Netherton Syndrome: Dental Considerations

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Triads of congenital erythroderma and ichthyosis, hair shaft abnormalities, and immune dysregulation have been recognized as Netherton's syndrome (NS). A pediatric patient with NS is presented. Clinical manifestations are described along with a pertinent review of the literature.
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INTRODUCTION

Netherton syndrome (NS) is an atypical autosomal recessive disorder characterized by a triad of clinical manifestations that comprise: (1) congenital ichthyosis, (2) hair shaft abnormalities, and (3) immune dysregulation.[1, 2] The incidence is approximately 1 in 200,000 and NS is considered to be the cause of approximately 20% of congenital erythrodermas.[3] The gender ratio is most likely equivalent, although several reviews state that females predominate.[1] There is also evidence that a greater penetrance of the hair defects is seen in females.[2]

With some exceptions,[4] the bulk of NS cases are detected at an early age. Symptoms present as early as birth and periodic re-evaluation of the hair must be made in order to make a definitive diagnosis. The characteristic hair shaft abnormality of NS is typically not present until after the first year of life and therefore can delay the diagnosis of NS.[5] However; there is a reported incidence in which hair shaft abnormalities was present at birth.[6] Described here is a 3-year-old boy with NS presenting with congenital exfoliative erythroderma, excessive skin peeling, and multiple hair shaft abnormalities. The purpose of this report is to present a pediatric dental patient with NS and associated intraoral findings.

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Case Description

A 3-year-old Hispanic male patient with documented NS (Figure 1) was referred by the pediatrician to the pediatric dental residency clinic for evaluation. According to physician reports, the patient was born prematurely at 33 weeks gestation to unaffected parents. Gestation was complicated by an ectopic twin, which had to be surgically removed in the first trimester. The patient was born with exfoliative erythroderma and he was small for his age. Skin examination at 4 weeks of age revealed erythroderma with large scales covering his torso, extremities, and scalp. Scalp hair and eyebrows were present with normal gross appearance. Based on these features, diagnostic considerations included congenital ichthyosiform erythroderma and peeling skin syndrome. One week later, he developed edema of his hands and feet. His oral intake was low and he weighed only 2.1 kg. Serum analysis revealed hypoproteinemia, decreased albumin, hypoglycemia, elevated potassium and IgE levels. Over the

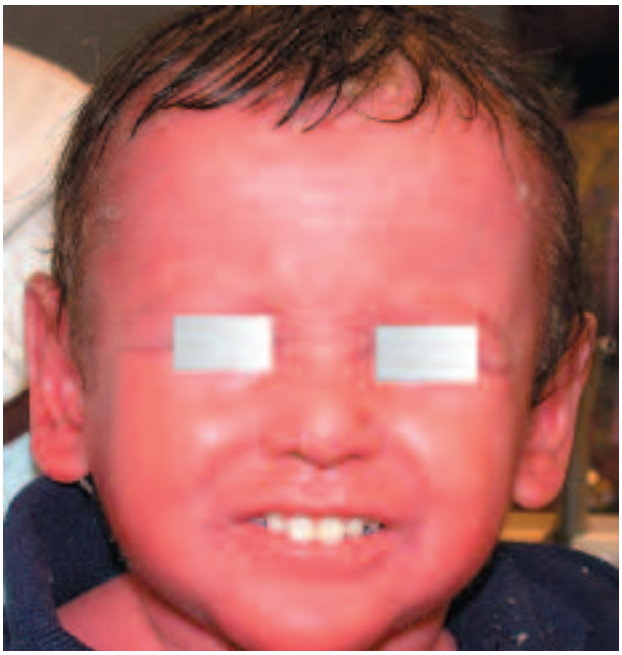

Figure 1. Pediatric patient with documented Netherton Syndrome.

Figure 2. Note peeling and "red-colored" skin.

next 3 months, the patient remained hospitalized because of profound failure to thrive, persistent electrolyte abnormalities, intermittent aminoaciduria and hypoalbuminemia. Initially, nasogastric tube feeds were attempted but due to poor gastrointestinal absorption, a Broviac catheter was placed, and was maintained on parenteral nutrition for several weeks. A gastrostomy tube was placed for prolonged nutritional support. With normalization of his electrolytes and stable weight gain, he was discharged home with close multidisciplinary follow-up. Currently, the patient takes zinc supplements for his low zinc concentration and uses a corticosteroid cream for his skin. The patient is allergic to various nuts as well as peanuts. The parent reports that he does not tolerate orange juice due to its acidity and demonstrates an overall developmental delay of 70%.

Generally, the pediatric patient was observed to have peeling and "red-colored" skin (Figure 2). Facial symmetry was noted. The ears were prominent. He also presented with developmental and physical delays. The dental history was not significant at this time. There was no history of oral trauma or toothaches. All primary teeth were present with no visible carious lesions or defects. The patient exhibited generalized moderate plaque buildup characterized as thick voluminous plaque. There was moderate generalized gingivitis noted. The gingiva was bulbous and erythematous (Figure 3) and tender to palpation. There was no primate or incisor spacing, and the overbite and overjet were 75% and 4 mm, respectively. Due to age and behavior, radiographs were not taken at this time. A rubber cup prophylaxis without paste was performed and the patient was placed on a 3-month oral hygiene maintenance follow-up. Consultation with the oral pathologist and dermatologist confirmed inflamed erythematous gingival tissues. Goals are to minimize superimposed gingival inflammation.

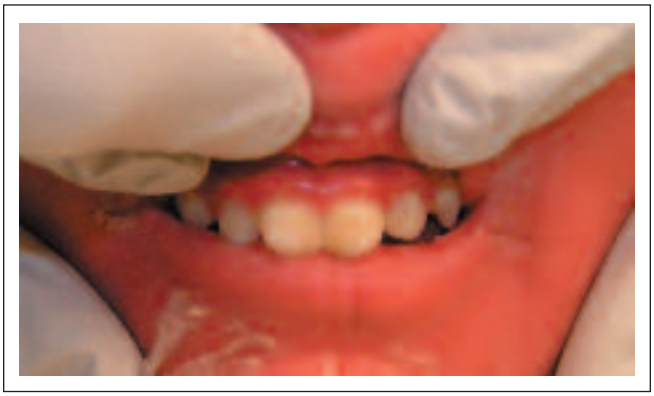

Figure 3. Introral view revealing erythematous and bulbous gingival tissues.

DISCUSSION

Netherton (1958) first described a young girl with erythroderma and abnormal hair. In 1964, Wilkinson created the term trichorrhexis invaginata to describe the hair abnormality.[7] The observed hair abnormality was further described as "bamboo hair" that are coarse and lusterless[8] and are usually short, brittle and may break off or stand on end.[1] These defects can be found on the scalp, eyebrow or eyelash hairs. Cutaneous features of NS are characterized by a double-edged scale with a serpiginous border surrounding erythematous, polycyclic, migratory patches.[1, 8] Although some authors say the eruptions are not usually pruritic, the patients in the study conducted by Judge et al. showed universal pruritus.[8] Atopic diatheses reported include urticaria, angioedema (usually from peanut ingestion), asthma, allergic rhinitis, and elevated IgE levels.[1, 7, 8]

Due to elevated IgE levels, some authors feel that NS belongs in the class of hyper-IgE syndromes such as Wiscott-Aldrich and DiGeorge.[7] The elevated serum IgE may lead to T-cell dysfunction[2] and although some believe NS to be an immunodeficiency disorder, others believe that studies do not demonstrate a significant immune defect in these patients.[5]

Although NS should be clearly diagnosed with the clinical triad, it may be misdiagnosed as other disorders with similar findings. These differential diagnoses include acrodermatitits enterophatica, atopic dermatitis, cystic fibrosis, celiac disease and seborrheic dermatitis.[2] Other common misdiagnoses are Leiner's disease, which is an immunodeficiency disorder with dermatitis, erythrodermic psoriasis, and nonbullous congenital ichthyosiform erythroderma.[5] Further light and microscopy studies would allow distinguishing the disorder from other erythrodermatic disorders.

The distinguishing histologic feature of NS is an accumulation of an eosinophilic, periodic acid-Schiff, Sudan positive material that focally replaces the stratum corneum at the active border of the skin lesions.[1] A study specifically focused on the changes of the stratum corneum was conducted by Fartasch et al. The study showed that a distinctive feature of NS is the premature secretion of lamellar body contents. Light microscopy showed psoriasiform features with epidermal acanthosis and hyperkeratosis, accentuated rete ridges and sometimes long, narrow rete ridges. The stratum corneum was entirely parakeratotic. Electron microscopy showed inclusions in cells such as intracellular

lipid droplets and nuclear remnants.[5]

In addition to the characteristic clinical triad, there are other findings associated with NS. These include failure to thrive in infancy, mental retardation, aminoaciduria, growth and development delay, recurrent infections (skin, eye, upper or lower respiratory tract), immune defects, and hypernatremic dehydration.[1, 2, 3, 7] There have been several reports with hypernatremia in infancy of NS patients and the severity may lead to death. In NS, there is a great fluid loss through the skin and an additional enteric water loss. This can lead to decompensation of the fluid balance that may lead to more severe complications.[6]

Many treatments have been attempted with NS patients. However, most have been shown to be ineffective. Due to their condition, patients with NS are more susceptible to systemic absorption and there are at an increased risk to adverse reactions to topical therapies. Treatments have included low-dose oral corticosteroids, etretinate, and psoralen ultraviolet A therapy.[2] A study on oral retinoid therapy demonstrated an improvement for cutaneous symptoms but did not improve the hair shaft defect.[3] One treatment that should be avoided is the use of topical tacrolimus. This macrolide immunosuppressant inhibits T cells and is contraindicated for patients with NS because of the concern for increased systemic absorption. Although it may appear to be effective at first, patients later have intolerable local burning and irritation.[3] The use of topical LacHydrin 5% lotion has been shown to reduce scaling in some patients.[2] Other treatments such as antihistamines, penicillamine, and even uses of homeopathic treatments and Chinese herbal teas have been attempted and all proved to be unsuccessful.[8]

The literature review conducted by Sun and Linden mentions that the teeth were usual in development in NS patients. However, in one case report of NS presenting as congenital psoriasis, the patient was noted to have delayed eruption of normal dentition.[7] Similarly in this case, the eruption pattern and primary dentition appeared to be normal size and shape as well as in pattern of eruption. However, this patient exhibited microstomia and a history of perioral lesions due to the skin condition as well as dental crowding.

Of particular interest to pediatric dentists are that topical fluorides foam or gel, fluoride varnishes, and fluoridated dentifrices are contraindicated in patients with NS. Patients may experience 'burning' sensations with fluoridated dentifrices. Consequently, patients with NS should routinely follow-up with their dentist to ensure oral health. Antimicrobial liquids to brush on may be effective in reducing candidiasis and dental caries. Oral hygiene recommendations should include a small headed toothbrush with soft nylon bristles. The toothbrush may be softened under warm water so that gingival tissues are not irritated. A cyanoacrylate based topical ointment may provide relief from major and minor oral ulcerations. Further, prescription Maalox, benadryl, lidocaine (1:1:1) may be used to sooth and treat stomatitis if needed.

Early intervention and aggressive prevention in the form of regular evaluation of soft tissue and oral hygiene maintenance visits every three months along with calculus removal is key.

CONCLUSIONS

The pediatric dentist has the opportunity of being one of the first medical-health personnel to observe young children who manifest uncommon syndromes or anomalies. Therefore, it is important that pediatric dentists be familiar with these unusual cases.

REFERENCES

1. Krafchik, Bernice R. Netherton Syndrome. Pediatric Dermatology, 9(2): 157–160, 1992.
2. Seraly MP, Sheehan M, Collins M, Mostow E. Netherton Syndrome Revisited. Ped Dermatol,11(1): 61–64, 1994.
3. Sun JD, Linden KG. Netherton syndrome: A case report and review of the literature. International J Dermatol, 45: 693–697, 2006.
4. Ibrahim G, Jameelah A, Hassari G. Netherton Syndrome. Skin Med, 2(6): 387–9, 2003.
5. Fartasch M, Williams ML, Elias PM. Altered Lamellar Body Secretion and Stratum Corneum Membrane Structure in Netherton Syndrome: differentiation from other infantile erythrodermas and pathogenic implications. Arch Dermatol, 135(7): 823–32, 1999.
6. Stoll C, Alembik Y, Tchomakov D, et al. Severe Hypernatremic Dehydration in an Infant with Netherton Syndrome. Genetic Counseling,12(3): 237–243, 2001.
7. Shwayder T, Banerjee S. Netherton Syndrome Presenting as Congenital Psoriasis. Ped Dermat, 14(6): 473–476, 1997.
8. Judge MR, Morgan G, Harper JI. A clinical and immunological study of Netherton syndrome. Brit J Dermat, 131: 615–621, 1994.