unmoved) for too long. Though less frequent, *decubiti* may also occur from the pressure exerted on soft tissues by casts or splints that have been fitted too tight or whose angles exert too much pressure on a particular joint.

*Decubiti* primarily occur over the bony prominences of the elbow, the anterior or posterior iliac crest, the trochanter, ischial tuberosity, knee, malleolus, or heel. They often occur bilaterally and symmetrically. Most *decubiti* (60%) occur over the hip joints and buttocks. Less frequent sites include the pinna of the ear and over vertebral spinous processes.

The circumference and depth of the *decubitus* increases in direct proportion to how long the damaging pressure is maintained (intermittent pressure may also be damaging if it is repeated too frequently within a short period of time). The circumference of the injury site may vary from the size of a dime to one that encompasses an entire buttock or heel, and the injury depth may range from a surface discoloration to an ulcer that exposes bone.

Soft tissue damage from unabated pressure follows a predictable pattern of distinctive stages:

### Stage I: Decubiti

The first sign of ischemic injury is an inflammatory response of the skin, appearing as an irregular, poorly defined area of erythema continuing

unresolved for 30 minutes after the pressure is relieved. The color of the injury site varies from pale pink to bright red (it will completely blanch, temporarily, under probing pressure). The area appears slightly swollen and is excessively warm to the touch. If sensory innervation is normal, the patient will complain of pain and palpation tenderness. If the epidermis is still intact, the erythema will disappear in 24 hours and the tissues will be free of the reactive process within five to 10 days.

### Stage II: Decubiti

The erythema of the injury site will not blanch with probing pressure and the skin color is now dark red or even cyanotic. The epidermal skin layer has broken down to expose the dermis. In some cases, the wound will have penetrated the full thickness of the dermis to the subcutaneous fat layer. The edges of the ulceration will have become more distinct. As capillary circulation has decreased, the tissues have become increasingly cool and indurate. At this stage, if the pressure is relieved the wound (skin layers) will heal in two to four weeks without sustaining permanent damage.

### Stage III: Decubiti

Reactive fibrosis, inflammation, and the retraction of the dermis and subcutaneous fat have occurred. Tissue destruction has continued until it now reaches the deep fascial layer protecting the underlying muscle. Bacterial contamination of the wound has occurred and caused thrombosis of the small blood vessels. The bacteria have irritated the surrounding tissues, provoking a chronic state of inflammation. The inflammation has further increased the ischemia and the wound has grown in size. The infection may have generated a systemic response and the patient suffers from fever, dehydration and leukocytosis.

The wound now appears as an irregular crater edged by alternately colored (dark to light) rolled skin. The crater contains eschar and necrotic tissue and it is beginning to smell of decomposition. The floor of the wound is generally painless and sinus

tracts may have developed. The surrounding skin surface is suffering from erythema and is warm to the touch.

#### **Stage IV: Decubiti**

The necrotic process has begun to destroy the deep fascial layer. If it continues, muscle, joint and bone tissues will be destroyed (osteomyelitis may even develop). The crater now appears quite deep and may extend to the bone. Extensive undermining of the surrounding tissues has occurred and a well-developed sinus tract formation has appeared. The wound is now draining profusely and the smell of the exudate is extremely malodorous. If the patient is normally innervated (can feel) the bottom of the crater will now be painful. At this stage, the patient may be in danger of dying from complications (it is estimated that as many as 60,000 patients a year die from this source).

At this extreme stage, unaided healing may take many months to complete (12 or more months have been noted in the literature). Extensive and permanent tissue damage has occurred. Scar tissue formation and loss of normal tissue contours will mark the end of the healing process. Keloid formations may be a possible threat and there may be some functional loss through adhesion formation or contracture.

#### **Treatment**

*Decubiti* have been shown to be very responsive to treatment techniques used for treating chronic dermal lesions. They include the phonophoresis of vitamin E oil, and various electrical stimulation techniques used to increase capillary circulation while decreasing the threat of bacterial infection.

It is best, however, to avoid having to treat decubiti. To prevent *decubiti*, patients who must suffer enforced bed rest should be provided with a full-flotation bed or mattresses designed to evenly distribute the patient's weight (air-filled alternating pressure, *egg crate* foam rubber, silicone gel, or water mattresses). Likewise, wheelchair bound patients should be supplied with seat pads which distribute and cushion the sitting body weight (generally made of the same type of materials used in weight distributing mattresses). Regardless of the mattresses used, the bed bound patient should move or be moved after every 10 or 15 minute period to completely relieve the pressure on supporting bony prominences. This may mean going from back to stomach, back to side, side-to-side, or side to stomach. Wheelchair bound patients should shift positions after every 10 or 15-minute period, regardless of the type of seat cushion pad used (refer to Ultrahigh Frequency Sound (Ultrasound), Wound Healing).