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Original Research Article

Evaluation and management of pressure ulcers in plastic surgery department at tertiary care center in India

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ABSTRACT

Background: A pressure ulcer also known as decubitus ulcers, bedsores, or pressure sores is a localized injury to the skin and/ or underlying tissue usually over a bony prominence, as a result of unrelieved pressure or pressure in combination with shear. When extrinsic pressure exceeds the capillary pressure of 32 mmHg than vessel occluded and blood flow stops. When pressure not relieved for 5 minute every 2 hour, then necrosis and ulceration will result.
Methods: Retrospective study of 74 patients with pressure injury admitted in SMS hospital Jaipur during 3 year duration from September 2019 to August 2022 requiring plastic surgery intervention. Patient specific factor, wound characteristics and flap outcomes analysed in study.
Results: Patients with early-stage pressure injury (stage I and II) and advance stage (stage III and IV) with deteriorating or terminal co-morbidities, managed with conservative treatment in form of dressing with pressure management. Patients with advance stage pressure injury (stage III and IV) managed with active operative intervention in form of debridement and flap cover surgery.
Conclusions: Prevention of pressure ulcer development is mainstay in management of both development and recurrence of pressure ulcer.

Keywords: Pressure ulcer, Ischial, Sacral, Trochanteric

INTRODUCTION

Pressure injury, pressure sore, bed sore, decubitus ulcer are cell death or necrosis in response to prolonged unrelieved pressure over bony prominences. The national pressure ulcer advisory panel (NPUAP) an independent American organization established in 1987 and European pressure ulcer advisory panel (EPUAP) established in 1996 define pressure sore as "localized injury to the skin and/or underlying tissue usually over a bony prominence as a result of pressure, or pressure in combination with shear and/or friction". Pressure sore are most costly and major preventable physical debilitating complication.[1] Incidence of pressure ulcer had wide range from 0.4% to 38% in hospitalized patients and prevalence varies from 3.5% to 69%.[2-4] External pressure greater than 32 mmHg occlude capillary blood flow; if pressure exceeds critical duration than cell death and tissue necrosis with ulceration develop. After specific pressure obliteration of skin and subcutaneous vessels more than underlying muscles according to Hussain; but tissue damage more in muscle than skin.[5,6] Normal average pressure exerted over ischial tuberosity during sitting is 100 mmHg, over trochanteric region in lateral lying position is 70-80 mmHg, over sacral region in supine position is 40-60 mmHg.[7]

Factor contributing pressure ulcer predisposition may be extrinsic factors (primary or main) or intrinsic factors (secondary). Extrinsic factors are unrelieved pressure, shear, friction, moisture, impaired mobility and abnormal

pressure. Intrinsic factors are altered consciousness, decreased sensation, anemia, edema and atherosclerosis.[8]

Other than predisposing causative extrinsic and intrinsic factors there are many risks factor which should be assessed in pre-ulcer development phase for every patient by risk assessment scale. Three scales are currently used as risk assessment scale. Norton scale developed by Doreen Norton.[9] Norton scale includes physical condition, mental status, activity, mobility and incontinence. Waterlow scale was developed by Judy Waterlow.[10] Waterlow scale include build or weight for height, skin type visual risk area, sex and age, tissue malnutrition, continence, mobility, appetite, neurological deficit and major surgery or trauma. Braden risk assessment scale was developed by Bergstrom in 1987 and most commonly used. Braden scale includes sensory perception, moisture, activity, mobility, nutrition, friction and shear.

Classification of pressure ulcer was first described by Darrell Shea into five categories by anatomic depth of soft tissue damage.[11] Most commonly used classification system presented by NPUAP. Four stage classification system, ranging from non-blanching erythema to full scale tissue destruction.

Stage 1: Non blanching erythema of intact skin, stage 2: Partial thickness wound involves the epidermis, dermis or both, stage 3: Full-thickness wound involves the epidermis, dermis, subcutaneous tissue and the superficial fascia but not through fascia and stage 4: Full-thickness wound, which involves the epidermis, dermis, subcutaneous tissue and the deep fascia, muscle, bone, ligaments, cartilage, joint capsule etc.

Goals of management are prevention of complications, prevention of existing sore to become larger, preventing sore in other location and closure of wound. “Prevention is better than cure” is best emphasized in the case of pressure ulcer by taking care of causative extrinsic and intrinsic factors.

Objectives

Our retrospective study from tertiary care centre focus on distribution of pressure ulcer in various age and sex group with associated co morbid conditions. Aims of study are find preventable cause for development and progression of pressure ulcer and treat these causes.

METHODS

Retrospective study of patients with pressure injury admitted in SMS hospital Jaipur during 3-year duration from September 2019 to Augusts 2022 requiring plastic surgery intervention. Patients present with pressure ulcer during this time period at our institute included in study. Staging conducted according to NPUAP from stage I to stage IV. Un-stage able ulcer excluded from study. Patient specific factor, wound characteristics and operative intervention in form of dressing, debridement and various flap cover analysed in study. Study was performed in accordance with the ethical standards of the institutional and/or national research committee with ethical standards as laid down in 1964 declaration of Helsinki and all its later amendments. Written and informed consent was obtained from all individuals for use of their clinical photographs in this study.

RESULTS

Pressure ulcer with limited mobility significantly threatens well being of patients. In our study pressure ulcer more common in male (58%) compared to females. Patients of advance age group 50-64 were most commonly affected. Co-morbid conditions associated were cerebro-vascular disease, head injury/spinal injury, dementia, leg bone injury and infirmity of old age. Commonest site were ischial pressure ulcer and stage IV according to NPUAP classification. Dressing and pressure management were sufficient in stage I and stage II patients but additional flap cover required for advanced stage III and stage IV patients.

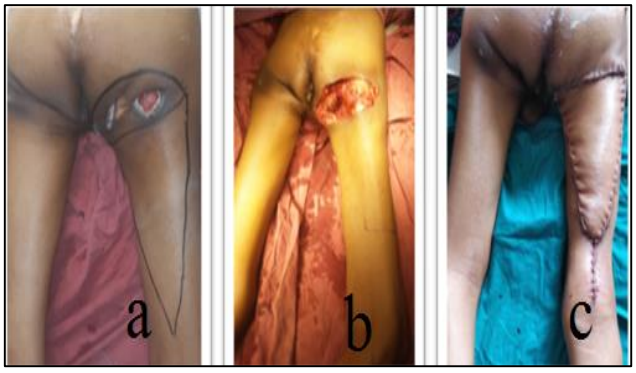

Figure 1: V-Y hamstring myocutaneous flap cover for ischial pressure ulcer; (A) pre-op picture with right ischial pressure ulcer, (B) intra-op post debridement wound defect & (C) post-op V-Y hamstring myocutaneous flap advancement cover of defect.

Figure 2: Gluteal myocutaneous rotation flap for sacral pressure ulcer; (A) pre-op wound, (B) defect after debridement, (C) inferiorly based gluteal myocutaneous rotation flap raised & (D) flap inset over defect.

Figure 3: Tensor fascia lata flap cover for trochanteric pressure ulcer. (A) Preoperative defect of trochanteric ulcer. (B) Tensor fascia lata flap elevation. (C) Flap inset over defect. (D) Donor area covered with split skin graft.

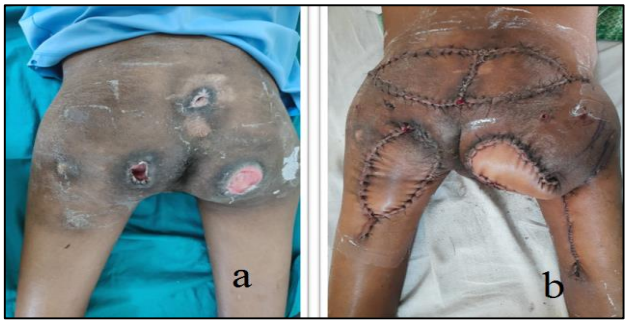

Figure 4: Bilateral V-Y gluteal fasciocutaneous flap, Left V-Y hamstring myocutaneous flap, right gluteal thigh flap cover for multiple pressure ulcers (A) Pre-op view of pressure ulcer stage IV at bilateral ischial and sacral region. (B) Post-op picture with flap cover.

Figure 5: Bilateral V-Y gluteal fasciocutaneous flap cover for sacral pressure ulcer. (A) Preoperative view of sacral pressure ulcer. (B) Intraoperative view after wound debridement and bilateral V-Y gluteal fasciocutaneous flap elevation. (C) Postoperative picture with complete flap inset and closure.

Table 1: Summary of patient factors, wound characteristics and operative intervention.

Variables	N
Patient factors	
Sex	
Male	43
Female	31
Age group (in years)	
14-49	28
50-64	37
65-74	9
Co-morbid condition	
Dementia	12
Head injury/spinal injury	23
Leg bone fracture	8
Cerebro-vascular disease	26
Other condition e.g., Infirmity of old age	5
Physical condition	
Good	7
Weak	28
Ill	25
Very ill	14
Mental status	
Alert	46
Apathetic	15
Confused	10

Continued.

Variables	N
Stuporous	3
Activity	
Ambulant	7
Walks with help	19
Chair bound	34
Bed ridden	14
Sensory perception	
No impairment	5
Slightly limited	21
Very limited	13
Completely limited	35
Mobility	
Full	7
Slightly impaired	19
Very limited	34
Immobile	14
In-continence	
No	2
Occasional	7
Usually urinary incontinence	23
Double incontinence	42
Previous surgery	
Primary	56
Recurrent	18
Wound characteristics	
Number of ulcer in each patient	
Single	46
Double	22
Multiple (>2)	6
Site of pressure ulcer	
Ischial	54
Sacral	29
Trochanteric	17
Occipital region	5
Heel	3
NPUAP stage	
Stage I	13
Stage II	26
Stage III	30
Stage IV	39
Operative intervention	
Dressing and pressure management	39
Debridement and flap cover	69
V-Y hamstring advancement flap	29
Gluteus myocutaneous rotation flap	17
Tensor fascia lata flap	11
V-Y gluteal fasciocutaneous flap	8
Gluteal thigh flap	4

DISCUSSION

Patients require prolonged course of treatment to fully heal their wounds. The basic principles of maintaining

the wound clean and well perfused by pressure reduction remain the mainstay of therapy. According to agency for health care policy and research bedridden patients should be repositioned every two hours. To minimize shear head should be maintained at the lowest degree of elevation and should not be elevated more than 30 degrees.[12] Pressure reducing devices can reduce pressure (in response to applied load) or relieve pressure (change load distribution with or without applied load) by lower tissue pressure to less than the capillary closing pressure of 32

mmHg. Pressure reducing devices classified as static (constant low pressure devices) or dynamic (alternating pressure devices).[13] Static devices or constant low pressure devices (foam, water, gel, air, and bead filled mattresses) mould around shape of patient and distribute patient's weight over large contact area. Dynamic devices or alternating pressure devices (alternating pressure mattresses, air fluidized bed, and low air loss beds) reducing duration of applied pressure by vary pressure beneath patient mechanically. Optimal nutrition and proper wound care are essential part of ulcer management. Necrotic tissue debridement and wound cleaning with normal saline required. Dressing that maintains a moist wound environment and facilitate healing are preferred. Trial of topical antibiotic should give for 2 to 4 weeks. Quantitative bacteria tissue culture performed for non-healing ulcer with sign of infection and high exudate output.[14] Surgical intervention required for advanced stage III and stage IV pressure ulcer to improve quality of life with rapid wound closure. Surgical intervention includes excision of complete pressure ulcer with its pseudo-bursa and flap cover.

Limitations

Small sample size was limitation in our study to represent mass population and make any hypothesis.

CONCLUSION

Pressure ulcers are major financial burden on healthcare system and debilitating illness for patients. Pressure ulcers are preventable with focus on causative factors and risk factor assessment. Preventive measures are effective in primary and recurrent pressure ulcer. Surgical intervention necessary in advanced cases.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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