

GENETIC LACTOSE INTOLERANCE, ADULT-TYPE

CASE REPORT

Pop-Kun Ruxandra-Claudia, Simionescu Bianca,

Pediatrics 2 Clinic, Emergency Clinical Hospital for Children Cluj-Napoca

Abstract

Lactose intolerance occurs in a genetically susceptible individual through lactase deficiency in the small intestine, which causes symptoms with sudden onset after lactose consumption. The treatment is mainly dietetic.

Patient, aged 10, presents abdominal pain, diarrhea, loss of appetite, with onset of 3 months. Clinically and anamnestically, we focused on a malabsorption syndrome, particularly a celiac disease considering positive family history for Hashimoto's disease and type 1 diabetes in a patient with recurrent / chronic diarrheal disease. Serologically, we ruled out celiac disease and there are no paraclinical arguments for inflammatory bowel disease. During hospitalization, dairy consumption aggravates symptoms and thus raises the suspicion of a genetic lactose intolerance, adult-type. The diagnosis is confirmed initially by following a lactose free-diet, under which the symptoms subside and, afterwards, by genetic testing.

INTRODUCTION

Lactose intolerance is a gastrointestinal disorder, clinically manifest in a genetically susceptible persons, due to lactase deficiency at brush border level of the mature enterocytes, which causes maldigestion and malabsorption of lactose [1-3].

This condition comes in four forms: 1. Primary transient hypolactasia of the preterm infant of

gestational age under 34 weeks; 2. Congenital, extremely rare, with fatal potential, which occurs in the newborn and is transmitted autosomal recessively 3. Adult-type primary deficit, which occurs only after the weaning period; 4. Deficiency secondary to a process with intestinal brush border damage (short or long term) [3-5].

Lactase activity decreases by up to 95% after weaning and continues to decrease throughout life. Globally, approximately 70% of the population has lactose intolerance, with variations depending on the geographical area, maintaining tolerance being closely correlated with dairy consumption in certain ethnic groups, which have this evolutionary advantage produced by genetic mutations. Thus, people with northern European origins have a prevalence of adult lactase deficiency of only 2%, while in those of African or Jewish origin the prevalence of this enzyme deficiency is 80% in adulthood, and reaches up to 100% in Asians and Native Americans. It seems that the continuous consumption of dairy products causes the persistence of lactase activity [1,2,5-7].

The lactase gene is located on chromosome 2 and is called LCT. The mutations that allowed the consumption of dairy products occurred by replacing Cytosine with Thymine and Guanine with Adenine. Thus, people with C/C and G/G genotype will most likely develop this condition throughout their lives, those with C/T heterozygous genotype will develop a mild form.

* **Corresponding author:** Dr. Pop-Kun Ruxandra-Claudia, resident pediatrician, Pediatrics 2 Clinic, Emergency Clinical Hospital for Children Cluj-Napoca, e-mail: ruxy.popkun@yahoo.com

Article received: 18.06.2021, **accepted:** 29.06.2021, **published:** 10.07.2021

Cite: Pop-Kun RC, Simionescu B. Genetic lactose intolerance, adult-type. Clinical case. The Journal of School and University Medicine. 2021;VIII(2):10-13

People with homozygous genotype T/T, A/A do not have a genetic predisposition for lactose intolerance [1-3,5,7].

Pathophysiologically, by reducing the activity of lactase in the brush border, undigested lactose stagnates in the small intestine. Undigested lactose in the intestine, having an osmotic effect, attracts water and electrolytes from this level, producing an accelerated transit by rapidly filling the intestine, eliminating unformed stools. Due to the persistence of lactose in the colon, it ferments under the action of local bacteria, with excessive production of intestinal gas [2,5].

The symptoms appear suddenly, between 10 and 30 minutes after ingestion of dairy products, through abdominal pain, abdominal flatulence, migrating cramps, soft, voluminous and foamy stools, excessive flatulence, nausea. The condition usually occurs between the ages of 2-5 years [1,4,5].

A first step in confirming the clinical suspicion of lactose intolerance can be made by the therapeutic test in which lactose-containing products are eliminated from the diet. As for laboratory diagnostic tests, in the past the oral lactose tolerance test was used which consisted of ingesting a standard dose of lactose of 1,75g / kg of body weight or 50g / m² of body surface area, followed by measuring blood sugar every 30 minutes for 2 hours. If the maximum increase in blood glucose was less than 25% of the baseline value, lactose malabsorption was diagnosed. False positive or negative results occur frequently. The modern diagnostic test that has replaced the oral lactose loading test consists of measuring hydrogen in expired air. This is positive if the increase in hydrogen in the first 3 hours after ingesting the lactose solution is over 20 ppm. A change in the patient's stool pH is not a reliable diagnostic test, having low specificity and sensitivity. Jejunal mucosa biopsy is rarely necessary, usually being useful in forms of secondary lactose intolerance in order to elucidate the etiology and stage the damage to the intestinal mucosa. More recently, in Romania, genetic tests have come into use to demonstrate the genetic predisposition for lactose intolerance [2,4,7,8].

Lactose intolerance is often confused by some practitioners, in young patients with cow's milk proteins allergy, and in older patients with irritable bowel syndrome [4].

The treatment is mainly dietary. Most patients can tolerate less than 12 g of lactose / day (i.e. less than 250 ml of milk). Yogurt and cheese, especially hard cheese, are better tolerated because they have a lower lactose content. Dietary supplementation with calcium and vitamin D is necessary. Lactase preparations can be used for enzymatic correction. The use of probiotics can be beneficial, especially strains of *Lactobacillus* and *Bifidobacterium* species [1-3, 9-14].

CLINICAL CASE

The 10-year-old patient goes to the Emergency Care Department (ECD) for abdominal pain, diarrhea, loss of appetite.

The current disease started 3-4 months ago with symptoms present about 3 days out of 7, and the current episode started 4 days ago, with voluminous diarrheal stools (12), without pathological products, with peri-umbilical abdominal pain and loss of appetite, in an afebrile patient. It also associates unintentional weight loss (about 4 kilograms in 3 months). The patient goes to the ECD, where biological samples are collected, which reveal a slightly reacted CRP, slightly elevated urea, monocytosis and mild eosinophilia. The surgical examination ruled out an acute surgical abdomen while the abdominal ultrasound revealed a relaxed colon, with mixed content, predominantly liquid content, and several reacted lymph nodes in the right flank (less than 9 mm in diameter). Initially, hospitalization was not considered necessary, and oral non-steroidal anti-inflammatory treatment was prescribed at home. The patient returns in the ECD the following day for the persistence of symptoms, at which point he is redirected to our service.

At admission, the general condition is good, patient is afebrile, with pale and dry skin and mucous membranes, poorly represented subcutaneous tissue, pectus excavatum, cardiovascular and respiratory systems with no pathological findings besides a left parasternal grade I systolic murmur, supple abdomen with mild periumbilical pain, no organomegaly, no signs of meningeal or focal irritation.

From the family history, we note that the mother, brother and father are known to have Hashimoto's thyroiditis, and the brother with type 1 diabetes.

Clinically and anamnestically, we focused on a malabsorption syndrome, in this case a celiac disease considering the positive family history for Hashimoto's disease and type 1 diabetes and the association of recurrent / chronic diarrheal disease. Although we did not have sufficient clinical arguments, an indicative balance for an inflammatory bowel disease was also indicated.

Paraclinically, the following were detected: leukopenia, neutropenia, lymphopenia, monocytosis, eosinophilia, mild hyperglycemia, Ca and Fe at the lower normal limit, increased anti-EBV (VCA and EBNA) Ig G, thyroid hormones and anti-TPO in normal limits, HbA1C within normal limits and p-ANCA within normal limits, positive fecal occult blood test. Serologically, we ruled out celiac disease and there were no paraclinical arguments for inflammatory bowel disease.

During hospitalization, the patient received antisecretory, antidiarrheal and probiotic treatment and hydro-electrolytic rebalancing, with favorable clinical evolution and normal-looking stool.

During hospitalization, the patient consumes polenta with cheese and has diarrhea and abdominal pain 15 minutes after the meal. Upon resumption of the anamnesis, we find that the patient frequently has these symptoms, especially in the morning, after consuming dairy products. The mother also has an aversion to milk, an indication of an unconscious refusal of the mother to consume a food with a potential negative effect. Thus, the suspicion of adult type genetic lactose intolerance is raised.

The patient is discharged with diagnoses of chronic painful abdomen, acute enterocolitis, pectus excavatum, suspected adult type genetic lactose intolerance, latent EBV infection, mesenteric lymphadenitis, grade I systolic murmur.

A diet with the exclusion of liquid milk and the consumption of lactose-free milk or of lactase products when having dairy products above the tolerated upper limit, but also calcium and vitamin D supplements, was recommended.

The patient showed complete remission of symptoms under this treatment. Private genetic testing was performed, which tested positive for homozygous C/C 13910 genotype, confirming the predisposition for lactose intolerance.

DISCUSSIONS

The age at which the patient's symptoms appeared was 10 years, compared to the average of 2-5 years, probably due to the continuous stimulation of lactase activity through dairy consumption.

A family history of Hashimoto's disease and type 1 diabetes led to a more likely diagnosis of celiac disease.

The patient and the family did not have the necessary information to be able to associate dairy consumption with the sudden onset of symptoms.

No further tests were required to confirm the diagnostic, seeing that the symptoms subsided under dietary treatment and the fact that the genetic tests were positive.

REFERENCES

1. Misselwitz B, Butter M, Verbeke K, Fox MR. Update on lactose malabsorption and intolerance: pathogenesis, diagnosis and clinical management. *Gut*. 2019 Nov;68(11):2080-2091.
2. Misselwitz B, Pohl D, Frühauf H, Fried M, Vavricka SR, Fox M. Lactose malabsorption and intolerance: pathogenesis, diagnosis and treatment. *United European Gastroenterol J*. 2013 Jun;1(3):151-9.
3. Di Rienzo T, D'Angelo G, D'Aversa F, Campanale MC, Cesario V, Montalto M, Gasbarrini A, Ojetti V. Lactose intolerance: from diagnosis to correct management. *Eur Rev Med Pharmacol Sci*. 2013;17 Suppl 2:18-25.
4. Di Costanzo M, Berni Canani R. Lactose Intolerance: Common Misunderstandings. *Ann Nutr Metab*. 2018;73 Suppl 4:30-37.
5. Fassio F, Facioni MS, Guagnini F. Lactose Maldigestion, Malabsorption, and Intolerance: A Comprehensive Review with a Focus on Current Management and Future Perspectives. *Nutrients*. 2018 Nov 1;10(11):1599.
6. Bayless TM, Brown E, Paige DM. Lactase Non-persistence and Lactose Intolerance. *Curr Gastroenterol Rep*. 2017 May;19(5):23. doi: 10.1007/s11894-017-0558-9.
7. Mattar R, de Campos Mazo DF, Carrilho FJ. Lactose intolerance: diagnosis, genetic, and clinical factors. *Clin Exp Gastroenterol*. 2012;5:113-21.
8. Robles L, Priefer R. Lactose Intolerance: What Your Breath Can Tell You. *Diagnostics (Basel)*. 2020 Jun 17;10(6):412.
9. Perino A, Cabras S, Obinu D, Cavalli Sforza L. Lactose intolerance: a non-allergic disorder often managed by allergologists. *Eur Ann Allergy Clin Immunol*. 2009 Feb;41(1):3-16.
10. Ianiro G, Pecere S, Giorgio V, Gasbarrini A, Cammarota G. Digestive Enzyme Supplementation in Gastrointestinal Diseases. *Curr Drug Metab*. 2016;17(2):187-93.
11. Usai-Satta P, Scarpa M, Oppia F, Cabras F. Lactose malabsorption and intolerance: What should be the best clinical

management? *World J Gastrointest Pharmacol Ther.* 2012 Jun 6;3(3):29-33.

12. Saborido R, Leis R. El yogur y recomendaciones dietéticas en la intolerancia a la lactosa [Yogurt and dietary recommendations for lactose intolerance]. *Nutr Hosp.* 2018 Sep 7;35(Spec No6):45-48. Spanish.

13. Szilagyi A, Galiatsatos P, Xue X. Systematic review and meta-analysis of lactose digestion, its impact on intolerance

and nutritional effects of dairy food restriction in inflammatory bowel diseases. *Nutr J.* 2016 Jul 13;15(1):67.

14. Hodges JK, Cao S, Cladis DP, Weaver CM. Lactose Intolerance and Bone Health: The Challenge of Ensuring Adequate Calcium Intake. *Nutrients.* 2019 Mar 28;11(4):718.