SKIN COMPLICATIONS IN ORTHOPEDIC PATIENTS

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Abstract

Background: Skin complications are a common occurrence in orthopedic patients, and they can significantly impact patient outcomes and quality of life. Knowledge of these complications and contributing factors is important for design and development of preventive approaches. Therefore, this study was designed to assess skin complications in orthopedic patients.

Methods: In this case-series study, 53 orthopedic patients referred to Divisional Railway hospital, Ambala from 2019 to 2020 with skin complications were analyzed. The adverse effects were assessed with respect to type and contributing factors. Fisher's exact test, Chi-square, and independent sample t-test were performed to assess the associations between skin complications and other variables.

Results: In total, 30 (55.5%) cases of fracture and 5 (9.4%) cases of cellulitis were studied, while the remaining cases presented with osteoarthritis-related arthroplasty, disc herniation, osteomyelitis, etc. Skin complications in orthopedic patients included hypersensitivity reactions in 35 (66.03%) cases, infections in 14 (26.4%) cases and 4 (7.5%) cases with other complications. Severe reactions presenting as toxic epidermal necrolysis were observed in 1 patient, who recovered eventually. Age and gender were not related to the type of skin complications ($P>0.05$).

Conclusion: Skin complications in orthopedic patients were not uncommon. These complications can lead to increased morbidity and rarely mortality in orthopedic patients emphasizing the need for preventive strategies, multidisciplinary approaches and evidence based interventions.

Keywords: Skin complication, Orthopedic procedures, Hypersensitivity reactions

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Introduction

All surgical procedures, even the simplest ones, are associated with an unending list of complications. Skin complications in orthopedic patients are an important aspect of healthcare management, as they can significantly impact patient outcomes and quality of life. These changes can be attributed to a variety of factors, including surgical procedures, immobilization, medications and use of orthopedic devices. Understanding the nature, prevalence, underlying mechanisms and impact of these skin complications is essential for healthcare professionals to ensure prevention, timely intervention and optimal patient care.

The skin being the largest organ of the body, can be significantly affected by orthopedic conditions, trauma, surgeries or other related factors. Orthopedic patients who are immobilized or have limited mobility nay also experience moisture-associated skin damage. Prolonged exposure to moisture from sweating, incontinence or wound drainage can lead to skin maceration and disruption of epidermal integrity and barrier function, further predisposing to variety of cutaneous infections. Studying skin changes in orthopedic patients involves a multidisciplinary approach with orthopedic surgeons, dermatologists, wound care specialists, nurses and other healthcare workers acting together to assess, prevent and manage these conditions. Research in this field aims to improve understanding of the underlying mechanisms of skin changes, develop preventive measures, refine treatment protocols and enhance patient outcomes. Also, by addressing skin complications in orthopedic patients proactively, healthcare providers can minimize complications, improve patient comfort and expedite recovery

There is a paucity of studies on this topic in literature. Hence the present study was designed to assess the skin complications seen in orthopedic patients.

Material and methods

This observational study was conducted during 2019-2020 among 305 cases (including outpatient and hospitalized patients), referred to Northern Railway Divisional Hospital, Ambala. We selected 53 adult patients, subsequently referred to a dermatologist by an orthopedic surgeon due to skin complications.

Written informed consent was taken from all the patients. The demographic profile and epidemiological data was recorded in pre-designed proforma. Skin examination was carried out by qualified dermatologist. Diagnosis of skin disorders was mostly based on clinical features, however required bed-side tests and specific investigations were carried out when required for reaching a specific diagnosis. The exclusion criteria were:

1. Patients with known skin disease
2. Pregnant or lactating women
3. Patients who refused to give consent.

Results

The mean age of the participants was 38.1±12.5 yr. Moreover, 32 (60.4%) and 21 (39.6%) patients were males and females, respectively. Overall, 30 cases of fracture and 16 cases of cellulitis were detected.

The remaining cases included complications, such as disc herniation, nerve involvement, and osteoarthritis-related arthroplasty. The patients' conditions are shown in table 2.

Table 1: Demographic Data of patients

Gender	
Male	32 (60.4%)
Female	21 (39.6%)

Table 2: Underlying Orthopedic disease

	No. of patients
Fracture	30
Cellulitis	5
Osteoarthritis related arthroplasty	3
Disc herniation	4
Rheumatoid Arthritis	1
Osteomyelits	3
Low back ache	4
Club foot	1
Others	2

Skin complications in orthopedic patients included hypersensitivity reactions in 35 (66.03%) cases, infections in 14 (26.4%) cases and 4 (7.5%) cases with other complications.

The most common causes of bacterial infection were *Staphylococcus* species (88%) and *Pseudomonas aeruginosa* (8%). Eight patients had intertrigo with Candida and tinea infections in the inguinal region. All intertrigo patients underwent hip arthroplasty surgery. However, there was no significant correlation between the underlying cause of admission and infection rate (P=0.7). In addition, age and gender were not related to the type of skin infection in patients (P=0.6).

Hypersensitivity reactions seen were in the form of local skin reactions and generalized drug eruptions secondary to prescribed orthopedic drugs. Local skin reactions were observed as irritant or allergic contact dermatitis with erythema, edema and pruritus, and less frequently, bullous lesions. Orthopedic implants and bandages were

responsible for most cases of local contact dermatitis. Other causes are presented in table 3.
Generalized drug eruptions were seen in 15 patients and were caused by a variety of orthopedic prescription drugs. NSAIDs were the most commonly implicated drug (53.3%), followed by Antibiotics (33.3%), Alendronate (6.6%) and cartilage repair supplements (6.6%). Severe skin reactions, presenting as toxic epidermal necrolysis, was seen in one patient. This patient has developed this reaction pattern after administration of Diclofenac (NSAID) and the patient recovered eventually.
Urticaria was the most common pattern observed (33.3% of cases) followed by maculopapular rash (26.7%), fixed drug eruptions (20%), cutaneous vasculitis (13.3%) and SJS/TEN seen in one patient (6.7%).
Commonly implicated drugs and reaction patterns observed are tabulated in table 4 and 5.
No significant correlation was observed between the underlying cause of admission and skin reactions (P=0.6).

Table 3: Local skin reaction to most common orthopedic devices

	No. of cases
Topical pain-relieving gels	5
Orthopedic casts	6
Orthopedic implants (plate/screws)	2
Corn/callus removal tapes	6
Surgical tape	1

Table 4: Commonly implicated drugs causing generalized drug reactions

NSAID	8 (53.3%)
Antibiotics	5 (33.3%)
Alendronate	1 (6.6%)
Cartilage repair supplement	1 (6.6%)

Table 5: Pattern of drug reactions observed

Urticaria	5 (33.3%)
Maculopapular drug rash	4 (26.7%)
Fixed drug eruption	3 (20%)
Cutaneous vasculitis	2 (13.3%)
SJS/TEN	1 (6.7%)

Other complications included depigmentation at injection site after intralesional corticosteroid injection for tendonitis in 2 patients and skin lacerations after implanting plates in 2 patients. Both these lacerations occurred in hospital-admitted patients.

Discussion

In this study, skin complications were assessed in orthopedic patients. The skin complications presented in 3 main categories, including hypersensitivity reactions, infections and other less common adverse effects.
Hypersensitivity reactions were seen in the form of local allergic reactions to implants, fixators, locally applied medications and other orthopedic devices. The main symptoms include erythema, itching, rash or blistering. These hypersensitivity reactions may lead to implant loosening and implant failure, leading to reoperation (1,2). Hypersensitivity reactions may be seen in up to one-fourth of patients undergoing orthopedic surgeries (3,4). The need for reoperation and removal of orthopedic devices (or replacement with less allergenic devices) may be indicated in severe cases (5,6).
Systemic drug reactions in orthopedic patients are similar to other surgical patients. The most routinely prescribed drugs are nonsteroidal anti-inflammatory drugs (NSAIDs) (7). Although skin eruption due to NSAIDs is commonly mild, severe conditions, such as toxic epidermal necrolysis and Stevens-Johnson syndrome, may occur. In this study, the majority of negative reactions to NSAIDs were urticarial eruptions, although vasculitis (a rare skin reaction to NSAIDs) has been reported in the literature (8) was also seen. Systemic antibiotic prophylaxis in orthopedic surgeries is the standard practice. Cephalosporins are commonly prescribed antibiotics, and urticaria and maculopapular eruptions are the most common reactions; fatal reactions have been also reported in other studies (9). In our study, one patients had developed TEN after taking diclofenac. Three per 10000 patients in orthopedic wards can experience such drug reactions, and careful attention must be paid to the high risk of TEN with NSAIDs and antibiotics.
Generally, scattered and limited studies have been done in this area, whose results are mostly consistent with our study, though with certain differences due to the type of study, type of treatment, etc. The prophylactic use of antibiotics was evaluated, (10) or examined the difference between the upper and lower extremity infections in Germany (11) and a study (12) investigated the difference between the position of the fracture and postoperative infection.
Infections at or near surgical incisions within 30 days of an operative procedure are known as surgical site infections, which may present as skin infections (0.5%–2%) (13). The most common contributing bacteria are skin flora, such as coagulase negative *Staphylococci* (14, 15). Occasionally, other less common bacteria may be seen in some patients, especially those with immunodeficiency or underlying diseases (15–17). When the implants are located on the target site, successful biointegration requires colonization of a

highly reactive implant surface by host cells (18). Bacteria such as Staphylococcus species may attach to metallic or polymeric devices and colonize the implant surface instead of the host cells. Once attached, these bacteria can develop a biofilm and undergo phenotypic changes, which make them somewhat resistant to the host's immune responses (19, 20). These infections are usually treatment-resistant, and responses to common antibiotics are less expected (21, 22). In more procedures complex, half of infected patients may require reoperation for wound debridement or sometimes skin flap closure (23).

Use of broad-spectrum antibiotics may be optionally indicated to reduce the resistance and recurrence of skin infections after orthopedic procedures (24, 25). In severe cases, removal of external devices may be necessary (1).

There are some other skin complications associated with orthopedic procedures, such as hypopigmentation after local corticosteroid injection to control the joint and tendon inflammation. Overall, this complication is quite rare (estimated risk, <1%), and steroid injections may result in skin atrophy or hypopigmentation (7). On the other hand, we can reduce the risk of subcutaneous fat atrophy and hypopigmentation by using soluble and potent steroids. Overall, low-solubility steroids (e.g., triamcinolone acetonide) are suggested for deep structures (e.g., knee), while high-solubility steroids (e.g., betamethasone and dexamethasone) are administered preferably in soft tissues (e.g., carpal tunnel and tendon sheath) (26).

Conclusion

The results of this study suggest that skin changes significantly increase the morbidity in orthopedic patients. This further emphasize the need for preventive strategies and a multidisciplinary approach in managing orthopedic patients. Knowledge of these adverse effects is essential so that healthcare professionals can closely monitor, adhere to preventive measures and promptly address such complications to optimize patient care and outcomes.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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