Review on Pressure Sores

ABSTRACT

Pressure sore is a localised injury to the skin and underlying tissue caused due to unrelieved pressure on pressure points or bony prominences. The predisposing factors causing pressure ulcers are both intrinsic and extrinsic. Patients who are generally at risk, are those confined to bed or chair and unable to move without help. According to NPUAP (National pressure ulcer advisory panel), pressure ulcers can be categorised into four stages, and an unstable category also exists. Staging helps to select the mode of treatment. Diagnosis is mainly by MRI, bone scan, bone biopsy and blood culture, if necessary. As the cost of treatment and complications due to pressure sores increase with the period of stay, it is better to adopt preventive methods strictly to “at risk” patients. Prevention includes, identification of “at risk” patients using the three risk assessment scales and follow interventions to reduce the risks. Goals of treatment consist of resolution of infection, promotion of wound healing and effective infection control and in advanced stages, use of newer approaches like negative pressure wound therapy (VAC therapy-vacuum-assisted closure) and surgery.

KEYWORDS pressure sore, capillary pressure, intrinsic and extrinsic risk factors, staging, sepsis, osteomyelitis, negative pressure therapy (VAC), risk assessment scales

INTRODUCTION

Pressure ulcers have important consequences both for patients and health care system. They lead to intolerable pain, infection and high mortality rate in patients. Most younger individuals who develop pressure ulcers are males, compared to the increase in female gender in the elderly age group. More than 1% of the total health budget is spent on treatment of pressure ulcers1,2. Prevalence rates of pressure ulcers are 4.7–32.1% in hospital and 8.5–22% in nursing home settings. Studies show that in Indian setting, the prevalence rate reported is 4.94%3. During the first two weeks of admission alone, hospital acquired pressure ulcers occur in 9% of hospitalised patients. An average length of extended hospital stay for treatment of pressure ulcer is 13 days4.

The national pressure ulcer advisory panel (NAUAP) is an independent nonprofit organisation formed in 1987 and dedicated to the prevention, management, treatment and research on pressure ulcers.

Etiology

A pressure sore otherwise called as bed sore, pressure ulcer/necrosis, decubitus/ischaemic ulcer, occurs as a result of (extrinsic factors) such as prolonged and high pressure more than the capillary pressure or pressure in combination with shear force, friction burns and skin irritation by moisture. Prevalence of pressure sores increases with underlying diseases (intrinsic factors) like sepsisemia, UTI, pneumonia and other co-morbid conditions like respiratory and cardiac failure or complicated diabetes mellitus, with most of them (72%) above 65 years of age1,4. Vulnerable immobile patients are the stroke victims, elderly patients with fractures and other chronic ailments, diabetics, dementia and bedridden patients with impaired mobility and loss of sensation.

Pathophysiology

Two primary theories have been put forward to explain the development of pressure sore. First, the deep tissue injury theory, where the pressure ulcers begin from the bone and move upward. Second, the top to bottom model, where skin destruction occurs from epidermis and proceeds to deeper tissues. By the time, ulceration is present through the skin level, significant damage of underlying
muscle has already occurred making the overall shape of ulcer an “inverted cone”. Constant pressure between bone and external surface occludes the capillaries whose normal capillary pressure range from 16–33 mm Hg. External pressure when greater than 33 mm Hg occludes the blood vessels causing decrease in tissue perfusion, resulting in ischaemia, soft tissue necrosis and ulceration. The development of pressure sores are inversely proportional to the amount of soft tissue between bone and skin and directly to the duration of pressure.

Common locations of pressure ulcers are the occiput, scapula, shoulders, elbow, sacrum, greater trochanter, tibial tubercocities, lateral malleolus and heel. If prone, iliac crest, thighs and knees are affected.

Risk assessment scales in use are Norton/Norton plus scale, Braden/Modified Braden scale and Water low scale specified by NPUAP, help in assessment of the risk of development of pressure sore, in a given patient. International classification of diseases (ICD – 10) categorises pressure ulcers into four stages:

I. Nonblanchable erythema of intact skin.
II. Partial thickness skin loss involving epidermis or dermis. Lesions may be an abrasion blister or superficial ulcer.
III. Full thickness skin loss but not extending through fascia.
IV. Full thickness skin loss involving deeper tissues such as muscle, bone or joint structures.

Unstageable pressure sores

- Only deep tissue injury where there is no open wound but tissue beneath are damaged. Affected area is purple to dark red in colour.
- Base of the ulcer is covered by thick layer of slough, eschar or other tissue and base cannot be seen to determine the stage.

Complications of pressure sore can be divided into non-infectious and infectious complications.

1. Non-infectious complications like:
   - Malignant transformation
   - Marjolin’s ulcer
   - Amyloidosis
   - Heterotrophic bone formation
   - Pseudoaneurysm
   - Fistula formation

2. Infectious complications like:
   - Abscesses, sinus tracts, cellulitis, necrotizing fasciitis, osteomyelitis, endocarditis, meningitis, septic, arthritis etc.
   - Empirical antibiotics pending culture results should cover MRSA, anaerobes, Enterococci, gram +ve organisms and infection by non fermentors.
   - Osteomyelitis has been reported in 17–32% of infected pressure ulcers.

- Bacteremia and sepsis can occur and overall mortality is high in both conditions. A 5 years prospective study of bacteremia among long term care patients showed that infected pressure ulcers were the second leading cause of bacteremia after urinary tract infection.

**DIAGNOSIS**

Complete blood and biochemical parameters are done along with blood cultures if bacteraemia or sepsis is suspected. Swabs or aspirations from wound site are not of much value as it cannot usually differentiate colonisation with wound infection. Therefore, deep tissue biopsy specimens are only clinically significant. Imaging studies like plain X-ray, MRI and radionuclide scintigraphy are useful in diagnosing osteomyelitis. Bone scan and needle biopsy with HPE (histopathological examination) is recommended for diagnosis of osteomyelitis.

**Management**

Goals of treatment are to resolve infection and promote wound healing.

**Treatment**

- Topical antimicrobial agents commonly used are cadexomer iodine and silver. Parenteral antibiotic therapy covering polymicrobial infections with gram +ve, −ve and anaerobes, is indicated for invasive or systemic infection.
- Nutritional support given after assessing patient’s nutritive statements using bio electric impedance analysis.
- Newer methods like electromagnetic and ultrasound therapy, hyperbaric O2 therapy, use of growth factors (bicaplermin), negative pressure wound therapy, vacuum assisted closure (VAC) therapy for stages III & IV can be used to promote wound healing. This consists of removing tissue fluids and chronic wound exudates, reducing infectious materials and assisting in reformation of granulation tissues.

The following are the ways to prevent pressure sores and its complications:

- Prevent constant pressure in any part of the body.
- Eat healthy diet rich in protein.
- Keep skin clean and free from body fluids and faeces contamination.
- Use skin lotion to keep the skin from drying and cracking.
- Encourage early mobility.

The ability to minimise the four extrinsic risk factors (pressure, friction, stress and moisture) is crucial to prevent pressure ulcer. Thus the most important key in prevention of pressure ulcer is, promoting educational
programmes to patients and care givers. Importance of quality nursing and wound care should be emphasised.\(^1\)

Interventions designed to reduce the risk of development of pressure sores are:

1. Two hourly change of posture of bedridden patients, avoidance and reduction of pressure by spreading the body weight evenly using special beds, mattress and cushions.\(^2\)
2. Care should be taken to avoid folding and twisting of skin layers when shifting patients.
3. Pressure reducing devices can help to reduce or relieve pressure to less than the capillary closing pressure of 32 mmHg. They are of two types.
   - Static devices e.g., foam water gel or air mattresses.
   - Dynamic devices, which are alternating pressure devices which use a power source to distribute localised pressure.\(^3\)
4. Extensive wound debridement followed with removal of necrotic tissue, abscess drainage, appropriate dressing and surgical repair using skin grafts and free or myocutaneous flaps.

**CONCLUSION**

Thorough understanding and enhanced knowledge of this subject will improve the ability of clinicians and care givers to diagnose and treat pressure ulcers and importantly identify “at risk” patients and prevent development of pressure sores and its complications.

- As pressure ulcer treatment is costly, continued research and clinical trials and cost analysis have to be encouraged in order to make the newer modes of management and therapy available to all patients in a cost effective manner.
- Thus “prevention is better than cure” suits this condition the most.

**REFERENCES**