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Case report

Early genetic diagnosis of recessive dystrophic epidermolysis bullosa due to mutation of the COL7A1 gene: case report

Diagnóstico genético precoce da epidermólise bolhosa distrófica recessiva por mutação do gene COL7A1: relato de caso

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Abstract

Objective: to report a clinical case of a patient with Recessive Dystrophic Epidermolysis Bullosa (RDEB). **Case report:** this is H.V.C.F., a 12-month-old female, with a dermatological condition of skin aplasia on the calcaneus and lateral aspect of the left foot at birth, who was early diagnosed with Dystrophic Epidermolysis Bullosa (DEB). Throughout her follow-up, she developed new lesions on her skin, mucous membranes, and eyes from minor mechanical trauma. In addition to the dermatological lesions, delayed neuropsychomotor development was also observed. The patient is followed by a multidisciplinary team, and treatment is based on wound management, nutritional support, and physiotherapy to ensure improved quality of life. Nutritional support included powdered probiotics, medium-chain triglycerides, L-glutamine, omega-3, vitamin D, and ferric polymaltos. Treatment of wounds with exudate was performed using exudate transfer dressings and hydrogel foams, and when signs of infection were present, topical antimicrobials were used. Tubular and elastic bandages were used to prevent new lesions and reduce friction. **Conclusion:** DEB is a disease with difficult-to-control signs and symptoms that requires, as a form of treatment, the support of a permanent multidisciplinary team.

Keywords: Dystrophic epidermolysis bullosa. Nonsense mutation. Heredity. Infant.

Resumo

Objetivo: relatar um caso clínico de paciente portadora de Epidermólise Bolhosa Distrófica Recessiva. **Relato de caso:** trata-se de H.V.C.F., sexo feminino, 12 meses de idade, com quadro dermatológico de aplasia de pele em calcâneo e face lateral do pé esquerdo ao nascimento que foi precocemente diagnosticada com quadro de Epidermólise Bolhosa Distrófica (DEB). Ao longo de seu acompanhamento, evoluiu com surgimento de novas lesões em pele, mucosas, olhos a partir de trauma mecânico de menor intensidade. Além das lesões dermatológicas, foi observado também atraso no desenvolvimento neuropsicomotor. Paciente é acompanhada por equipe multidisciplinar e o tratamento baseia-se no manejo de feridas, suporte nutricional e fisioterapia, para garantir melhoria da qualidade de vida. Como suporte nutricional foram utilizados probiótico em pó, triglicerídeos de cadeia média, L-glutamina, ômega-3, vitamina D e ferripolimaltos. O tratamento das feridas com presença de exsudato foi realizado por meio de coberturas transferidoras de exsudato e espumas de hidropolímero, e quando houve sinais de infecção, foi utilizado antimicrobiano tópico. Para a prevenção de novas lesões e redução do atrito, foram utilizadas bandagens tubulares e elásticas. **Conclusão:** a EDB é uma doença de difícil controle dos sinais e sintomas que necessita, como forma de tratamento, o suporte de uma equipe multidisciplinar permanente.

Palavras-chave Epidermólise Bolhosa Distrófica. Mutação sem sentido. Hereditariedade. Lactente.

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Introduction

Dystrophic Epidermolysis Bullosa (DEB) is a rare genetic disease that presents with dermatological manifestations, with a prevalence in Europe between 1/120,000-350,000.[1,2]. In the case of DEB, the presence of a mutation in the *COL7A1* gene (3p21.31), responsible for encoding type VII collagen, is noted[1]. This collagen interacts with laminin 5 and constitutes anchoring fibrils, located in the sublamina densa of the skin[2]. When a mutation occurs, there are defects in the anchoring fibrils and, consequently, blisters form in the subdermal portion[3].

Blister formation occurs because of minor trauma and is the most important characteristic of the condition1. The lesions are not limited to the skin, and can affect oral, tracheal, esophageal mucous membranes, among others[4]. In more severe cases, progressive and erratic healing can result in limb contractures, disfigurement, and stenosis[1]. The lesions cause significant impairment in the quality of life of patients, but the complications are even more extensive, involving anemia, growth disorders, and osteoporosis, since there is intense energy expenditure in order to sustain the healing of chronic wounds[5].

The diagnosis is based on clinical findings and the identification of causal variants of the *COL7A1* gene[1-12]. Although studies are underway, there is no approved disease-modifying treatment[5-7].

The case report description of rare diseases helps in the understanding and clinical management of patients affected by the condition, as well as producing data that can be used for new research. Thus, the objective was to report a case of DEB due to a *COL7A1* mutation.

Case report

This work was approved by the Human Research Ethics Committee website with CAAE number: 89609625.4.0000.5141.

This is patient H.V.C.F., female, 1 year old, diagnosed shortly after birth with Recessive Dystrophic Epidermolysis Bullosa (RDB). The patient is the daughter of non-consanguineous parents, with no family history of the disease. She was born at the Dr. Mário Ribeiro da Silveira Clinical Hospital, located in the city of Montes Claros (MG). The pregnancy was of usual risk, the term delivery, cephalic position, at 38 weeks and 3 days, occurred vaginally. At birth, she weighed 2,704 g; length of 46 cm; head circumference of 34 cm; chest circumference of 32 cm and abdominal circumference of 32 cm. In the Apgar score, the infant obtained a score of 8 at one minute and 9 at five minutes. No abnormalities were observed in the neonatal screening tests.

At the time of delivery, the attending pediatrician identified areas of cutaneous aplasia, mainly on the lateral aspect of the right foot, as well as lesions on the thumb and right olecranon, and intraoral lesions. A few hours after birth, after discussing the case with other pediatricians and a dermatologist, the attending physician established a clinical diagnosis of Epidermolysis Bullosa, advising the family on the importance of genetic testing for diagnostic confirmation and classification of the disease subtype, as well as the need for intensive care to maintain the integrity of healthy skin and to apply specific dressings to the existing lesions.

Figure 1. Record of some of the injuries presented by the patient.

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At two months of age, the patient underwent next-generation sequencing testing, which revealed a nonsense mutation in the COL7A1 gene, identifying the homozygous presence of the variant NM_000094.4 (COL7A1): c.325_326insCG;p. (Glu109Alafs*39), with cytogenetic location chr3: 48593637 [GRCh38/Hg38] classified as pathogenic. The human genome reference for this test was GRCh37 / hg19. This mutation is associated with various clinical phenotypes related to type VII collagen, with autosomal dominant and recessive inheritance. The patient consulted with a medical geneticist who, based on the test, confirmed the diagnosis of RDEB.

Since the diagnosis, the patient has undergone multidisciplinary follow-up consisting of a pediatrician, pediatric dermatologist, pediatric gastroenterologist, ophthalmologist, geneticist, nutritionist, and physiotherapist.

In addition to several lesions in different stages of healing that arise from minimal trauma, the patient presented with low weight for her age, delayed neuropsychomotor development requiring late introduction of food. Thus, the patient received individualized nutritional monitoring and used powdered probiotics, medium-chain triglycerides, L-glutamine, omega-3, vitamin D, and ferric polymaltos; as well as individualized monitoring with a physiotherapist for motor stimulation. Additionally, the appearance of a lesion on the right cornea, which was identified and monitored by an ophthalmologist, should be highlighted.

Regarding wound management, carried out by the patient's caregivers under the guidance of the attending dermatologist, it included daily local care, with the use of mineral water, cleansing gel (Soothing Cleansing Gel — Mustela®) and, occasionally, physiological solution (0.9% NaCl). Dressings are changed daily, with the type of dressing chosen according to the stage and appearance of the lesion. The wound dressings used aimed to promote moist healing, protect the wound bed from mechanical trauma, control pain and exudate, and allow for atraumatic removal.

During the inflammatory phase of the wound healing process, the choice of dressing depended on the presence of signs of infection. In the presence of exudate, exudate transfer dressings and hydrogel foams, gel with Polyhexamethylene Biguanide, and in cases of abundant exudate, exudate transfer dressings with silver were used. In the presence of signs of infection, antimicrobial agents were chosen. In special cases, such as in newborns with Epidermolysis Bullosa, Dialkyl Carbamoyl Chloride or Hydrofiber with silver may be used.

When necrotic tissue was observed, lipid-colloid technology with silver or surfactant dressings were used. When there was an unpleasant odor, activated charcoal with silver was used. At this stage, the patient routinely uses a porous regenerative membrane (Membracel®), Mepilex Transfer (Molnlycke®), UrgoTul and UrgoTul Ag/Silver (Urgo Medical®), in addition to FOAM Lite dressing (Convatec®).

When pain was present, dressings impregnated with ibuprofen were used; and, in cases of bleeding, alginates were indicated. If signs of infection persisted, the same dressings recommended for the inflammatory phase were maintained. In the remodeling phase, it was essential to protect the newly formed scar with skin protectors, such as acrylate polymer spray and foams. In these phases, the patient used the Esenta protective barrier spray (Convatec®) and the gel with Polyhexamethylene Biguanide (Curatec®).

To prevent further injuries and reduce friction, tubular and elastic bandages were used in this case. Tubifast (Molnlycke®) mesh and elastic tubular netting for dressing fixation (Poolfix®) were used, which can be customized to aid in retention in areas difficult to secure, such as armpits, groins, and shoulders, without hindering mobility and avoiding material waste.

Finally, the patient uses custom-made orthoses (gloves) which, in addition to facilitating the fixation of dressings, played an essential role in preventing damage to the limbs, preventing injuries, contractures, and the development of syndactyly. In the event of blisters, puncture is recommended, as internal pressure tends to worsen skin damage. Drainage should be performed with a sterile needle, preceded by adequate asepsis.

Discussion

Epidermolysis Bullosa corresponds to a group of genetic diseases related to skin fragility in response to minimal trauma, resulting in the appearance of lesions on the skin and mucous membranes[6]. DEB is classified into two subtypes: dominant and recessive, according to the Mendelian inheritance pattern; these are further subdivided into eleven other subtypes[1]. Authors argue for the participation of 16 different genes[1], while others describe the involvement of up to 20 genes[6]. These genes encode various components essential for the structural maintenance of the dermis, so that each mutation results in different clinical phenotypes[7]. Thus, the most widely used classification seeks to identify the layer of skin affected by the formation of blisters, which is related to specific mutations[1,6,7].

As differential diagnoses in the neonatal period and in childhood, conditions such as congenital cutaneous aplasia, herpes simplex infection, epidermolytic ichthyosis, bullous impetigo, staphylococcal scalded skin syndrome, linear IgA bullous dermatosis, bullous pemphigoid, neonatal pemphigus, and gestational pemphigoid may be considered. In rare forms of late-onset EB, the differential diagnosis should include acquired dermatoses such as lichen planus and autoimmune bullous diseases[2].

Regarding the genetic aspects of the disease, in the patient's clinical case, the presence of a homozygous pathogenic variant in the *COL7A1* gene was observed. All dystrophic subtypes of Epidermolysis Bullosa are caused by mutations in this gene[7], which modify the coding of type VII collagen that makes up the anchoring fibrils of the skin[2,7], generating structural changes in the sublamina densa[8]. A large population study that performed genetic analysis of the *COL7A1* gene in patients with Epidermolysis Bullosa identified 472 variants, with 247 unique mutations in the gene[11]. From another perspective, different altered genes can present with similar phenotypes, demonstrating complex pathological mechanisms[4] and reinforcing the need for genetic confirmation of the diagnosis of Epidermolysis Bullosa.

Within the dystrophic type, the main manifestations include blister formation from simple mechanical trauma, but with the formation of deep, ulcerative lesions with generalized distribution

on the skin, mucous membranes (oral, esophageal, genitourinary and ocular) and nails[4,8]. The recessive subtype occurs more frequently in the severe and intermediate forms1 and has cutaneous presentations (blisters, milia, atrophic scarring, dystrophic nails, granulation tissue and scalp abnormalities) more frequently than the dominant type[4,9].

Regarding the clinical signs of this syndrome, extracutaneous manifestations stand out. The recessive subtype most frequently presents with anemia, growth retardation, pseudosyndactyly, lesions in the oral cavity, gastrointestinal tract, and eyes; while lesions in the genitourinary and respiratory tracts are uncommon[4,9].

The symptomatology presented by the patient follows this pattern and includes the appearance of lesions from minimal skin friction, mainly affecting the hands and feet — especially the right foot, the face, the pectoral region, the back, the elbows, and the oral mucosa. The lesions present varied characteristics, being in different stages of healing, with a bullous, crusted appearance, areas of hyperemia, and fibrosis.

The central objective of patient management is to mitigate the effects of the disease, relieve symptoms, control pain, promote quality of life, and ensure adequate development for the age, since the main therapeutic measures consist of performing specific dressings for the lesions and using ointments and creams that aid in the healing process. It is important to emphasize that nutritional care is essential and aims to prevent malnutrition and developmental deficits.

Since there is no approved disease-modifying therapeutic option for DEB, knowledge of the genetic mutation is a prerequisite for approaching molecular therapies. In this sense, there are several researchers studying gene replacement therapies, gene editing, exon skipping, continuous reading therapy, among other techniques[5]. The aim is to alter the expression of collagen type 7, allowing the formation of anchoring fibrils and reducing the extent, duration and resolution time of wounds[10].

A study in development investigates the applicability of a topical gene therapy for DEBR cases. In it, a vector of herpes simplex virus-1, Beremagene Geperpavec (B-VEC), with a replication defect containing two copies of the coding sequence COL7A1 is used. In preclinical results, there was an effective restoration in the expression of collagen type 7 in vitro[10], a promising example that amplifies future therapeutic perspectives. In 2025, a phase III clinical study with 15 patients, using Prademagenzamikeracel, showed promise in wound healing and pain control[12]. Regarding prognosis, patients with this dermatological condition have a long-term risk of developing squamous cell carcinoma, esophageal stricture, melanoma, or death[4,9].

In short, the importance of performing not only genetic testing but also the overall context can be understood. The pediatrician must be knowledgeable about rare genetic diseases, requesting the correct genetic test, diagnosis, and follow-up with a medical geneticist. Diagnostic confirmation of

Epidermolysis Bullosa is fundamental, but understanding the type and subtype of the disease; the manifestations and clinical course of the disease help in future studies with gene therapy.

Conclusion

The patient's case highlights the variety of clinical manifestations and challenges in managing DEBR. The mutation identified in the *COL7A1* gene is associated with often severe phenotypes, with cutaneous, mucosal, and neuropsychomotor development impairment, requiring long-term multidisciplinary follow-up. Thus, in addition to genetic diagnosis for confirmation and classification of the disease, knowledge of the most appropriate conservative management is fundamental to providing comfort and support to those with this syndrome.

Therefore, this report contributes to the clinical and genetic knowledge of DEBR, highlighting the need for continuous research for the future implementation of innovative therapies that can improve the prognosis and quality of life of patients affected by this debilitating condition.

Authors' contributions

Research conception and design: Maria Luiza Pereira de Oliveira, Marcelo José da Silva de Magalhães, Francisco de Assis Cavalvante Júnior. Analysis, interpretation of the data, and manuscript writing:Maria Luiza Pereira de Oliveira, Marcelo José da Silva de Magalhães, Francisco de Assis Cavalvante Júnior. Resource management: Maria Luiza Pereira de Oliveira, Marcelo José da Silva de Magalhães, Francisco de Assis Cavalvante Júnior. Critical review of the manuscript regarding intellectual content and final presentation: Marcelo José da Silva de Magalhães. The authors approved the final version of the manuscript and declared themselves responsible for all aspects of the work, including ensuring its accuracy and integrity.

Conflict of interests

None.

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References

1. Has C, Bauer JW, Bodemer C, Bolling MC, Bruckner-Tuderman L, Diem A *et al.* Consensus reclassification of inherited epidermolysis bullosa and other disorders with skin fragility. Br J Dermatol. 2020;183(4):614-627. https://doi.org/10.1111/bjd.18921.

2. Lucky AW, Pope E, Crawford S. Dystrophic epidermolysis bullosa. 2006 Aug 21 [updated 2025 Aug 7]. In: Adam MP, Feldman J, Mirzaa GM *et al.*, editors. GeneReviews® [Internet]. Seattle (WA): University of Washington; 1993-2025. Available from: https://www.ncbi.nlm.nih.gov/books/NBK1304/.

3. Ayub M, Xiong X, Anwer S, Altmüller J, Naeem M, Hassan N *et al.* A homozygous nonsense mutation

identified in COL7A1 in a family with autosomal recessive dystrophic epidermolysis bullosa. J Med Life. 2024;17(9):892-896. https://doi.org/10.3390/jml.2024.892.

4. Fine JD, Bruckner-Tuderman L, Eady RAJ, Bauer EA, Bauer JW, Has C *et al.* Inherited epidermolysis bullosa: updated recommendations on diagnosis and classification. J Am Acad Dermatol. 2014;70(6):1103-1126. https://doi.org/10.1016/j.jaad.2014.01.903.

5. Has C, South A, Uitto J. Molecular therapeutics in development for epidermolysis bullosa: update 2020. Mol DiagnTher. 2020;24(3):299-309. https://doi.org/10.1007/s40291-020-00466-7.

6. Has C, Fischer J. Inherited epidermolysis bullosa: new diagnostics and new clinical phenotypes. ExpDermatol. 2019;28(10):1146-1152. https://doi.org/10.1111/exd.13668.

7. Bruckner-Tuderman L, Has C. Molecular heterogeneity of blistering disorders: the paradigm of epidermolysis bullosa. J Invest Dermatol. 2012;132(Suppl 1):E2-E5. Available from: https://www.jidonline.org/action/showPdf?pii=S0022-202X%2815%2961055-7.

8. Has C, Liu L, Bolling MC, Charlesworth AV, El Hachem M, Escámez MJ *et al.* Clinical practice guidelines for laboratory diagnosis of epidermolysis bullosa. Br J Dermatol. 2020;182(3):574-592. https://doi.org/10.1111/bjd.18128.

9. Gupta D, Jayashankar C, Srinivas M, Vishwanathan GB, Reddy KR, Kubba A *et al.*Clinical and allelic heterogeneity in dystrophic epidermolysis bullosa: lessons from an Indian cohort. PLoSOne. 2023;18(8):e0289558. https://doi.org/10.1371/journal.pone.0289558.

10. Gurevich I, Agarwal P, Zhang P, Dolorito JA, Oliver S, Liu H *et al.* In vivo topical gene therapy for recessive dystrophic epidermolysis bullosa: a phase 1 and 2 trial. Nat Med. 2022;28:1-9. https://doi.org/10.1038/s41591-022-01737-y.

11. Lwin SM. Decoding COL7A1: a genetic roadmap to prognostication and personalized medicine in recessive dystrophic epidermolysis bullosa. Br J Dermatol. 2025;192(5):794-795. https://doi.org/10.1093/bjd/ljaf056.

12. Tang JY, Marinkovich MP, Wiss K, McCarthy D, Truesdale A, Chiou AS *et al.*Prademagenezamikeracel for recessive dystrophic epidermolysis bullosa wounds (VIITAL): a two-centre, randomised, open-label, intrapatient-controlled phase 3 trial. Lancet. 2025;406(10499):163-173. https://doi.org/10.1016/S0140-6736(25)00778-0.