

ADORNMENT OF THE FOOT : THE FASHION SHOE AND ITS REPERCUSSION ON THE NAIL APPARATUS

Bertrand Richert

Department of Dermatology, University of Liège, Belgium

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Summary

The fashion shoe is slowly deforming device often taking years before the damaging effect appear. The toenail dystrophies may present in many ways: some are very obvious but others, more difficult to recognize, may perplex the physician. Their detection remains important in order to avoid prescription of useless, expensive and not always innocuous treatments.

Riassunto

Le scarpe deformano lentamente il piede anche se i danni si evidenziano soltanto dopo molti anni. Le distrofie delle unghie dei piedi possono evidenziarsi in diversi modi: molte sono evidenti ma altre sono difficili da riconoscere e lasciano spesso il medico nel dubbio. È quindi importante che il medico approfondisca questi problemi per evitare l'utilizzazione di trattamenti spesso inutili, costosi e non sempre innocui.

Footwear induced nail dystrophies may present in many ways: some are very obvious but others more difficult to recognise may perplex the physician. Their misdiagnosis often leads to prescriptions of useless and expensive treatments. ...

More than 80 % of women aged over 65 have foot pain (1). In this latter group, women outnumber men in chronic foot disorders with double the number of ingrown toenails and 13 times more bunions (2). Why such a female predominance? These toenail dystrophies are mostly seen in women who routinely wear ill fitting shoes: tight pointed shoes, high heels... The fashion shoe is a slowly deforming device often taking years before the damaging effects appear. For fashion victims, it is clear that the foot must adapt itself to the shape of the shoe and what could be worse than a square forefoot in a triangular space ? (3). Osteoarthritis, which is more prominent in women after menopause may also intervene in the pathogenesis of foot and toe deformities with subsequent toenail alterations. The latter may be aggravated in case of arterial insufficiency. The weight of the body may also play a role in the etiology of the toenail abnormalities: in men, the whole body weight is located on the heel; in women wearing high heels a part of the body weight is transmitted to the toes thus increasing the toe/shoe interactions. The narrow pointed shoe will also increase the toe/toe interactions.

1. LATERAL CONSTRAINTS:

Friction of the shoe against the medial part of the great toenail leads to an hyperkeratosis of the distal part of the lateral nail fold called **onychophosis**. The same condition may be observed on the lateral part of the fifth toe and may also result from pressure from adjacent toes and is therefore located on both lateral nail folds (Fig. 1). Rubbing of the proximal nail fold against the shoe may be responsible for a **fric-**



Fig. 1 - Onychophosis : hyperkeratosis of both lateral nail folds secondary to pressure of adjacent toes.

tional melanonychia (4) that commonly involves the fifth toe, often associated to subungual hyperkeratosis of the nail, but that may also be observed on the fourth and even the third toe (Fig 2). Tight pointed shoes enhance the lateral



Fig. 2 - Frictional melanonychia of the fifth, fourth and third toes.

deviation of the great toenail resulting in hallux valgus, often forcing the second toe to override the first one with subsequent **frictional onycholysis** (5) (Fig 3). This onycholysis occurs in an anatomical zone where the nail plate is loosely attached to its nail bed (6). Secondary fungal contamination is frequent; systemic antifungal therapy will lead to mycological cure; a normal nail will only be achieved with the suppression of the overriding. The same mechanism is responsible of **subungual haematomas**, almost always of triangular shape. A major factor that



Fig. 3 - Disto-lateral frictional onycholysis of the great toe due to overriding of the second toe.

encourages haematomas is the lack of cushioning subcutaneous fat deep to the nail bed (7). Rarely, the second toe might override the great toenail with similar consequences: onycholysis, frictional melanonychia, subungual haematomas. Permanent pressure of the second toe on the lateral part of the great toenail, on which the former is imprinted, may account for the arising of a **pincer nail** (8). Pressure from the shoe box and/or from the adjacent toe may in some instances be responsible from an hypertrophic nail fold of the great toenail, also called **hypertrophic lip**, that may precipitate an ingrowing toenail. Seams running over the distal part of the shoe have an irritating effect on the proximal nail fold, which added to rubbing against the shoe, are responsible for the arising of a **chronic frictional paronychia** with potential acute episodes.

2. ANTEROPOSTERIOR CONSTRAINTS:

During walking, the foot has a forward and backward motion within the shoe. When the great toenail is long, its repeated buffeting against the tip of the shoe may be responsible for disto-lateral **nail fractures** (Fig 4). The sa-



Fig. 4 - Nail fractures on the medial part of the great toe nail.

me mechanism may lead to **transversal leukonychias** (9) (Fig 5) that may in some rare instances also be observed on the lesser toes. When the great toenail is cut, one may however observe **lamellar splitting** (onychoschizia) of the nail plate at its longest part: this particular aspect is common in sportsmen in which the foot is subjected to frequent sudden starts and stops as in tennis, squash, soccer, basket ball.... Friction of the upper part of the shoe against the nail plate may induce an hyperkeratotic reaction that manifests as a subungual horn, called **onychoclavus** or **heloma**, located under the distal



Fig. 5 - Transverse leukonychia. Note the location facing the longest part of the nail plate.

part of the nail plate, mostly the great toenail (10) (Fig 6). It may be very painful and may impair walking. Its clinical presentation is very discrete exception made of the subjective symp-



Fig. 6 - Onychoclavus (or heloma). The subungual horn is revealed by partial nail avulsion.

toms: a black or sometimes a pinkish red patch is seen through the nail plate on which pressure with the rubber of a pen gives causes considera-

ble pain. Avulsion of the distal part of the nail plate reveals the lesion which is easily excised.

3. ADDED ORTHOPAEDIC ABNORMALITIES:

Chronic trauma to the nail unit can result from added faulty biomechanics (11). Most of the orthopaedic abnormalities are acquired and precipitated by long-standing footwear (especially high heels) and / or underlying osteo-arthritis which accounts for their occurrence in the elderly. Some of them are congenital such as Morton's toe. Accidental trauma and surgery may also be responsible for these deformities. Occupational factors should also be taken in account: the amount of time a patient spends in his shoes may affect the severity of his nail problems: an orthopaedic abnormality will more rapidly affect the nail apparatus in a sportsman than in a sedentary person. Occupational footwear, such as steel toe cap shoes, may also act as a precipitating factor.

Morton's toe is a second toe longer than the first one, but the trouble is in fact a shorter great toe. Therefore, this second toe performs a plantar rotation when the shoe is worn. The amplitude of this downward flexion is modulated by the length of the toe: the longer it is, the greater the rotation. According to the degree of rotation and the duration of the condition, several nail alterations may be observed: a slight rotation leads to an hyperkeratosis of the hyponychium, due to the repeated buffeting of the tip of the toe against the shoe. In time, the hyperkeratosis may affect the distal portion of the nail bed leading to onychiaxis often associated to splinter haemorrhages. When the rotation is severe, the whole distal phalanx will rub against the shoe. Hyperkeratosis of the hyponychium and hyperkeratosis of the nail plate (onychiaxis) may be observed. Onychomycosis has always to be ruled out (12). Rubbing on the proximal nail

fold may also result in frictional melanonychia often associated with a callosity facing the pigmented band. Subungual haematomas due to repeated stubbing are common.

Hammer toes result from a muscular imbalance between the extensor and flexor muscle group. As in the Morton's toe, several deformities may be observed according to the severity of the plantar rotation: hyperkeratosis of the hyponychium, onychoclavus, onychauxis, frictional onycholysis, subungual haemorrhages.

Hallux valgus is characterised by an enlargement of the metatarsal head and a general stiffening of the joint; over time, this leads to a fixed dorsiflexed distal phalanx. The nail often protrudes dorsally and is then exposed to rubbing and stubbing against the shoe, resulting in *onychauxis* or *onychogryphosis* often associated with *hyperkeratosis of the medial nail fold*. The gradual lateral deviation of the great toe forces the second to override the first one. Progressively, the lateral nail fold becomes hyperkeratotic due to friction, achieving an *onychophosis* or an *hypertrophic lip*; pressure of the second toe on the lateral portion of the great toenail is a precursor of the development of *pincer nail*. Overriding of the second toe on the first one may lead to *frictional onycholysis* of the lateral part of the great toenail which may be subsequently contaminated by fungi. *Subungual haematomas* due to overriding are common and mostly always show a triangular shape.

Lateral rotation of the fifth toe is precipitated by osteo-arthritis and footwear. The toe is orientated such that the patient ambulates on the lateral part of the nail plate. The frictional forces occurring between the shoe and the nail apparatus will result in hyperkeratotic reactions such as *heloma* or *onychophosis*. *Subungual haemorrhages* are very common and must be distinguished from *frictional melanonychia*.

Hallux erectus is due to an exaggerated tension of the extensors with a laxity of the flexors. This diagnosis is often missed because dermatologists examine the nail apparatus from the

front. Examination from the side reveals that the nail protrudes dorsally which exposes it to rubbing and stubbing against the top of the shoe. This can lead to distal *onycholysis* and to a progressively shortened and thickened nail due to a constant pressure against the upper part of the shoe (Fig 7). The patient often spontaneously acknowledges that he does not trim this nail anymore or is persuaded that this nail never grows out !



Fig. 7 - Hallux erectus on a side view : note that the nail protrudes dorsally being thus constantly worn out against the top of the shoe.

4. TREATMENT:

Treatment of such dystrophies has to be appropriate in order to allow these patients to ambulate with greater efficiency and minimal pain thus keeping their independence. But most of the orthopaedic abnormalities of the foot in the elderly are irreversible as well as their consequences on the nail apparatus. Treatment must be therefore conservative. Moreover, when conditions are operable, the patients may not be candidate for surgery due to associated systemic diseases (diabetes, cardiac failure...) or concomitant therapy such as anticoagulants. In these instances, podiatric care is the most useful approach to maintaining mobility. Several techniques are available:

- Drilling with an electric drill or a burr is helpful in almost every type of hyperkeratosis. If

such a treatment is contraindicated (eg. diabetes) partial or complete removal of the nail plate may be achieved with 40 % urea ointment under occlusive dressing for 3 to 8 days.

- Silicon prosthesis is probably the most useful

technique in such dystrophies and is indicated to avoid or reduce friction and rubbing from the shoe box or from toe-toe interaction.

- Surgery may however be indicated in some patients with pincer nails or onychoclavus i.e.

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