

A Premature Infant with Bilateral Corneal Ulceration due to Vitamin A Deficiency

Prematür Bebeğe Vitamin A Eksikliğine Bağlı Bilateral Kornea Ülseri

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ABSTRACT

A premature newborn with a gestational age of 25 weeks and a birth weight of 750 grams was presented with bilateral corneal epithelial ulcers at 39 weeks (of corrected gestational age). The patient developed the ulcers one week after the laser treatment for retinopathy of prematurity, which was performed at 35 weeks of corrected gestational age. Topical antibiotics and artificial tears were administered as an initial treatment. However, both ulcers were inresponsive to the treatment. Peripheral blood was drawn for the evaluation of serum vitamin A level, and the patient was treated with topical and systemic vitamin A. The epithelial ulcers healed within two weeks; however, bilateral superficial corneal haze persisted. The initial level of vitamin A was observed to be low in the serum. At the end of the first year, corneal haze regressed partially in both eyes. It should be noted that vitamin A deficiency can be presented with a variety of clinical signs and in unusual patients with current medical and nutritional practices. Furthermore, vitamin A deficiency should be considered in the differential diagnosis of corneal diseases in the various age groups.

Key Words: Vitamin A deficiency; corneal ulcer; prematurity

Received: 03.18.2020

Accepted: 11.03.2020

ÖZET

Yirmi beş hafta ve 750 gram olarak doğan prematür bir bebek olgu, düzeltilmiş gestasyonel yaşı 39 haftalıkken bilateral korneal epitelyal ülser ile kliniğimize sevk edilmiştir. Olgunun korneal ülserleri, düzeltilmiş gestasyonel yaşı 35 haftalıkken prematür retinopati nedeniyle uygulanan lazer tedavisinden 1 hafta sonra gelişmiştir. Olguya topikal antibiyotikler ve suni gözyaşları başlanmıştır. Buna rağmen ülserler, bu tedaviye cevap vermemiştir. Serum vitamin A düzeyi tespiti için olgudan periferik kan alınmış, olguya topikal ve sistemik A vitamini başlanmıştır. Epitelyal ülserler 2 hafta içinde iyileşmiştir fakat bilateral yüzeyel bir korneal haze kalmıştır. Alınan serumda vitamin A'nın başlangıç düzeylerinin düşük olduğu görülmüştür. Birinci yılda, korneal hazelerin her iki gözde de kısmen gerilediği görülmüştür. A vitamini eksikliği, güncel tıbbi ve nutrisyonel uygulama altındaki olağandışı olgularda çeşitli klinik bulgularla ortaya çıkabileceği ve farklı yaş gruplarındaki çeşitli korneal hastalıkların ayırıcı tanısında dikkate alınması gerektiği unutulmamalıdır.

Anahtar Sözcükler: Vitamin A eksikliği; korneal ülser; prematürite

Geliş Tarihi: 18.03.2020

Kabul Tarihi: 03.11.2020

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doi:<http://dx.doi.org/10.12996/gmj.2021.26>

INTRODUCTION

Prematurity is a risk factor for many systemic diseases. It also plays an important role in vitamin A deficiency. Premature newborns are at a higher risk of vitamin A deficiency compared with mature newborns. Theoretically, inadequate intake and storage, poor absorption, inadequate body stores, inability to tolerate routine oral supplementation, and increased need of vitamin A are contributing factors for vitamin A deficiency in newborns (1).

Vitamin A is one of the most important micronutrients affecting the health of children. Recognized as an essential dietary constituent, vitamin A is necessary for orderly growth and differentiation of tissues. It is essential for the maintenance of the body's epithelial surfaces, immune function, cell growth and differentiation, and epithelial recovery. Considering the eye, vitamin A is necessary for the health of corneal surface and is also an essential constituent of visual pigments (and therefore the developing photoreceptors) (2).

The initial sign of vitamin A deficiency is generally night blindness, which is followed by xerosis in cornea and/or conjunctiva, bitot spots, corneal ulceration and scar formation (3).

In this case report, we present a premature newborn who developed bilateral corneal ulcers following successful laser treatment for retinopathy of prematurity (ROP), considering the differential diagnosis and management.

CASE REPORT

A premature newborn with a gestational age of 25 weeks and a birth weight of 750 grams was referred to our clinic with bilateral central corneal epithelial ulcers at 39 weeks (of corrected gestational age). The baby was born to a farmer family with low economic income. The newborn had suffered from sepsis and respiratory distress syndrome. Moreover, the patient had received bilateral laser treatment at 35 weeks of corrected gestational age for ROP.

One day after laser treatment, the baby had been discharged from the hospital with no additional problem. One week later, the patient was admitted to our hospital with bilateral corneal epithelial defects were detected, and treatment with topical antibiotics and artificial tears were initiated. However, 3 weeks after the topical treatment, the epithelial defects persisted (Figure 1), and the baby was referred to our clinic. Other anterior segment structures were normal and laser scars were observed in the both fundus.

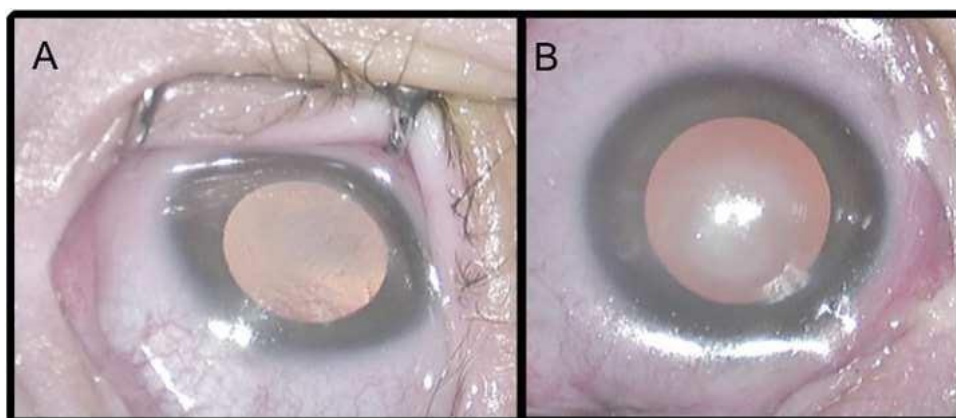


Figure 1: At presentation, central epithelial ulcer and stromal haze was noted in both, right (A) and left (B) eyes.

Considering the socioeconomical status of the family and the malnutrition of the nursing mother, a test for serum vitamin A level was ordered. Simultaneously, the patient was consulted to the pediatric metabolism department, with the preliminary diagnosis of sepsis, RDS and malnutrition. The patient was treated with topical antibiotics four times a day and artificial tears seven times a day. In addition, Vitamin A given systemically and topically (two times a day).

Moreover, nutritional support was added to the treatment according to the instructions of the pediatrics. The epithelial ulcers healed within two weeks; however, superficial corneal haze developed bilaterally (Figure 2). The initial level of vitamin A was observed to be low in the serum (1.07 nanomoles/liter (nmol/l, Normal range:1.2-2.8 nmol/l). The values of other vitamins and elements in the blood were within normal limits. At the final examination, the corneal haze regressed partially in both eyes (Figure3).

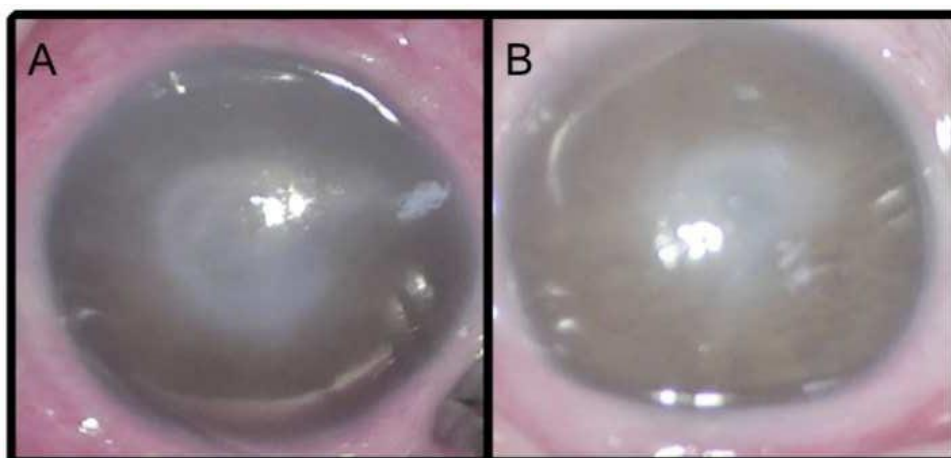


Figure 2: At 2 weeks after presentation, the ulcers in both right (A) and left (B) eyes had healed. However, superficial corneal haze had developed bilaterally.

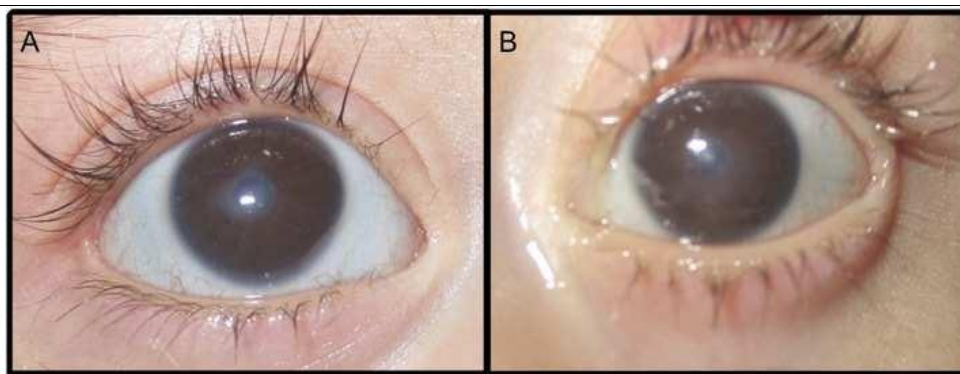


Figure 3: At 1 year, both right (A) and left (B) eyes demonstrated mild residual superficial corneal haze.

DISCUSSION

Vitamin A is an essential micronutrient for optimal growth and development of newborns. In the developing world, vitamin A supplementation of the newborn infant is well known to reduce infant mortality. In the developed world, the babies under risk of vitamin A deficiency are the extremely preterm infants, who are born with lowbody stores of vitamin A (4).

Corneal ulceration due to vitamin A deficiency is a well-known disease. However, it is very rare with its classical clinical manifestations with present-day nutrition. Interestingly, the modern-day presentation and the affected population vary as a result of recent nutritional habits and medical therapy (5).

In this case, surgical trauma, drug toxicity, and limbal stem cell deficiency were also considered in the differential diagnosis. The onset of the epithelial defects at first week after the laser treatment excluded surgical trauma. Drug toxicity was excluded the baby received only a 1-week course of topical steroids and antibiotics, with a dosage of four times a day. There was no sign of peripheral corneal neovascularization, which excluded the possibility of limbal stem cell deficiency. Hence, treatment was initiated with a presumed diagnosis of vitamin A deficiency. The diagnosis was confirmed with a low serum vitamin A level, which presumably indicated a further lower tissue level of the vitamin.

Vitamin A deficiency is a major preventable cause of blindness in underdeveloped countries (6). Every year, half of the 5 to 10 million children suffering xerophthalmia due to vitamin A deficiency end with blindness. The deficiency can be primary which is due to inadequate intake, or secondary which is due to gastrointestinal disease leading to lipid malabsorption (5).

Various factors, such as sepsis, malnutrition of either the baby or the mother, inadequate intake of breast milk, low socioeconomic status, low mother educational status can cause or contribute to vitamin A deficiency in premature newborns (7). Hence, vitamin A deficiency should always be considered in the differential diagnosis of corneal diseases in premature newborns, and treatment with both topical and systemic vitamin A should be started as soon as possible (8).

Despite evidence of benefit, optimal vitamin A supplementation for premature babies is not clearly defined, and early vitamin

A supplementation for the extremely preterm infants is not uniformly practiced. Further studies regarding quantification of the hepatic stores of the vitamin, functional assessment of vitamin A status, and the long-term outcomes of the deficiency in preterm infants are warranted (9).

CONCLUSION

Vitamin A deficiency should be considered in the differential diagnosis of corneal diseases in various age groups. The disease may present with a variety of clinical signs and in unusual patients with current medical and nutritional practices.

Conflict of interest

No conflict of interest was declared by the authors.

REFERENCES

1. Greer FR, Tsang RC, Uauy R et al. Nutrition of the Preterm Infant: Scientific Basis and Practical Guidelines 2nd ed. Digital Educational Publishing: Cincinnati Ohio 2005; pp 141–73.
2. Kositamongkol S, Suthutvoravut U, Chongviriyaphan N et al. Vitamin A and E status in very low birth weight infants. *J Perinatol* 2011;31:471-6.
3. World Health Organization. Control of vitamin A deficiency and xerophthalmia. *World Health Organ Tech Rep Ser* 1982;672:1–70.
4. Mactier H. Vitamin A for preterm infants; where are we now? *Seminar in Fetal and Neonatal Medicine* 2013;18:166-71.
5. Donalson KE, Fishler J. Corneal ulceration in a LASIK patient due to vitamin A deficiency after bariatric surgery. *Cornea* 2012;31:1497–9.
6. Sommer A. Xerophthalmia, keratomalacia and nutritional blindness. *Int Ophthalmol* 1990;14:195–9.
7. Gupta N, Tandon R. Sociodemographic features and risk factor profile of keratomalacia in early infancy. *Cornea* 2012;31:864–6.
8. Mactier H, McCulloch DL, Hamilton R et al. Vitamin A supplementation improves retinal function in infants at risk of retinopathy of prematurity. *J Pediatr* 2012;160:954-9.
9. Mactier H, Weaver LT. Vitamin A and preterm infants: what we know, what we don't know, and what we need to know. *Arch Dis Child Fetal Neonatal Ed* 2005;90.