Beau lines, onychomadesis, and retronychia: A unifying hypothesis

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Beau lines, onychomadesis, and retronychia are nail dystrophies with distinctive clinical findings. Trauma has been reported as the initiating factor in each of these entities. Infections, severe medical illnesses, major surgery/anesthesia, medication side effects, and autoimmune disease can produce Beau lines and onychomadesis. This article illustrates the common underlying pathophysiological mechanism that produces each of these nail dystrophies. (J Am Acad Dermatol 2015;73:849-55.)

Key words: Beau lines; medication reactions; nail dystrophy; nails; onychomadesis; retronychia; trauma.

Beau lines, onychomadesis, and retronychia involve a pause in cell growth in the nail matrix. The severity of the insult to the nail matrix, duration of the pause in cell growth, location within the matrix of slowing nail plate production, and presence of a new nail plate dictate whether the nail abnormality is a Beau line or a more dramatic manifestation such as onychomadesis or retronychia. The diagnosis for each of these nail disorders is based on clinical features that are surprisingly quite different in view of the similar disruption of nail matrix function. This article reviews the etiology, diagnosis, and treatment of Beau lines, onychomadesis, and retronychia, and proposes a unified hypothesis of the pathophysiologic mechanism of these disorders.

ETIOLOGY

Reports of Beau lines go back 169 years.[1] Along with onychomadesis, this condition has been associated with a variety of causes including a variety of medications (Table I).[2] Retronychia is a more recently described condition, and the literature relating to its cause is less voluminous (Table II).

DIAGNOSIS

The diagnosis of Beau lines and onychomadesis is based on inspection and palpation of the nail plate.[3,4] Beau lines are transverse depressions on the back aspect of the nail plates (Fig 1).[3,4] Onychomadesis involves the complete separation and possible subsequent shedding of the nail plate and represents a more severe form of Beau lines (Fig 2).[3,4] It is classified as a stage IV onycholysis, which involves separation of the proximal nailfold (PNF) from the distal end of the nail.[5] Retronychia was more recently described as a proximal ingrowing of nail into the ventral surface of the PNF (Fig 3).[6] A clinical suspicion of retronychia is based on an unresolved chronic proximal paronychia, proximal periungual granulation tissue, and proximally separated nail plate usually with a clinical history of local trauma.[7] Ultrasound can demonstrate a thickened nail plate beneath the PNF and is a valuable technique in confirming the diagnosis of retronychia.[8,9] Diagnosis is confirmed with proximal or complete plate avulsion and observation of regrowth of a normal nail plate.

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PATHOPHYSIOLOGIC BASIS

Normal nail growth involves the production of the nail plate from the nail matrix, which moves outward over the nail bed (Fig 4).[10] A similar pathophysiologic mechanism produces Beau lines, onychomadesis, and retronychia. In each case, an insult to the nail matrix is followed by recovery of the matrix and subsequent production of the nail plate at the nail matrix.[4,11] The degree to which the nail plate growth from the matrix is stunted and direction of nail growth are critical differences.[4,11]

In Beau lines, a slowing or disruption in cell growth from the more proximal matrix results in a thinner nail plate.[4] This manifests clinically as transverse, usually palpable depression(s) in the nail plate (Fig 5).[3,4,11] Onychomadesis has a similar pathophysiologic basis but is associated with a complete halt in nail plate production (Fig 6).[3,4,12-14] Ultrasound can confirm the presence of onychomadesis as this defect can be identified beneath the PNF.[8] Retronychia is similar to onychomadesis but involves vertical growth of the new nail plate into the PNF or a repetitive disruption of nail matrix growth may lead to a stacking of nail plates (Fig 7).[11,15,16] Another theory proposed to explain the development of retronychia involves a single nail plate that is pushed into the PNF as a result of shearing forces.[8,9,17] All of these possible mechanisms lead to an inflammatory nidus as the nail pushes into the PNF. These theories have been supported by ultrasound.[8,9]

CAPSULE SUMMARY

- Beau lines, onychomadesis, and retronychia present with identifiable clinical characteristics.
- All 3 conditions share a common pathophysiologic basis: slowing and/or cessation of nail plate production at the nail matrix.
- Beau lines and onychomadesis are likely to resolve without treatment if the cause is eliminated. Avulsion treats most cases of retronychia.

TREATMENT

For Beau lines and onychomadesis, the patient should be reassured that simple observation will almost always lead to complete resolution of the problem so long as the nail matrix has not been permanently scarred, and the underlying cause has been eliminated. The nail defect slowly grows outward and until it is trimmed away in the case of Beau lines or until the nail is shed in the case of onychomadesis.[2,18] If the defect in Beau lines is acutely bothersome to the patient, gel nails can be used to fill the defect followed by slight buffing.[19] It is important to avoid

Table I. Etiology of Beau lines and onychomadesis[2,12,13,18,20,24-102]

Trauma	Cast immobilization,[12,74] fractured olecranon,[24] manicure,[24,25] fractured wrist,[25] fingertip crushing injury,[26] hand trauma,[27,28] high-altitude expeditions,[29] deep saturation dives,[30] road running[73]
Infectious disease	Diphtheria,[24] syphilis,[24] mumps,[24] measles,[24] typhoid fever,[24] malaria,[24] scarlet fever,[24,81] hand-foot-mouth disease,[31-33,75-79] Asian flu,[34] mucocutaneous lymph node syndrome,[35,84] paronychia,[78,81] eczema coxsackium,[80] varicella virus,[82] *Trichophyton tonsurans*[83]
Autoimmune	Familial Mediterranean fever,[36] nail psoriasis,[37] pustular psoriasis,[37,42] epidermolysis bullosa acquisita,[38] pemphigoid gestationis,[38] linear IgA disease,[38] bullous pemphigoid,[38,85,86] pemphigus vulgaris,[38-41,86-88] telogen effluvium,[42] Guillain-Barré syndrome,[43] alopecia areata[89,90]
Neonatal	Stresses in utero[91,92]
Systemic disease	Stevens-Johnson syndrome,[18] peritoneal dialysis,[20] diabetes mellitus,[29] zinc deficiency,[29] severe sepsis,[29] myocarditis,[29] gastrointestinal bleeding,[30] pancreatitis,[30] postcardiac arrest,[44] postpartum hyperparathyroidism,[45] reflex sympathetic dystrophy,[46,47] malaria,[48] myocardial infarction,[48] rheumatic fever,[48] hemodialysis,[49] critical illness,[50,51,99] Pel-Ebstein fever,[52] erythema nodosum leprosum,[53] severe dysmenorrhea,[54] myelomatosis,[55] Raynaud disease,[56] carpal tunnel syndrome,[57] acute hypocalcemia,[57] chronic paronychia,[57] severe epileptic convulsion,[57] hypopituitarism,[57] dapsone-induced erythroderma,[58] erythroderma,[78] fever,[78] allergic contact dermatitis,[78] chronic kidney disease,[98] mycosis fungoides,[100] neurologic disease[101]
Hereditary	Heimler syndrome,[59,60] idiopathic sporadic onychomadesis,[93,94] hyper-IgM syndrome[95]
Idiopathic	Idiopathic sporadic onychomadesis,[94] Cronkhite-Canada syndrome,[96] seasonal onychomadesis[97]
Medication	Cephaloridine,[2] cloxacillin,[2] radiation therapy,[2,102] valproic acid,[2,102] carbamazepine,[2,102] lithium carbonate therapy,[2,102] penicillin,[13] corticosteroids,[56] vincristine,[57,61] adriamycin,[61] docetaxel,[62] bleomycin,[62] doxorubicin,[62] cisplatin,[62,63] paclitaxel,[63] octreotide,[64] cytarabine,[65] etoposide,[65] idarubicin,[65] mitoxantrone,[65] epirubicin,[65] razoxane,[66] gold injections,[67] azathioprine,[68] moxifloxacin,[69] itraconazole,[70] penicillamine,[71] arsenic,[72] lead poisoning,[102] retinoids[102]