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Autonomic denervation dermatitis – A post-operative enigma

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Dear Editor,

Autonomic denervation dermatitis (ADD) is an underrecognized, cutaneous complication presenting in the post-operative period. Herein, we describe a case series of 4 patients with this entity. Three males and one female, belonging to the age group 25–50 years, presented to the dermatology outpatient with lesions that developed 6–12 months after undergoing surgery around the knee. The lesions were well-defined erythematous-to-hyperpigmented scaly plaques adjacent to the surgical incision site [Figure 1 and Table 1]. Two of the patients reported associated numbness. Diagnosis of ADD was made, and they were prescribed mid-potency topical steroids and emollients. The lesions resolved within the next few weeks, and emollients were continued for maintenance.

The term ADD has been coined to include all eczematous eruptions at or around surgical sites, regardless of the nature and site of the operative procedure. It has been proposed to include a subset terminology known as "SKINTED," surgery of the knee, injury to the infrapatellar branch of the saphenous nerve (IPSN), and traumatic eczematous dermatitis.[1] Clinically, ADD can range from a simple rash to an extensive eruption or even an excoriated zone of papules or macules. It can be asymptomatic or associated with numbness and can run a chronic and persistent course exhibiting frequent remission and relapse. The associated numbness resolves over time with reinnervation of the area by the surrounding neural structures. On histopathology, it is suggestive of chronic spongiotic dermatitis.[2]

ADD occurs secondary to iatrogenic insult. It has been postulated that the injury to the IPSN, which supplies the anterolateral aspect of the knee below the patella, increases the transepidermal water loss, leading to xerosis and also alters the behavior of keratinocytes by hampering the secretion of neuropeptides including substance P and acetylcholine. This leads to disruption of the epithelial barrier and increases the risk of dermatitis over the affected area.[2] Another mechanism that has been proposed for the occurrence of eczema in hypoesthetic skin is a defect in forming inter-corneocyte lipids due to faulty release of ceramide from the lamellar bodies leading to an improper water barrier formation.[3] It has also been proposed that skin incisions can cause transections of dermal nerves, leading to

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Table 1: Clinical characteristics of patients.

Patient no.	Age/ Gender	Type of intervention	Latency period	Site of eczema	Sensory loss	Treatment
1	27/M	Surgery for proximal tibia fracture fixation	9 months	Lateral to incision	Absent	Topical steroids Emollients
2	32/M	Surgery for proximal tibia fracture fixation	12 months	Lateral to incision	Absent	Topical steroids Emollients
3	37/M	Surgery for distal femur fracture fixation	6 months	Lateral to incision	Present	Topical steroids Emollients
4	42/F	Surgery for distal femur fracture fixation	11 months	Lateral to incision	Present	Topical steroids Emollients

F: Female, M: Male

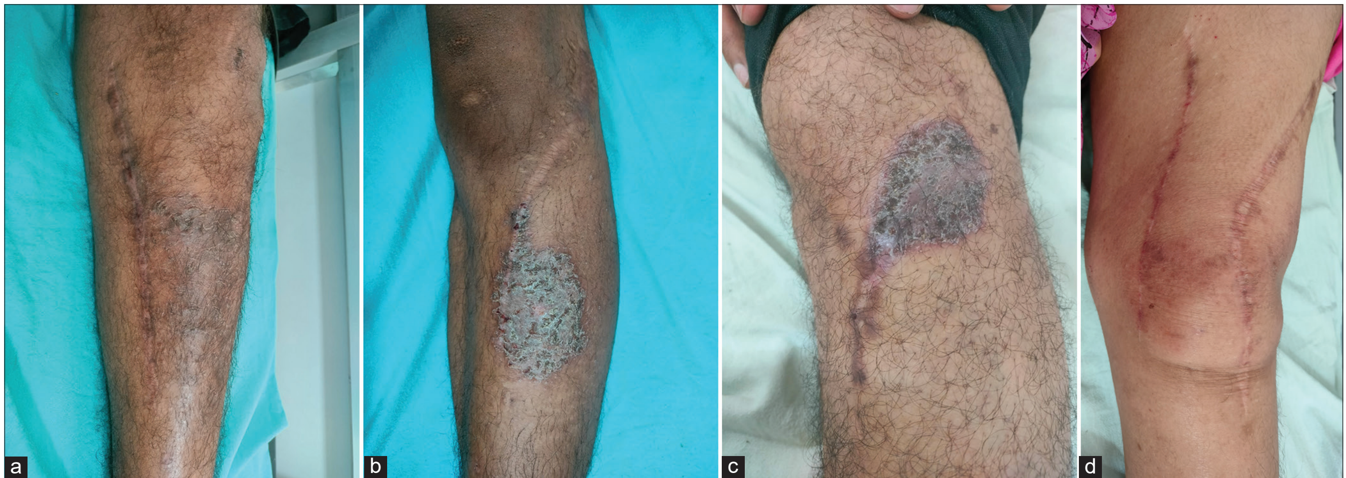

Figure 1: Well-defined hyperpigmented eczematous plaques adjacent to the surgical incision site in (a) patient 1, (b) patient 2, (c) patient 3, and (d) patient 4.

denervation and impairment of sudomotor and vasomotor responses. "Trophoneurosis" is used to describe the alteration in cutaneous architecture and physiology after injury to peripheral nerves.[1] Injury to IPSN is common, but only a few develop ADD, which is explained by a probable theory of the extent of nerve damage, wherein a larger incision with some crushing component due to retraction may lead to more chances of developing ADD.[4] Figure 2 shows the distribution and sensory area supplied by the infrapatellar nerve. It is important to distinguish ADD from hypersensitivity to iodine or dressing patches and metal hypersensitivity. Hypersensitivity reaction to iodine or dressing patches is localized to the application area only, could be anywhere around the knee, and is not associated with sensation loss. Metal hypersensitivity is more generalized, presents all around the knee, and could be associated with swelling and fluid formation.[5] ADD is more location specific, with most cases localized at the inferolateral aspect of the knee along with numbness in IPSN distribution.[6] Table 2 summarizes the recent studies regarding ADD.

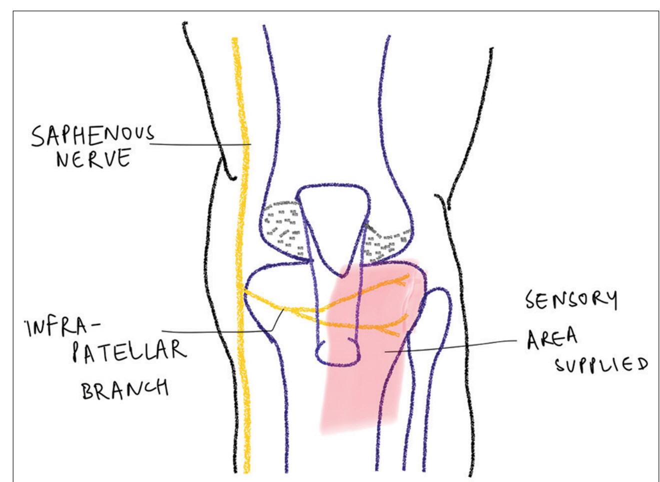

Figure 2: Diagram showing the sensory area supplied by the infrapatellar nerve.

Treatment of ADD includes maintaining the skin barrier through the use of emollients and occlusive moisturizers and short-term use of topical steroids.[1] Dermatologists and surgeons should be aware of this underreported entity to permit early diagnosis, management, and allay unnecessary anxiety in the post-operative period.

Table 2: Review of recent cases of autonomic denervation dermatitis.

S. No.	Author	Study design	Number of patient	Type of intervention	Latency period	Site of eczema	Time for resolution	Treatment
1.	Pathania and Singh[7]	Case report	1	TKA	3 months	Lateral to incision in both knees	2 weeks	NR
2.	Mathur and Sharda[8]	Case Report	2	TKA	11–16 months	NR	NR	NR
3.	Nazeer *et al*[4]	Prospective cohort study	148	TKA	3–6 months	Lateral to surgical site	4–10 weeks	Topical steroids
4.	Mukartihal *et al.*[6]	Retrospective cohort study	3318	TKA	2–6 months	Lateral to surgical site	6–12 weeks	Topical steroids
5.	KavyaDeepu and Sekar[9]	Case report	1	TKA	3 months	Lateral to surgical site	2 weeks	Topical steroids
6.	Mahajan *et al.*[10]	Case report	1	TKA	3 months	Lateral to surgical site	8 weeks	Topical steroids
7.	Das *et al.*[11]	Case report	1	Amputation of great toe of right foot	2 years	Dorsum of right foot	NR	Topical steroids
8.	Baxi *et al.*[12]	Case series	3	TKA	3–5 months	Over, lateral and medial to surgical site	NR	Topical steroids
9.	Ray *et al.*[13]	Case report	1	Coronary artery bypass Graft surgery	2 years	Medial aspect of the left lower limb	NR	Topical steroids
10.	Vivekanandh, *et al.*[14]	Case series	6	1-Coronary artery bypass graft surgery 2,3,4-Split-thickness skin graft 5,6-Surgery for left Tibial fracture	4 months–3 years	1,2,3,4-ver graft site 5,6-Over trauma site	NR	3-topical steroids Rest-NR

NR: Not reported, TKA: Total knee arthroplasty

Authors' contributions

Ranjana Beniwal: Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Project Administration, Supervision, Visualization, Writing (Original Draft), Writing - Review and Editing. Akriti Agrawal: Conceptualization, Data Curation, Formal Analysis, Methodology, Project Administration, Visualization, Writing (Original Draft), Writing - Review and Editing. Devendra Singh: Conceptualization, Formal Analysis, Investigation, Methodology, Project Administration, Supervision, Visualization, Writing - Review and Editing.

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Institutional Review Board approval is not required.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript, and no images were manipulated using AI.

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