

Linear lesions in dermatology

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INTRODUCTION

Linear lesions in dermatology are commonly encountered. They vary in cause; being congenital or acquired; vary in morphology and can present as macules, papules, patches, plaques, vesicles or nodules; they can be inflammatory or non-inflammatory; it can be a single lesion which is linear or multiple lesions which are arranged in a linear pattern. The causes for occurrence in a linear pattern include lesions following Blaschko's lines, blood vessels, lymphatics and dermatomes; due to Koebner's phenomenon and auto inoculation; external factors; infestations like cutaneous larva migrans and burrows of scabies. We review each of these causes one by one.

BLASCHKO'S LINES

Blaschko's lines are imaginary skin lines which various skin conditions are known to follow. They do not follow neural, vascular, or lymphatic structures and are distinct from dermatomes as well as Langer's lines.^[1] These were first described by Alfred Blaschko in 1901. The most widely accepted basis for these lines is genotypic mosaicism, i.e., presence of more

than one type of cell lines within the body.^[2,3] The causes for mosaicism are half chromatid mutation, lyonization, post zygotic mutation, chromosomal non disjunction, and chimerism.^[3] The most common disorders following Blaschko's lines are enlisted in Table 1.^[2-5]

Figures 1-3 show a few conditions following Blaschko's lines.

There are case reports of hypermelanotic macules of McCune-Albright syndrome,^[6] extragenital lichen sclerosis,^[7] eosinophilic cellulitis,^[8] erythematous rash of scarlet fever,^[9] Bart syndrome,^[10] linear scalp lupus profundus,^[11] all following Blaschko's lines.

BLOOD VESSELS

Blood vessels have a longitudinal course in the body. Hence, lesions which occur in blood vessels are likely to have a linear pattern. These include the following:

- a. Thrombophlebitis refers to blood vessel inflammation along with thrombus formation. Two types are recognised - superficial and deep. Superficial thrombophlebitis is visible and presents with erythema and tenderness in the skin along the distribution of the affected blood vessel.^[12] Mondor's disease is a type of superficial thrombophlebitis which affects the breast and sometimes the penis, which presents with a linear and tender cord-like thickening of the affected vein.^[13,14]
- b. Varicose veins present with dilated and tortuous veins commonly occurring in the lower limbs due to insufficient closure of valves causing backflow from deep to superficial veins.^[15] Veins being linearly arranged, these lesions show a linear distribution.
- c. Intravenous drug induced hyperpigmentation presents with linear hyperpigmented streaks along the course of veins. It commonly occurs in case of intravenous drugs given for malignancies^[16] [Figure 4].

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Table 1: Causes of linear lesions

Blaschko's lines	Macules and patches of incontinentia pigmenti, hypomelanosis of Ito, linear and whorled nevoid hypermelanosis, nevus depigmentosus, linear fixed drug eruption Papules and plaques of morphea, Goltz syndrome, lichen striatus, Adult Blaschkitis, Darier's disease, linear verrucous epidermal nevus, inflammatory linear verrucous epidermal nevus, linear psoriasis, linear lichen planus, linear lichen nitidus, linear porokeratosis, linear chronic graft versus host disease, linear Hailey-Hailey disease. Vesicles of incontinentia pigmenti
Blood vessels	Thrombophlebitis, Varicose veins, intra venous drug induced hyperpigmentation, polyarteritis nodosa.
Lymphatics	Acute lymphangitis, infection with <i>Mycobacterium marinum</i> , <i>Sporothrix schenckii</i> , <i>Leishmania braziliensis</i> , <i>Nocardia brasiliensis</i> , <i>Mycobacterium chelonae</i> , <i>Francisella tularensis</i> and <i>Staphylococcus aureus</i> .
Dermatomal	Herpes zoster, linear vascular malformations, Segmental vitiligo
Koebner phenomenon	Psoriasis, lichen planus, vitiligo. Occasionally in Darier's disease, lichen sclerosus et atrophicus, Hailey Hailey disease, lichen nitidus.
Auto inoculation	Warts, molluscum contagiosum
Due to external factors	Paederus dermatitis, Berloque dermatitis, phytophotodermatitis, dermatitis artefacta
Infestations	Cutaneous larva migrans, burrows of scabies



Figure 1: Case of linear verrucous epidermal nevus showing multiple linear verrucous papules since birth with superimposed warts in the proximal part



Figure 2: Case of incontinentia pigmenti with multiple linear and whorled papulo-vesicular lesions and streaks of hyperpigmentation



Figure 3: Case of linear porokeratosis presenting with multiple asymptomatic plaques on the lower limb



Figure 4: Case of gastric carcinoma on treatment with 5-fluorouracil having linear streaks of hyperpigmentation along the vein of injection

- d. Polyarteritis nodosa is a necrotising inflammation of blood vessels which presents with nodules and ulcers mainly on the lower limbs along the distribution of blood vessels.

LYMPHATICS

The following conditions follow lymphatics:

- Lymphangitis is the inflammation of lymph vessels. Acute lymphangitis is streptococcal infection of lymphatics of subcutaneous tissue presenting with erythematous linear streaks from the site of infection to the draining lymph nodes.^[17] It also occurs in early stages of filariasis.
- Nodular lymphangitis is a clinical presentation in which erythematous papules and nodules occur along the course of lymphatics.^[18] This occurs mainly in chronic suppurative inflammatory disorders of the skin in which causative organisms spread via lymphatics. This distribution commonly occurs in



Figure 5: Case of sporotrichosis showing linear distribution of nodular lesions over the upper limb

sporotrichosis and hence is also called sporotrichoid distribution [Figure 5]. The differential diagnosis for this includes infection with *Mycobacterium marinum*, *Sporothrix schenckii*, *Leishmania braziliensis*, *Nocardia species*, *Mycobacterium chelonae*, *Francisella tularensis*, and *Staphylococcus aureus*.^[18-21]

DERMATOMES

A dermatome is a linear area of skin supplied by a single spinal nerve. The following conditions follow dermatomes:

- Herpes zoster presents with multiple erythematous vesicles with burning sensation along the distribution of a particular spinal nerve.
- Vascular malformations like capillary malformations are sometimes distributed along a dermatomal segment^[22] [Figure 6].
- Vitiligo is an acquired disorder which presents with



Figure 6: Case of segmental vascular malformation affecting the upper limb



Figure 7: Case of extensive verruca plana showing pseudo koebnerisation with linear lesions



Figure 8: Case of paederus dermatitis showing multiple papulovesicular lesions arranged linearly over the face

depigmented macules and patches. Sometimes, this disorder follows dermatomal segments when it presents with linear macules and patches and is called as dermatomal, segmental, zosteriform or pseudosegmentalis type of vitiligo.^[23] Segmental vitiligo has an early onset, rapid progression and no specific precipitating factors.^[24] In one study, the most commonly involved dermatome was the trigeminal and only a few patients had an associated autoimmune disease.^[24]

KOEBNER'S PHENOMENON

Koebner's phenomenon was first described by Heinrich Koebner,^[25] and refers to the development of isomorphic lesions at the sites of trauma in case of cutaneous disorders.^[26] Scratching being a common cause of cutaneous trauma, leads to linear lesions along the line of scratching. True Koebner's phenomenon occurs in psoriasis, lichen planus and vitiligo and is also occasionally seen in other conditions^[26] [Table 1].

AUTO INOCULATION

This is also termed as pseudo Koebner's phenomenon. It occurs in infectious disorders like due to implantation of infectious agent in the skin during trauma leading to development of isomorphic linear lesions like in Koebner's phenomenon. Examples include warts and molluscum contagiosum^[26] [Figure 7].

EXTERNAL FACTORS

- a. Paederus dermatitis (dermatitis linearis,^[27] or blister beetle dermatitis^[28]) commonly occurs in tropical and subtropical regions. It is a peculiar irritant contact dermatitis characterized by sudden onset linear erythematous and bullous lesions and burning on exposed areas of the body.^[28] It occurs when beetles of the genus Paederus (also called rove beetles) are crushed on the skin, releasing the vesicant pederin, which causes irritant dermatitis^[29] [Figure 8].
- b. Berloque dermatitis occurs when perfumes containing bergamot oil are applied followed by exposure to sunlight. It presents with erythema and hyperpigmentation along the pattern formed by the trickle of droplets, which is usually linear.^[30]
- c. Phytodermatitis (meadow dermatitis, strimmer dermatitis, weed wacker dermatitis)^[30] occurs due to furocoumarins in plants which cause a phototoxic reaction. It commonly presents with

linear streaks along the area of contact with the irritant.^[31]

- d. Dermatitis artefacta: Dermatitis artefacta (factitious dermatitis) refers to self-inflicted skin injuries made consciously to elicit sympathy, escape responsibility, or collect disability insurance. The lesions are common on areas which are easily accessible and commonly arranged in a linear pattern.^[32]

INFESTATIONS

- a. Cutaneous larva migrans is a skin infestation clinically characterized by erythematous linear serpiginous lesions caused by nematode larvae.^[33]
- b. The burrows made by the scabies mite in the skin are also commonly linear.

CONCLUSION

The importance of linear lesions in dermatology cannot be over emphasized. Linear lesions act as diagnostic clues in many disorders. They also help in elucidating the pathogenesis as they give a clue to the pathway of spread of the disease. Koebner phenomenon indicates the presence of active disease and helps to decide the line of management.

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