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PARONYCHIA: A NAIL INFECTION

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ABSTRCT

Paronychia is the localized superficial infections or abscess of the perionychium. It is characterized by swollen, erythematous and tender nail folds. They are mainly of two types i.e., acute and chronic. The acute paronychia is mainly seen in people who bite their nails. The Staphylococcus aureus (S.aureus) is the major disease-causing organism. Pseudomonas and anaerobes are also responsible for causing acute paronychia. The chronic paronychia is persistent type of infection mainly seen in people who are clinically exposed to water, alkali etc. Candida albicans(C. albicans) is mainly responsible for causing chronic paronychia. Other pathogens including atypical mycobacteria, gram-negative rods and gram-negative cocci, also cause chronic paronychia. The current treatment available includes topical therapy, oral therapy, surgical avulsion, Laser treatment etc.this review article include structure of perionychium, classification of paronychia, preventive measures and current treatment available for paronychia.

KEYWORDS: Paronychia, Treatment, nail, perionychium, disease, pathogens.

INTRODUCTION

Fingers are one of the important organs of human body in terms of appearance and interaction with people. Human nail is horn like envelope covering the dorsal aspect of terminal phalanges of fingers and toe in humans.[1] The nail also serve as a counterpoint for the sensory surface of the finger tip.[3] The nail, nail bed, paronychium together make the perionychium. No mammals other than the primates have a specialized perionychium, on the dorsal distal portion of each finger and toe.[2]

STRUCTURE OF PERIONYCHIUM

The perionychium consists of the nail, paronychium (border tissue around the nail) and the nail bed (germinal and sterile matrix).[2] The nail plate is the most visible part of nail apparatus consist of tightly packed dead cells and is highly keratinized. The nail plate can be small, large, wide, narrow, hard, smooth, ridged, thin etc. the nail plate is much thicker creating a much longer diffusional pathway of drug delivery. The plate composed of keratin molecule with disulphide linkage and low associated lipid levels does not resemble any other body membrane in its barriers properties; it tends more like a hydrogel than lipophilic membrane.[4] Nail bed is made up of thin soft epithelium that extends the whole length beneath the nail. It acts as holder for nail plate. It is pink in color due to the rich supply of blood and lymphatic vessels. It is composed of two types of tissues, the inner dermis and superficial epidermis. Nail matrix is a specialized epithelium structure that lies below proximal nail fold. The nail matrix also known as root of finger nail composed of basal cell which in turns differentiate into spinous cells and then into orthokeratotic cells that forms nail plate.

Lunula is the whitish visible semicircle (Half-moon) part at the base of the nail plate. At this half-moon part, the nail bed is so tightly packed with keratin that the capillaries are masked by the amount of keratin. The lunula is largest in the thumb and often absent in the little finger.

The Cuticle is the dead skin (almost invisible) at the base of the finger nail or toenail and is often removed during manicure.

Eponychium is the living skin that is present at the base of the nail plate and covers the matrix area. Cuticle seals the space between nail plate and the skin. Thus this sealing prevents the entry of foreign particle and micro-organisms and helps in avoiding injury and infection.

Hyponichium is the most distal, soft, slightly thickened layer of skin which is located between the fingertip and the free edge of nail plate. It forms a water proof protective barrier that prevents micro-organisms from invading and infecting nail bed.

Nail folds are folds of normal skin that surrounds the nail plate and forms the nail grooves which furrows on the side wall. The side wall is also known as lateral nail fold which the skin over lapping the side of the nail.[6] The structure of perionychium given in Fig No.1.

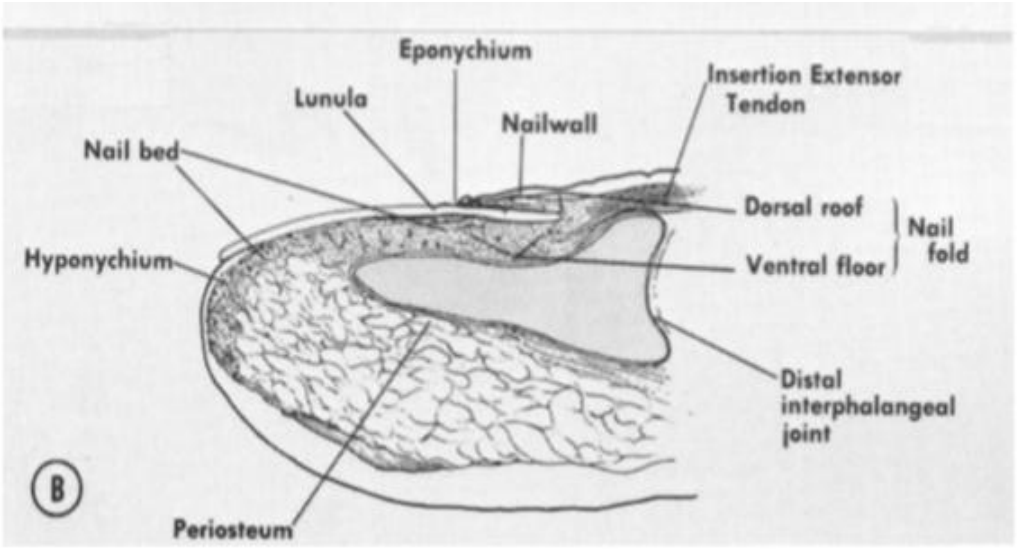

Fig No.1: Anatomy of the perionychium.

NERVE SUPPLY

Nerve supply is accompanied by a proper palmer digital nerve to the digital artery on the ventral radial and ulnar sides of the finger. At the base of the nail fold the nail split, sending branches to the pulp of the finger and branches dorsally into the nail bed. Along with the usual sensory organs of the skin, the nail bed has a numbers of unique structures known as glomus bodies. Glomus bodies consist of intertwined balls of fine nerves and vessels which affect the vasoconstriction and blood flow to the finger tips. This glomus body occurs most frequently in the nail bed and also in other areas of the finger tips.

VASCULAR SUPPLY

The proper palmar digital artery sends a large branch into the pulp of the fingertip at the level of the distal phalanx and another branch that runs parallel to the paronychium. There are two branches that cross the nail, one at the level of the lunula proximally and one distally, under the distal one third of the matrix; these vessels average 0.29 mm and 0.32 mm in diameter, respectively. The small veins of the nail bed coalesce into larger and larger veins from distal to proximal on the dorsum of the finger.[1]

PARONYCHIA

Paronychia is the localized superficial infections or abscess of perionychium. It is characterized by swollen, erythematous and tender nail folds.[7] Any disruption of the seal between proximal nail fold and nail plate can cause infections of the eponychial space by providing portal entry of the organism. Trauma (including manicures and pedicures),

infections (including bacterial, viral, and fungal), structural abnormalities, and inflammatory diseases (ex. psoriasis) are predisposing factors. Organisms will enter the moist nail crevice, which leads to colonization of the area.[10]

Paronychia is more common in women than in men, with a female-to-male ratio of 3 to 1. Usually, they affect manual labor workers or patients in occupations that continuously exposed to water for prolonged periods.

Depending upon the condition paronychia's are classified as.

ACUTE PARONYCHIA

The acute paronychia is mainly seen in people who bite their nails. It is characterized by red hot, tender nail fold with or without abscess. Acute paronychia condition is represented in Fig No 2. The *Staphylococcus aureus (S.aureus)* is the major disease-causing organism. *Pseudomonas* and anaerobes are also responsible for causing acute paronychia. Symptoms of acute paronychia appear spontaneously and the perionychial area usually appears erythematous and inflamed.[7]

Fig.No 2: Acute paronychia.

CHRONIC PARONYCHIA

Chronic paronychia can be defined as an inflammation lasting for more than 6 weeks, which is characterized by redness, tenderness, swelling, fluid under the nail folds, and thick discolored nail. Chronic paronychia condition is represented in Fig No 3.Nail plate may show thickening and longitudinal grooving. Repeated inflammation, edema, induration, and

fibrosis of nail folds can causes loss of an effective seal leads to a persistent retention of moisture, which causes penetration of organism and irritant within the groves that leads to chronic paronychia. The chronic paronychia is persistent type of infection mainly seen in people who are clinically exposed to water, alkali etc. *Candida albicans(C. albicans)* is responsible for 90% of chronic paronychia. Other pathogens including *atypical mycobacteria, Gram-negative rods* and *Gram-negative cocci*, also cause chronic paronychia.[9,7]

Fig.No 2: Chronic paronychia.

TREATMENT OF PARONYCHIA

Paronychia is notoriously difficult to treatment. The main goal of paronychia treatment includes eradication of pathogens, restoration of healthy nail and prevention of relapse or recurrence. It is an infectious disease that deserves prompt and appropriate care. Successful management of paronychia can be challenging due to limited availability of effective treatment, patient adherence and recurrence or reinfection. The disease is often associated with substantial distress which can affect the patient's quality of life.

In general most clinician feels that paronychia is an important problem that should be properly diagnosed and treated. Uniform guidelines for therapy are also lacking. Convenient cost effective antimicrobial agents with high and long lasting cure rate and less side effect are necessary.[12,13]

PREVENTATIVE MEASURES[10]

- ✓ The patient should be instructed to wear light cotton gloves to avoid the contact with moisture, irritants etc.
- ✓ Use heavy waterproof gloves when performing ‘‘wet work’’ or handling irritants.
- ✓ Cosmetic nail products of all kinds should be avoided.
- ✓ Pushing the cuticles back aggressively and commercial cuticle treatments can be harmful to patients with paronychia.
- ✓ Gloves should be worn in cold, windy weather to avoid drying and chapping which may leads to paronychia.
- ✓ Provide warm soak for the fingers if any irritation or discomfort occurs in the nail.

Current treatments available for paronychia are.

- ➢ **Topical therapy**

There are several topical antifungal preparations available. Clotrimazole is primarily used for the management. The active antifungal agents in the preparation is either an imidazole, an allylamine or polyene or an preparation that contain a chemical with antifungal, antiseptic and keratolytic properties such as benzoic acid, benzyl peroxide. Topical therapy has the greatest potential as primary therapy in mild infection as prophylactic agents.[11]

- ➢ **Oral therapy**

Oral antifungal agents have achieved greater success rate than topical therapies for the paronychia. Oral antibiotics like Clindamycin (Cleocin) and the combination of amoxicillin–clavulanate potassium (Augmentin) are effective against pathogens causing paronychia. Terbinafine are most commonly used antifungal to treat paronychia as well as dermatophyte infection and griseofulivin was the first approved antifungal drug by US food and drug administration. Oral systemic antifungal therapy is limited by its toxicity, drug interactions, contraindications, high cost of medication, increased microbe resistance, a long duration of treatment, and relapse is very common.

The common side effects caused with the oral drug formulation are hypersensitivity reactions such as skin rashes, gastric effects such as nausea, head ache, vomiting, and upset of stomach and also cause changes in the menstrual periods.

- **Surgical avulsion**[14,7]

Surgical management is only indicated in recalcitrant cases of chronic paronychia, which does not respond to medical management and proper use of general measures. Surgical treatment involves the removal of the chronically inflamed tissue, which aids in effective penetration of topical as well as oral medications and regeneration of the cuticle. It should only perform under anesthesia. The nail fold containing pus is incised with a no.11 or no.15 scalpel, towards the nail bed. Along with surgical management, oral antibiotics are also prescribed. The nail fold containing surgical avulsion is performed both distally and proximally. But this method showed to have high drop out and poor patient compliance.

- **Laser treatment**

Laser makes use of photo selective effects to eliminate infection. Neodymium-doped yttrium aluminium garnet (Nd:YAG) laser is effectively used for the treatment of paronychia. The procedure was performed using long pulsed1064-nm Nd:YAG laser ,at a rate of 70 to 80 J/cm^2 using a 2.5-mm spot size hand piece for 0.7ms.The Nd:YAG laser decreases inflammation by targeting water as chromophore and generate heat in the dermis via photothermolysis. It also acts by suppressing interleukin IL- 8 and thereby causing alternation of vascular permeability and tissue permeation. The Nd: YAG laser treatment also act by direct fungicidal effects.[15]

CONCLUSION

Paronychia are the local infections of the nail characterized by swollen, nail fold. Depending upon the conditions of the nail they are divided into acute and chronic. For the management of paronychia, systemic antifungals like Itraconazole and Terbinafine may be administered. The antibiotics like Amoxicillin/ Clavulate, Clindamycin, Trimethoprim/ Sulfomethoxazole are also prescribed. There are several preventive measures are available for the control of paronychia infection.

REFERENCES

1. Elvin G. Zook. Anatomy and Physiology of the Perionychium. Clinical Anatomy, 2003; (16): 1–8.
2. Elvin G. Zook. Understanding the Perionychium. J Hand Ther, 2000; (13): 269-275.
3. Elvin G. Zook, Allen L. VanBeek, Robert, Russell, Michael E. Beatty, M.D., Springfield. Anatomy and physiology of the perionychium: A review of the literature and anatomic study. J HAND SURG-AM, 1980; 6(5): 528-534.

4. Muralidhar P, Bhargav E, Rajesh Reddy. Transungual Drug Delivery: An Over View. Int J Pharma Res Health Sci, 2017; 5(1): 1522-1528.
5. Nandini P, Prasanthi N L, Mani Kiran SS, Rama Rao N. A review on transungual drug delivary system. WJPPS, 2018; 7(8): 260-269.
6. Vivek Kumar, Sangeet Sharma, Naveen, Pawan Jalwal. A comprehensive review on human nail. Int. med, 2017; 3(10): 72-74.
7. Rockwell GP. Acute and chronic paronychia. Am Fam Physician, 2001; 63(6): 1113-6.
8. Adam lomax, James thornton,Dishan singh. Toenail paronychia. Foot Ankle Sur, 2015; 1-5.
9. Vineet Relhan, Khushbu Goel, Shikha Bansal, Vijay Kumar Garg. Management of Chronic Paronychia.ijd, 2014; 59(1): 15-20.
10. York J. Yates, MD, Matthew J. Concannon. Fungal infections of the perionychium. Hand Clin, 2002; (18): 631–642.
11. Tosti A, Piraccini BM, Ghetti E, Colombo MD. Topical steroids versus systemic antifungal in the treatment of chronic paronychia: An open, randomized double-blind and double dummy study. J Am Acad Dermatol, 2002; 47: 73-6.
12. Gouri V, Gupchup, Joel L. Zatz. Structural characteristics and permeability properties of the human nail: A review. Int. J. Cosmet. Sci, 1999; 50: 363-385 22.
13. Praveen Kumar, P. Narayana Raju. Transungual Drug Delivery: A Promising Route to Treat Nail Disorders. IJPSR, 2013; 2(4): 22-33.
14. Tos P. Titolo N. L. Chirila F. Catalano. Surgical treatment of acute fingernail injuries. Eur J Orthop Traumatol, 2012; (13): 57–62.
15. EL-Komy, Samir. 1064 Nd:YAG laser for the treatment of chronic paronychia: a pilot study. Lasers Med Sci, 2013.