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Lamellar ichthyosis etiology and pathology: A review article

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Abstract

Introduction: Lamellar ichthyosis (LI) is a form of autosomal recessive congenital ichthyosis (ARCI). It is less common than congenital non-bullous ichthroderma (CIE), with an incidence of about 1 in 300,000 births. This disease begins at birth and continues into adulthood, in severe conditions it is easily recognized. Lamellar ichthyosis is characterized by the presence of large, plate-like lamellar scales, ectropion, and eclabium. The appearance of ichthroderma is usually minimal to no erythroderma. The newborn ("collodion baby") was wrapped in a shiny envelope that was cracked in several areas. This tension usually causes an inverted eyelid (ectropion) and lips (eclabium). Treatment of lamellar ichthyosis is symptomatic only. Emollients are useful for keeping skin smooth and hydrated. Keratolytic drugs are used to promote peeling and thinning of the stratum corneum. Corneal lubrication may be given for ectropion. Oral retinoids can produce significant improvements, but be aware of the side effects of long-term use. Therefore, life-long therapy is needed to improve quality of life.

Discussion: Lamellar ichthyosis is caused by a mutation in a gene encoding the transglutaminase 1 enzyme (TGM 1) on chromosome 14q11. IL usually occurs at birth with collodion babies, which is a translucent (semi-transparent) layer. IL lasts a lifetime, this disease almost always involves the entire surface of the skin. The membrane-associated TGase was approximately 92 kD. Since the identification of the TGase 1 gene (TGM1) mutations in a number of families with the IL mutation on TGM1. In 2003, keratinocyte lipid transporter ABCA12 was reported to be the causative molecule in type 2.In general, there are 5 mutations that cause IL, namely TGM1 (14q11), ABCA12 (2q34), 19p12-q12, 19p13, ALOXE3-ALOX12B (17p13) and ichthyin (5q33).

Conclusion: Genetic etiology of lamellar ichtyosis is autosomal recessive and x-linked recessive, caused by a mutation in a gene encoding the transglutaminase 1 enzyme (TGM 1) on chromosome 14q11. Pathology of Lamellar ichthyosis is hyperkeratosis, normal or increased stratum granulosum, and acanthosis are common histologic findings of lamellar ichthyosis. Orthohyperkeratosis was found in all cases and most cases showed follicular keratosis.

Keywords: lamellar ichthyosis, etiology, pathology, genetic

Introduction

Lamellar ichthyosis (LI) is a form of autosomal recessive congenital ichthyosis (ARCI). It is less common than congenital non-bullous ichthroderma (CIE), with an incidence of about 1 in 300,000 births. This disease begins at birth and continues into adulthood, in severe conditions it is easily recognized. Lamellar ichthyosis is characterized by the presence of large, plate-like lamellar scales, ectropion, and eclabium. The appearance of ichthroderma is usually minimal to no erythroderma. The newborn ("collodion baby") was wrapped in a shiny envelope that was cracked in several areas. This tension usually causes an inverted eyelid (ectropion) and lips (eclabium) [1,2].

After living for several days, the colodionic membrane of lamellar ichthyosis is replaced by a layer of rough scales that remains for life. Eclabion usually does not persist after birth, but it persists and can cause corneal damage due to abnormal tear flow. There is hyperkeratosis of the palms and feet. Limited motion of the joints, flexion contractures, finger sclerodactyly and cartilage hypoplasia may occur. The stratum corneum is thick and scales on the scalp envelop the hair, infection often resulting in alopecia. Nails are mottled, wrinkled, grooved or thickened, often with subungual buildup of keratin. Lips and mucosa are less likely to be involved. Hyperkeratosis can interfere with normal sweat gland function, resulting in hypohidrosis. Some patients have severe intolerance to heat and should avoid overheating [3, 4].

Genetic etiology of ichtyosis is autosomal recessive and x-linked recessive, as example lamellar ichtyosiform and non bullous congenital erythroderma-NClE). Based on the degree of severity, ichthyosis is divided into the most severe forms, namely harlequin ichthyosis (HI), lamellar ichthyosis (LI), congenital ichthroderma (CIE), epidermolytic hyperkeratosis (EHK), recessive X-linked ichthyosis (RXLI) to the lightest form. are ichthyosis vulgaris (IV), and Siemens bullous ichthyosis (SEI). Hereditary (congenital) ichthyosis includes lamellar ichthyosis, epidermolytic hyperkeratosis, and X-linked ichthyosis [5, 6].

Histopathological examination showed a varied picture according to the type of ichthyosis, which was dominated by thickening of

the stratum corneum, thinning of the stratum granulosum and the presence of perivascular lymphohistiocytic infiltrates and protein in the dermis layer. Histopathological examination can help make the diagnosis as early as possible so that it can accelerate the administration of therapy so as to improve quality of life and reduce mortality and morbidity due to ichthyosis [7]. Aims of this article is to review ethiology and pathology of LI.

Discussion

Lamellar ichthyosis is caused by a mutation in a gene encoding the transglutaminase 1 enzyme (TGM 1) on chromosome 14q11. IL usually occurs at birth with collodion babies, which is a translucent (semi-transparent) layer. IL lasts a lifetime, this disease almost always involves the entire surface of the skin. The membrane-associated TGase was approximately 92 kD. Since the identification of the TGase 1 gene (TGM1) mutations in a number of families with the IL mutation on TGM1. In 2003, keratinocyte lipid transporter ABCA12 was reported to be the causative molecule in type 2.In general, there are 5 mutations that cause IL, namely TGM1 (14q11), ABCA12 (2q34), 19p12-q12, 19p13, ALOXE3-ALOX12B (17p13) and ichthyin (5q33) [8].

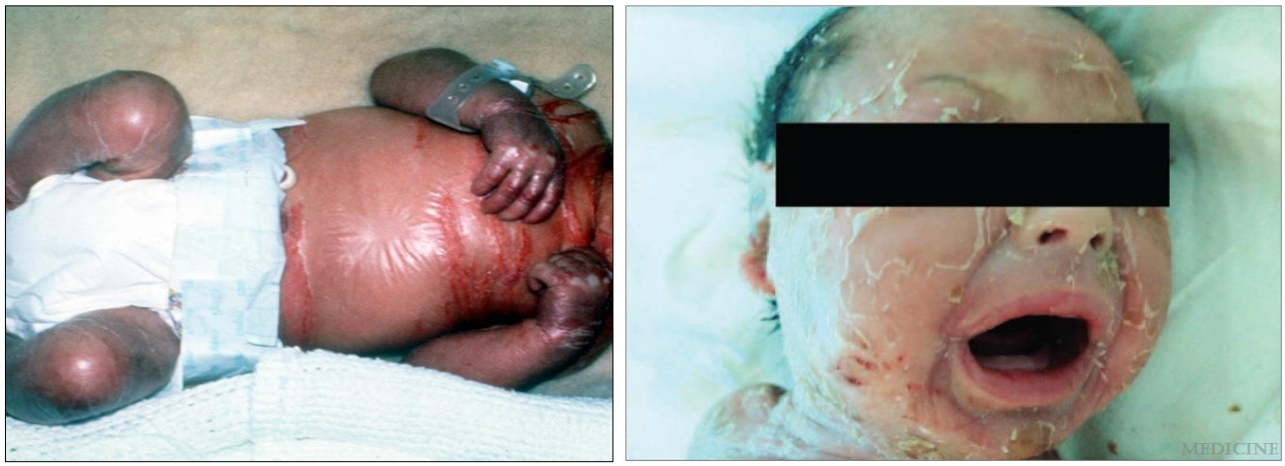

Fig 1: Lamellar ichthyosis. Collodion baby features in lamellar ichthyosis. You can see ectropion and eclabium [5]

Hyperkeratosis, normal or increased stratum granulosum, and acanthosis are common histologic findings of lamellar ichthyosis. Orthohyperkeratosis was found in all cases and most cases showed follicular keratosis [5].

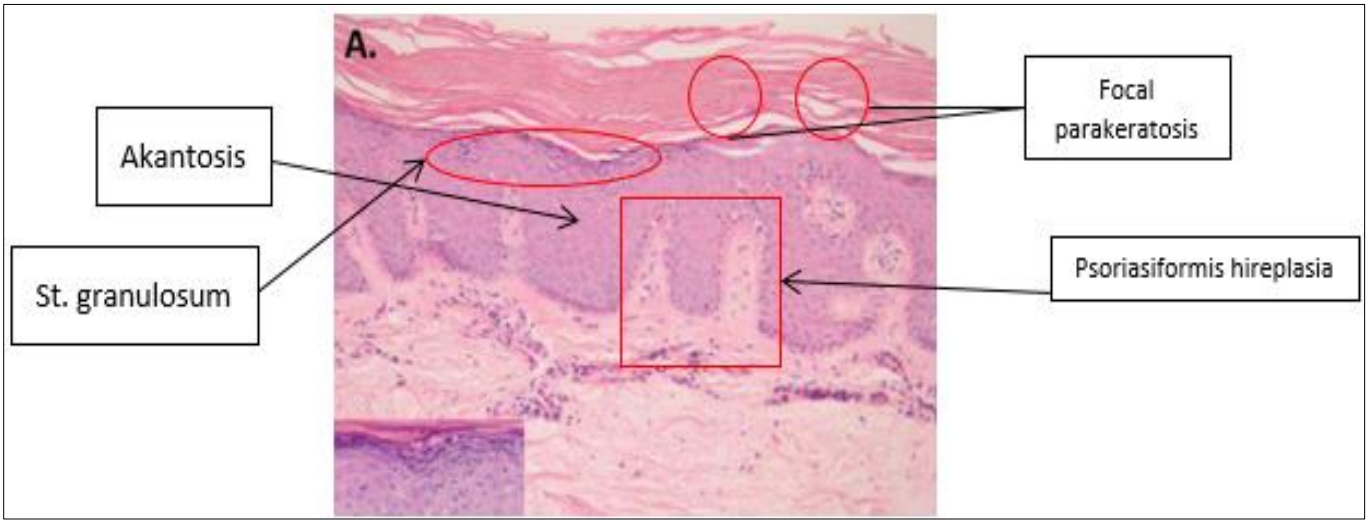

Fig 2: Lamellar ichthyosis. On histological examination, there was a focal parakeratosis, thickened stratum granulosum, acanthosis, and psoriasiform hyperplasia. (H.E. stain, 200x magnification) [6]

The diagnosis of lamellar ichthyosis is based on clinical findings. Diagnosis support is very important, but it is quite difficult to interpret, often difficult to distinguish from non-bullous CIE. With electron microscopy, the features of lamellar ichthyosis vary.Immunohistochemical examination showed high expression of loricrin and involucrine that were scattered abnormally in the keratinocyte cytoplasm, with a faded color of cytoplasmic transglutaminase. Prenatal diagnosis based on molecular analysis of fetal DNA is the preferred method, but is only possible in families where the molecular defect is known beforehand [4, 9].

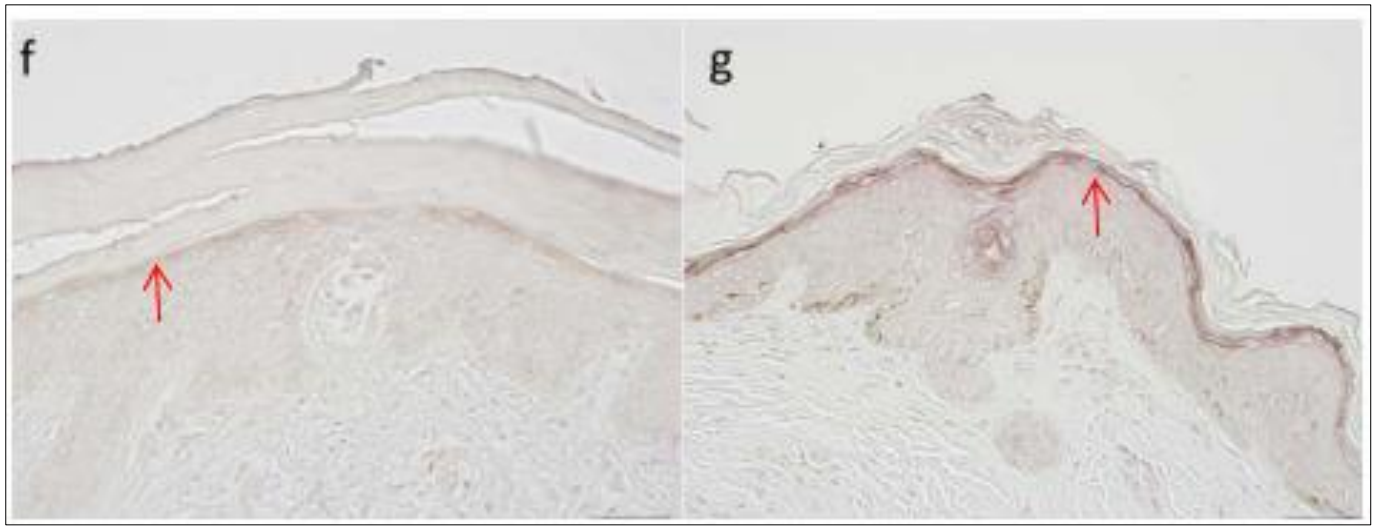

Fig 3: Lamellar ichiosis. Immunohistochemical staining of lamellar ichthyosis lesions using anti-TGM1 monoclonal antibody. The results of TGM1 staining were reduced in patients with lamellar ichthyosis (f) compared to normal skin (g) [5]

Abnormalities in the loricrine and involucrine staining patterns and reduced, or even absence of TGase 1 may be seen on immunohistochemical examination of the cell envelope in some, but not all, patients with lamellar ichthyosis. The differential diagnosis of lamellar ichthyosis includes Cornel Nethernton's syndrome, Sjogren-Larsson's syndrome, epidermolytic hyperkeratosis, harlequin ichthyosis, vulgaris ichthyosis, Rud's syndrome, trichothyodystrophy, and recessive x-linked ichthyosis [1, 2, 10]

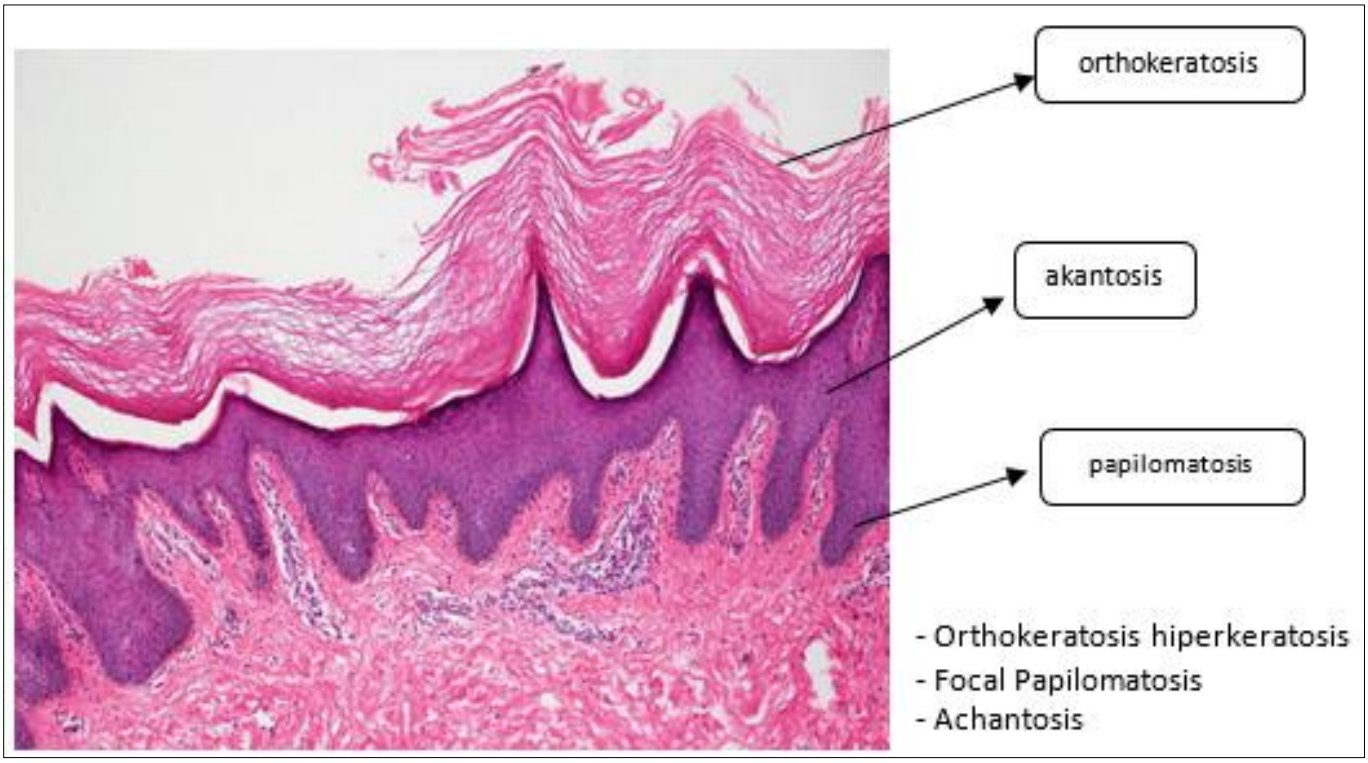

Fig 4: Histopathological features of Sjogren-Larsson syndrome, one of the differential diagnoses of Lamellar ichthyosis [5]

Treatment that can be done in cases of ichthyosis is symptomatic treatment to reduce disturbing complaints. Topical keratolytic drugs to reduce the thickening of epidermal cells. Meanwhile, symptomatic drugs can be in the form of emollients due to dry skin, and antihistamines if there are complaints of itching. Patients should also be educated about the conditions causing ichthyosis, the routine medications that should be given and the factors that can make it worse [9, 11]. Treatment of lamellar ichthyosis is symptomatic only. Emollients are useful for keeping skin smooth and hydrated. Keratolytic drugs are used to promote peeling and thinning of the stratum corneum. Corneal lubrication may be given for ectropion. Oral retinoids can produce significant

improvements, but be aware of the side effects of long-term use. Therefore, life-long therapy is needed to improve quality of life [12].

Conclusion

Genetic etiology of lamellar ichtyosis is autosomal recessive and x-linked recessive, caused by a mutation in a gene encoding the transglutaminase 1 enzyme (TGM 1) on chromosome 14q11. Pathology of Lamellar ichthyosis is hyperkeratosis, normal or increased stratum granulosum, and acanthosis are common histologic findings of lamellar ichthyosis. Orthohyperkeratosis was found in all cases and most cases showed follicular keratosis

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