

# DERMATOLOGICAL CHANGES OF AMPUTATION STUMP

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Dermatological changes of stumps of 174 amputees are presented. The commonest dermatological change recorded at the site of amputation stump was hyperpigmentation in 46 (26.4%) followed by callosities in 32 (18.3%), scaling in 29 (16.7%), cutaneous atrophy in 20 (11.5%), lichenification in 19 (10.9%), traumatic ulcer and bacterial infections in 18 (10.3%) each, hypertrophic scar in 14 (8.1%), hypopigmentation and corns in 13 (7.4%) each, verrucous hypertrophy of stump in 12 (6.9%), dermatophytic infection in 5 (2.9%), stump oedema and phantom limb in 4 (2.3%) each, intertriginous dermatitis in 3 (1.7%), allergic contact dermatitis (resin) and frictional eczema in 2 (1.1%) each. Epidermoid cyst, keloid formation, anaesthesia, gangrene and cutaneous horn were recorded in 1 (0.6%) each. Atrophy (epidermal and dermal), anaesthesia, alopecia and elephantiasis of the stump have not been documented in the literature earlier.

## Introduction

Loss of a limb causes not only physical disability but also leads to psychological, social and economic handicap. The loss can be overcome to a certain extent by provision of a suitable artificial limb which restores the function as well as the total body image. The amputation stump, which comes in continuous contact and bears weight on the prosthesis, undergoes certain changes, some of which are easily identifiable but require no treatment e.g., pigmentary change, some require treatment e.g., corns, callosities, traumatic ulcer etc, whereas rarely there are some potentially fatal disorders that have an early or major dermatological manifestation, which if not recognised or treated early in their course, can sooner or later lead to death e.g., gangrene. The present study was undertaken to study the dermatological problems of amputation stump. There has

been no similar work documented in Indian literature to the best of our knowledge.

## Material and Methods

The material for the study consisted of amputees attending the outpatient department of Dermatology, Command Hospital, Southern Command and in-door amputees hospitalised in Artificial Limb Centre, Pune from June 1991 to July 1992. The methodology included detailed history recording, general physical examination and systemic examination of cardiovascular system, central nervous system, respiratory system, abdomen and joints and dermatological examination with special emphasis on examination of amputation stumps. Laboratory investigations included haemoglobin estimation, total and differential white cell count, urinalysis, blood sugar estimation (fasting and postprandial), pus culture and antibiotic sensitivity in secondarily infected lesions, scraping for fungus, skin biopsy and radiological examination of stump and when indicated. Patch test to establish the diagnosis of allergic contact dermatitis was carried out with different types of

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rubber, leather, wood, plastic, fibre-glass, resins and hardners.

## Results

The age group of patients varied from 17 to 92 years. 128 (73.5%) patients were in third, fourth and fifth decades of life; 100 (57.5%) patients had been amputees for more than 10 years and 1 (0.6%) was an amputee for more than 50 years. Remaining 73 (41.9%) were amputees of less than 10 years duration. 106 (60.9%) underwent amputation because of war/warlike conditions. Accidental injuries necessitated amputation in 57 (27.7%) and in the remaining 11 (6.4%) indication of amputation was disease or investigative procedure for the disease process. 162 (93.2%) were lower limb amputees and 21 (12.1%) were upper limb amputees. 9 (5.2%) had more than 1 limb amputated. Prosthesis used were primarily of plastic in 88 (50.6%), of wood in 58 (33.3%) and 1 patient was using indigenous prosthesis. 27 (15.5%) patients had undergone amputation and were waiting for prosthesis. 14 (8.9%) patients had associated systemic diseases. The commonest dermatological change recorded at the site of amputation stump (Table I) was hyperpigmentation in 46 (26.4%) followed by callosities in 32 (18.3%), scaling in 29 (16.7%), cutaneous atrophy in 20 (11.5%), lichenification in 19 (10.9%), traumatic ulcer and bacterial infections in 18 (10.3%) each, hypertrophic scar in 14 (8.1%), hypopigmentation and corns in 13 (7.4%) each, verrucous hypertrophy of stump in 12 (6.9%), dermatophytic infections in 5 (2.9%), stump oedema and phantom limb

in 4 (2.3%) each, intertriginous dermatitis in 3 (1.7%), allergic contact dermatitis (resin) and frictional eczema in 2 (1.1%) each. Epidermoid cyst, keloid formation, anaesthesia, gangrene and cutaneous horn was recorded in 1 (0.6%) each.

**Table I.** Dermatological changes on amputation stumps

Sl. No.	Manifestation	Number	Percent
1.	Allergic contact dermatitis (resins)	2	1.1
2.	Alopecia	8	4.6
3.	Anaesthesia	1	0.6
4.	Atrophy		
	(a) Epidermal	16	9.2
	(b) Dermal	4	2.3
5.	Bacterial infections	18	10.3
6.	Callosities	32	18.3
7.	Corns	13	7.4
8.	Cutaneous horn	1	0.6
9.	Dermatophytic infections	5	2.9
10.	Elephantiasis stump	1	0.6
11.	Epidermoid cyst	1	0.6
12.	Frictional bulla	1	0.6
13.	Frictional eczema	2	1.1
14.	Gangrene	1	0.6
15.	Hypertrophic scar	14	8.1
16.	Intertrigo	3	1.7
17.	Keloid	1	0.6
18.	Lichenification	19	10.9
19.	Miliaria	1	0.6
20.	Mycetoma	1	0.6
21.	Phantom limb	4	2.3
22.	Pigmentary change		
	(a) Hyperpigmentation	46	36.4
	(b) Hypopigmentation	13	7.5
23.	Pruritus	7	4.0
24.	Psoriasis	3	1.7
25.	Scaling	29	16.7
26.	Stump oedema	4	2.3
27.	Traumatic ulcer	18	10.3
28.	Verrucous hyperplasia	12	6.9
Total*		174	100.0

\* Total exceeds the number of patients as some patients had multiple dermatological changes.

## Comments

Basic requisites of an artificial limb are that it should be functional, stable, light and cosmetically acceptable. To meet these requirements there are 4 components viz. socket, suspension system, joint and components which include thighs, shin, foot, arm, forearm and hand. In spite of best of prosthesis which meet the requirements, each time a lower leg adult amputee places a step forwards, it bears an average weight of 70 kg on an amputation stump. The skin of the stump primarily not anatomically structured for such a function bears the brunt of misuse and overuse. In addition, the amputation stump is subjected to many insults e.g., hot and humid climate within the socket and uneven loading which causes stress on localised areas of stump skin in the form of intermittent stretching and friction from rubbing against the socket edge.<sup>1</sup> Constriction of the soft tissue may cause significant obstruction to venous and lymphatic drainage of the leg. All these factors lead to numerous cutaneous changes. The spectrum of such manifestations varies from an insignificant cutaneous finding like change of colour to a life threatening condition e.g., gangrene of stump.

Repeated friction or shearing trauma of prosthesis leads to some specific dermatological changes on the stump. Callosities were seen in 32 (18.3%), and corns were observed in 13 (7.4%) amputees. These resulted from chronic frictional injuries and uneven pressure on the stump in obese and in the amputees indulging in occupations involving weight bearing and walking. Acute frictional force as a result of continuous walking for a

long distance had produced a thick topped bulla in 1 patient. The frictional bulla possibly resulted from prickle cell necrosis causing an intraepidermal slit which was filled with fluid. Frictional eczematous dermatitis was seen on 2 (1.1%) stumps. It appeared to have resulted from mild repetitive, frictional injury playing an important, initiating, localising and perpetuating role. The importance of friction on the skin was recognised long ago.<sup>2</sup> Scaling, resulting from minimal friction seen best on the inferior part of stumps which rests on the base of socket was present in 29 (16.7%). Psoriasiform lesions with positive Auspitz's sign were seen in 3 (1.7%). The lesions on the stump simulated Koebner's phenomenon. Epidermoid cyst<sup>4,5</sup> was present in 1 (0.6%) amputee after the prosthesis was worn for over a decade. It is likely that cysts originate from shearing forces invaginating fragments of epidermis into dermis. Traumatic ulcers were present in 18 (10.3%) amputees as a result of continuous use of artificial limb. Lichenification was recorded in 19 (10.9%) amputees. It had resulted possibly as a protective mechanism to repeated frictional trauma.

Miliaria rubra resulting from hot and humid climate within the socket to which the amputation stump was subjected, was present only in 1 (0.6%) case. The incidence of this condition was rather low keeping in view the subtropical climate of the country. However, in Pune where the study was carried out the climate is moderate and a case of miliaria is rarely seen as an outpatient.

Keloids and hypertrophic scars represent a fibroblastic response to injury

in excess of that appropriate for repair of the trauma.<sup>6</sup> The former has a familial tendency and was observed in 1 (0.6%), the later undergoes some resolution in time and were seen in 14 (8.1%) amputees. Epidermal atrophy was present in 16 (9.2%). Dermal atrophy was present in 4 (2.3%). 1 (0.6%) amputee with dermal atrophy had anaesthesia of the major portion of the stump. The atrophies and anaesthesia had not been recorded in the literature earlier and so was stump (traumatic) alopecia which manifested in 8 (4.6%) as short broken hair or black dots when the hair had been completely rubbed off as a result of frictional trauma.

Stump oedema<sup>7</sup> manifesting as diffuse swelling of stump which pitted on pressure, not present on the counter lower limb and for which no systemic disorder could be elicited, was recorded in 4 (2.3%) patients in the present series. The condition appears to result from increased perfusion of the tissues. Chronic oedema, simulating growth of dermal connective tissue causing permanent enlargement and deformity of stump resembling elephantiasis was present in 1 (0.6%). Filariasis was excluded. Stump elephantiasis has been documented earlier.

A cutaneous horn was seen in 1 (0.6%) below knee amputee. Mayne<sup>8</sup> had reported a similar lesion in 1931. Verrucous hyperplasia of the stump initially reported by Lowenthal<sup>9</sup> in 1953 was seen in 12 (6.9%) lower limb amputees. The condition appeared to result from poor prosthetic fit and alignment for a prolonged period and possibly bacterial infection.

Some patterns of allergic contact dermatitis (ACD) immediately suggest the cause<sup>10</sup> whereas in others patch testing has to be done to confirm the aetiological agent.<sup>11,12</sup> 2 (1.1%) patients had ACD to resins confirmed by patch testing. The condition was not easily recognisable, hence all cases of eczema on the stump had undergone patch testing to resins, lacquers, hardners, varnish, plastic and rubber material used for the prosthesis.

Phantom limb, an illusion of the persistence of a part of the body which was lost by amputation<sup>13</sup> was recorded in 4 (2.3%). In 3 (1.7%) it was painless and in 1 (0.6%) it was painful.

Intertriginous dermatitis was seen in 3 (1.7%) amputees in the folds of the stump. It appears that protective layer of keratin was removed by friction predisposing to bacterial infections.<sup>14</sup> Moisture, warmth and maceration had led to dermatophytosis of stump in 5 (2.9%) and to pyodermas viz. folliculitis, furunculosis, cellulitis, ecthyma, poritis and periporitis in 18 (10.3%). The infections were severe, serious, chronic, persistent and difficult to manage in diabetic amputees.

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