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Evaluate Role of Histopathological Changes in Nail Diseases Using Nail Biopsy: A Single Center Study

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Abstract: Involvement of the nail is moderatelyuniversal in psoriasis and at times maybe the sole diagnosticclue. However, the histopathology of nail psoriasis has notbeen sufficientlyassessed. A confirmation of the diagnosis is required in casessuspected to have nail psoriasis in order to plan long-term therapy. To study clinical spectrum and evaluate role of histopathological changes in nail diseases using nail biopsy. Clinical and mycological features were studied in 48 patients with nailpsoriasis. Of these, 30 patients gave consent for nail biopsies to be taken and thehistopathological changes were assessed. Males were affected more commonly (70%) with a peak incidence in theage group of 21-40 years (46.7%). Averages of nails infection duration in our 30 cases were 34.03±42.5 (months). Distal subungual hyperkeratosis, onycholysis, pitting, yellowish discolouration, beau's line longitudinal striation, koilonychia, crumbling, pterygium, blackish dis, melanonychia and white patchy dis were the predominant clinical features.Histopath impression were leuconychia in 3(10%), Nail LP in 2 (6.6%), nail psoriasis in 8 (26.7%), onychomycosis in 15 (50%) and pachyonychiacongenita in 2 (6.6%). PAS stain was positive in only Onychomycosis diseases and in outer disease were negative. Histopathological examination of nails is a valuable diagnostic aid,especially inthe absence of skin lesions. Examination of the PAS-stained sectionsis necessary before making a histological diagnosis of nail psoriasis because onychomycosisand psoriasis may show similar histology.
Keywords: Psoriasis; Onychomycosis; Histopath Impression and PAS Stain.

INTRODUCTION

Nail disorders can arise at any age. About half of all nail disorders are of infectious origin, 15% are due to inflammatory or metabolic conditions, and 5% are due to malignancies and pigment disturbances[1]. The nail is a cutaneous annex that covers the dorsal face of the fingers and toes. Abnormalities of the nail may serve as important clues to cutaneous and systemic disease and may provide information about the disease or toxic exposures that occurred several years in the past[2]. A variety of skin diseases may involve the nails in absence of cutaneous lesions. Onychomycosis is the commonest nail infection accounting for up to 50% of all nail disorders. It comprises all fungal infections affecting the nail apparatus, i.e., nail matrix, nail plate, cuticle, mesenchymal tissue and nail folds.[3]Apart from onychomycosis several other diseases can lead to dysmorphic nails[4]. The list may include psoriasis, lichen planus, twenty nail syndrome, lichen sclerosis et atrophicus, eczema, Darier`s disease and also tumors like melanocytic nevi, Bowen's disease, melanoma, and others.Nail involvement occurs in 10-50% of psoriasis patients[5] mostly those with arthritis, and about 1-5% of patientsmanifest with nail changes alone[6]. This is the category ofpatients in whom the clinician faces a formidable diagnosticchallenge because psoriatic nail disease resembles other causesof dystrophic nails, the most common differential diagnosisbeing onychomycosis. The diagnosis in these casesneeds to be confirmed before embarking on long-term andtedious therapy.

Causes of acquired deformed or dysmorphic nails are numerous and those affected are often very concerned about the management of their unsightly nail problem. Correct diagnosis is needed in order to get proper management[7]. Nail biopsy could be of value in order to find out or confirm the actual diagnosis.Nail

morphology in psoriasis depends uponthe anatomical location of the disease process. Disorders ofthe nail matrix manifest as defects of the nail plate suchas pitting, thinning, onychorrhexis and leuconychia, andinvolvement of the nail bed produces the oil drop sign orsalmon patch, subungual hyperkeratosis, onycholysis andsplinter haemorrhages, etc. Other manifestations includecrumbling of the nail plate, psoriasis of the nail folds orpsoriatic arthritis. Pitting in fingernails and subungualhyperkeratosis in toenails is the most common finding[6]. Based on nail fold capillary analysis, the changes associatedwith psoriasis have been differentiated from normal controlsin 79% of cases.3Except for a few sporadic reports, there have been few studiesof nail histopathological features in psoriasis[8-12]. This couldbe due partly to a reluctance to perform nail unit biopsies onthe part of dermatologists. There is a relative paucity and lackof proficiency in interpretation of the nail histopathology inpsoriasis. Hence, we carried out a clinical profile, etiology and histopathology of patients with psoriasis from central India with an aim to study clinical spectrum and evaluate role of histopathological changes in nail diseases using nail biopsy.

MATERIALS AND METHODS

Study Design

The present study is an observational to study histopathological changes in nail diseases using nail biopsy. The study was conducted over a period from September 2015 to august 2017 is Department of Skin and V.D, Sri Aurobindo Medical College and PG Institute, Indore. Patients who attended the dermatology OPD were asked for participating in the study. Informed consent was taken from all the patients. A pre structured proforma was used to collect the baseline data.

A minimum of 30 patients of nail diseases was included in the study. A detailed history and examination was performed and nail sample was sent to histopathology lab for confirmation of the diagnosis. Written informed written consent was taken from all the patients.

Inclusion Criteria

Candidate in whom either there are no skin lesions or they are not contributing towards a diagnosis.

Exclusion Criteria

Diabetes mellitus, Peripheral vascular disease.

Nail Biopsy Procedure

The affected digit was soaked in antiseptic Betadine solution, and Xylocaine 1-2% was used as anesthetic (No adrenaline in the anesthetic because of the risk of provoking prolonged peripheral ischemia). Insulin syringe was used to deliver the anesthetic solution in a ring manner at the base of the affected digit. Injection was administrated into the dorsolateral aspect of the digit at the base, with about 1-2 ml on each side of the phalanx (Digit size matter). Additional anesthetic was given distally near to the harvesting site at the bulb of the finger/toe. A sterile glove worn by the patient and the tip of the glove digit at the site of surgery is snipped off, and then rolled back to the base of the digit, providing a tourniquet to minimize blood flowing to the area. Tourniquet was removed immediately after harvesting the required biopsy, making sure that its application time does not exceed 20 minutes.Th e efficacy of the anesthesia was tested on skin near the harvesting site (using the tip of the used syringe). Punch probes of 3 or 4 mm diameter were used to obtain the nail specimen passing through affected nail plate to nail bed reaching to the periosteum of the distal phalanx. Specimens were kept in 10% formalin and sent for regular histopathological preparation and H&E and PAS staining. Sterile dressings were smoothly applied after ensuring vascular patency then hemostasis at site of procedure (after removal of the tourniquet). Analgesic (Diclofenac potassium 50mg/2/d) was prescribed in the first 2 days post-operatively. The frequency of dressings was every 2 days with application of topical fusidic acid ointment. After one week no further dressings were needed.

RESULTS

A total of 30 nail infectious patients were included in the study. The age of patients included in the study were in the range of >20 years with a mean age of 36.01±15.02 yrs. Maximum number of patients was in the age group of 21-40 years which consisted of 14 patients, accounting for ~46.7%. Patients in the age group of >41 years were 12 in numbers (~40%) accounting for more than half the cases. Of the 30 cases included in the study, males were 21 in number (~70%) , showing a strong male predilection, as opposed to only 30% of cases in the female category, with Male: Female ratio of 3:1 (Table 1).

Out of 30 recruited cases numbers of cases with 2-5 nails involved were 16 (53.5%), 5-10 nails involved were 3(10%), 10-15 nails involved were 5(16.5%) and 15-20 nails involved were 6 (20%).Averages of nails infection duration in our 30 cases were 34.03±42.5 (months). Majority of case 33.3% specimen was collected from left side of which 3.4% from big toe, 10 % form index, 13.4% from middle and 6.5% from thumb. Form right side 66.6% specimen were collected of their 13.4% from big toe, 13.4 % from index, 16.5% from middle and 23.4% from thumb.

Histopath Impression and PAS Stain

Out of 30 recruited cases histopath impression were leuconychia in 3(10%), Nail LP in 2 (6.6%), nail psoriasis in 8 (26.7%), onychomycosis in 15 (50%) and pachyonychiacongenita in 2 (6.6%)**.** PAS stain was positive in only Onychomycosis diseases and in outer disease were negative (Table 2).

Clinical Morphology and Nail (HP) Morphology

Clinical morphology table 3 shows that majority of cases according to morphological characteristic were the subungual hyperkeratosis shows in 12 cases of onychomycosis, 3 in nail psoriasis and 2 in pachyonychiacongenita. Onycholysis in 4 cases of onychomycosis and 6 nail psoriasis. Pitting in 1 case of onychomycosis and 6 in nail psoriasis.Yellowish discolouration in 7 case of onychomycosis and 2 in pachyonychiacongenita. Beau's line in 2 cases of nail psoriasis and 1 nail LP. Longitudinal striation in 1 case of onychomycosis, 3 in nail psoriasis and 2 in nail LP.Koilonychia in 2 cases of nail psoriasis.Crumbling seen in only 1 case of nail psoriasis.Pterygium seen in 1 case of nail psoriasis and 2 in nail LP.Blackish dis seen in only 3 cases of onychomycosis.Melanonychiaseenin only 1 case of nail LP.White patchy dis seen in 3 cases of leuconychia.

Nail histopathology table 3 shows that majority of cases according to nail histopathological morphology there were thick orthokeratotic seen in 8 cases of nail psoriasis, 15 in onychomycosis, 3 in leuconychia and 2 in pachyonychiacongenita. Thinning of granular layer seen in only the 6 cases of nail psoriasis. Parakeratotic layer seen in 8 cases of nail psoriasis, 1 in onychomycosis and 3 case of leuconychia.Acanthosis seen in 3 cases of nail psoriasis, 7 cases of onychomycosis, 1 case of leuconychia and 2 in pachyonychiacongenita. Thick spinous layer in only 2 cases in pachyonychiacongenita. Keratohyaline granule in 1 caseofleuconychia. Band like lymphocytic infilteration in 2 cases, elongated rete ridges in 1 case, hyperkeratosis in 2 cases and vacuolar degeneration in 1 case of nail LP.

RESULTS

Table-1: Clinical and mycological features

	Number	Percentage (%)
Age (years)		
>20	4	13.3
21-40	14	46.7
>41	12	40.0
Gender (Male: Female ratio of 3:1)		
Male	21	70
Female	09	30
Nails Involved		
2-5	16	53.5
5-10	3	10
10-15	5	16.5
15-20	6	20
Histopath Impression		
Leuconychia	3	10
Nail LP	2	6.6
Nail Psoriasis	8	26.7
Onychomycosis	15	50
PachyonychiaCongenita	2	6.6

Table-2: PAS Stain

	Nail Psoriasis	Onycho-mycosis	Nail LP	Leuco-nychia	Pachyonychia Congenita
PAS Stain(+)	-	+	-	-	-
PAS Stain(-)	-	-	-	-	-

DISCUSSION

Psoriasis is a common cause of dystrophic nails. However, it is often difficult to distinguish clinically from other causes of dystrophic nails, especially onychomycosis. This problem is further confounded in the absence of typical skin lesions. The treatment as well as prognosis of nail psoriasis is drastically different from that of onychomycosis. An objective confirmationof the diagnosis is desirable before starting the patient on long-term therapy. The present study is an observational to study histopathological changes in nail diseases using nail biopsy.

The age of patients included in the present study were in the range of >20 years with a mean age of 36.01±15.02 yrs. Maximum number of patients were in the age group of 21-40 years which consisted of 14 patients, accounting for ~46.7%. The patients in age group of >41 years were 12 in numbers (~40%) accounting for more than half the cases which is similar to study done by Stuart P, Piraccini BM and Baran R.The majority of our patients belonged to the age group 10-20 years in contrast to those studied by Calvert *et al*.[13] in whom the percentage with nail involvement was seen to increase with age.

Table-3: Detail of Morphology: Clinical& Nail (HP)

	Onycho mycosis	Nail Psoriasis	Nail LP	Leuco-nychia	Pachyonychia Congenita
Clinical Morphology					
Subungual Hyperkeratosis	12	3	0	0	2
Onycholysis	4	6	0	0	0
Pitting	1	6	0	0	0
Yellowish Discolouration	7	0	0	0	2
Beau's line	0	2	1	0	0
Longitudinal Striation	1	3	2	0	0
Koilonychia	0	2	0	0	0
Crumbling	0	1	0	0	0
Pterygium	0	1	2	0	0
Blackish Dis	3	0	0	0	0
Melanonychia	0	0	1	0	0
White Patchy Dis	0	0	0	3	0
Nail (HP) Morphology					
Thick Orthokeratotic	8	15	0	3	2
Thinning of Granular	6	0	0	0	0
Parakeratotic	8	1	0	3	0
Acanthosis	3	7	1	0	2
Thick spinous layer	0	0	0	0	2
Keratohyaline granule	0	0		1	0
Hypergranulosis	0	0	0	2	0
Vacuolar degeneration	0	0	0	1	0
Band like Lymphocytic Infilteration	0	0	2	0	0
Elongated Rete Ridges	0	0	1	0	0
Absent Granular Layer	0	0	0	0	2
Hyperkeratosis	0	0	2	0	0

The aberrant finding in our study could be due to the fact that adult patients with psoriasis did not seek medical attention as they had had the condition for quite a few years and it did not cause much cosmetic concern. The male to female ratio in present study was 3:1 which was similar in two studies Stuart P. Piraccini BM and Baran Rwere different. In majority of the cases 2-5 nails were involved in 16 (53.5%), 5-10 nails were involved in 3(10%), 10-15 nails were involved in 5(16.5%) and 15-20 nails were involved in 6 (20%) in present study which was different when we compared our results to other studies.

Our patients presented with various morphological variants of nail psoriasis. It is a localized form of pustular psoriasis, limited to the fingers and toes.[5]It begins as recurrent sterile pustules and scaling in the periungual region and extends proximally. It usually affects a single digit and has a relapsing course. In the long term it may produce thinning and resorption of the distal digit. Parakeratosispustulosa is a benign, inflammatory, self-resolving condition of the nail unit seen in children and affects one to several digits[14]. It typically affects girls and there is no history of sucking or onychophagia. Examination reveals well-demarcated, bright red, swollen, nontender distal phalanx and a brittle nail plate. Bacterial and fungal cultures are generally negative. Histopathological features are consistent with psoriasis and eczema. In present study cases histopathology impression were leuconychia in 3(10%), Nail LP in 2 (6.6%), nail psoriasis in 8 (26.7%), onychomycosis in 15 (50%) and pachyonychiacongenita in 2 (6.6%). Because of the sample size Stuart P, Piraccini BM and Baran R had different histopathology impression.

Limitations

The sample size in our study was small to analyses the proper results. In our study the frequency of no skin lesions or they are not contributing towards a diagnosis was very less.

CONCLUSION

From the foregoing account, it can be concludedthat a variety of nail changes can occur in variousdermatological, systemic and other conditions. The nail unit is capable of only a limited number ofreaction patterns; therefore, many diseases share similar changes, but correlation of the nail changeshelps dermatologist to reach conclusive diagnosis.In order to evaluate the nail changes skillfully onemust be familiar with the terminology and classification of the nail disorders. Thus knowing thenormal and abnormal variants of the nail and theirassociation with wide range of disease isbeneficial not only for the establishing diagnosis but also forthe specific management of the

disease. In conclusion nail biopsy is a useful diagnostic procedure which a dermatologist should be able to perform when the clinical diagnosis is obscure and routine laboratory methods have failed to establish the diagnosis.

Ethical approval

The study was approved by the institutional ethics committee, Sri Aurobindo Medical College and PG Institute, Indore

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