CASE REPORT

Unilateral Autosomal Recessive Anophthalmia in a Patient with Cystic Craniopharyngioma

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ABSTRACT

Anophthalmia is a rare ocular malformation. It is a genetically determined disorder and is typically associated with syndromes. However, sporadic nonsyndromic familial as well as non-familial cases of anophthalmia have also been reported. Non-syndromic familial cases are usually bilateral and have been attributed to autosomal recessive, autosomal dominant, and X-linked inheritance patterns. The authors hereby report a rare case of autosomal recessive unilateral anophthalmia in a patient with no other associated congenital anomaly. Patient was operated for craniopharyngioma. The clinical, radiological and intraoperative findings are discussed.

Keywords: Anophthalmia, autosomal recessive, inherited, unilateral

INTRODUCTION

Anophthalmia is characterized by either absence or chronic underdevelopment of an eye at birth.¹ It is a rare ocular malformations occurring in 0.18–0.4 per 10,000 births and may involve one or both eyes.² A genetically determined disorder with strong association with SOX2 gene mutation,³ anophthalmia is typically associated with syndromes.⁴ Matthew-Wood syndrome, Spear syndrome, anophthalmia-esophageal-genital (AEG) syndrome, Fraser syndrome, and oculo-facial-cardio-dental syndrome are some of the syndromes associated with anophthalmia.^{5–7} However, sporadic nonsyndromic familial as well as non-familial cases of anophthalmia have also been reported. Non-syndromic familial cases are usually bilateral and have been attributed to autosomal recessive,^{4,8} autosomal dominant,^{9,10} and X-linked inheritance patterns.¹¹ We hereby report a rare case of autosomal recessive unilateral anophthalmia in a patient with no other associated congenital anomaly. The patient presented with a complaint of visual deterioration in the fellow eye due to craniopharyngioma. The clinical, radiological, and intraoperative findings are discussed.

Case Report

A 40-year-old male with congenitally absent left eye presented with a complaint of progressive visual deterioration in the fellow eye due to craniopharyngioma for past 6 months. Clinical examination revealed absent left eye with small palpebral fissure. A small white tissue could be seen in the eye suggestive of sclera remnant (Figure 1c). On moving the right eye, movement of the white tissue in left eye could be seen. Vision in right eye was 6/18 with temporal field cuts. Fundus examination revealed pallor of the optic disc. The rest of the physical examination was normal.

A review of patient's family history revealed two other members with left-sided anophthalmia. Patient's cousin, brother and grandfather suffered from the same problem without any history suggestive of associated systemic anomalies. No other family member had any ocular problems (Figure 2). There was no history of consanguinity in the family as far as the patient could trace his family tree (four generations). Family history with respect to consanguinity was not available for previous generations. No other family member had a history of suffering

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FIGURE 1 Preoperative MRI showing a suprasellar lesion, isointense on T1W (a) and hyperintense on T2W (b) images. Ventriculomegaly can be seen. Patient had absent left eye with a small scleral remnant (c). Intraoperative photograph shows anatomy of suprasellar region (d). Bilateral olfactory tracts (*), pituitary stalk (black arrow), right optic nerve (*) continuing as optic chiasm are seen. On left side, optic nerve is absent. Left ICA (white arrowhead) and left ACA (black arrowheads) passing over the chiasm can be seen on left side (d). Left and right sides in intraoperative photograph have been labelled L and R, respectively.

FIGURE 2 Family pedigree.

from craniopharyngioma. The inheritance pattern was suggestive of autosomal recessive inheritance (Figure 2).

Preoperative magnetic resonance imaging (MRI) revealed a cystic suprasellar lesion that was isointense in T1W and hyperintense on T2W images (Figure 1a and b). The features were suggestive of cystic

craniopharyngioma. There was associated hydrocephalus. Preoperative MRI did not clearly depict the optic apparatus that was clearly demonstrated on postoperative MRI (Figure 3).

Patient underwent removal of craniopharyngioma via bifrontal basal interhemispheric approach. Intraoperatively, absence of left optic nerve was characteristically noticed (Figure 1d). Right optic nerve (star in Figure 1d) could be seen continuing into the optic chiasm. Left A1 anterior cerebral artery passed over the chiasm under a band of tissue that was presumed to be neural tissue and left intact.

Postoperative MRI revealed completely absent left globe (Figure 3a and b). However, ocular muscles could be seen well (Figure 3b) and optic nerve was replaced by a thin atretic strand (black arrow head in Figure 3a). The cisternal portion of right optic nerve could be well seen (white arrow in Figure 3c and white arrow heads in Figure 3d) but the corresponding cisternal portion of left optic nerve was conspicuous for its absence (Figure 3c and e). Postoperative functional MRI revealed bilateral cortical representation from right eye (Figure 3f). Three months after surgery, patient is

FIGURE 3 Postoperative MRI shows absent left globe (a and b). Optic nerve is replaced by a thin atretic strand (black arrowhead in a) visible in the centre surrounded by extraocular muscles (b). Cisternal portion of right optic nerve is clearly seen in coronal (white arrow in Figure 3c) and right parasagittal section (white arrow heads in Figure 3d). Left optic nerve is conspicuous for its absence in coronal (c) and left parasagittal (e) sections. Postoperative functional MRI showed bilateral cortical representation from right eye (f).

doing well and had improvement in the temporal visual field deficits.

Discussion

Anophthalmia is a consequence of insult to embryological precursors of eye at around 8 weeks of gestation.¹² It is typically associated with syndromes^{4–7} and more than 50% of these patients have associated systemic abnormalities.¹³ Associated nervous system anomalies include absence of optic pathways and absent corpus callosum. Non-syndromic cases usually occur sporadically and are due to congenital infections, maternal teratogenic drug use,^{4,14} and trauma.¹⁵ Heredity has also been implicated to play a role in some of these sporadic non-syndromic cases of isolated anophthalmia and autosomal recessive,^{4,8} autosomal dominant,^{9,10} and X-linked inheritance¹¹ patterns have been described in literature. The inherited familial cases of anophthalmia usually have bilateral involvement. Unilateral inherited anophthalmia has been reported only on few occasions.^{8–10,16}

Fryns⁹ and Morle et al.¹⁰ described four-generation and five-generation families of anophthalmia/microphthalmia, respectively, with autosomal dominant inheritance pattern with incomplete penetrance and variable expression. Three members of multiple generation family described by Fryns⁹ had unilateral

microphthalmia, whereas three other members suffered from bilateral anophthalmia. Five members of the family described by Morle et al.¹⁰ had anophthalmia/microphthalmia, whereas two had bilateral anophthalmia/microphthalmia. They also linked the autosomal dominant inheritance to chromosome 15q12–q15. Zlotogora et al.⁸ described three families with multiple members having anophthalmia/microphthalmia showing autosomal recessive pattern of inheritance. Griepentrog and Lucarelli described a case of unilateral anophthalmia in a female child whose mother also had Alport syndrome with unilateral anophthalmia.¹⁶

We describe a four-generation family with unilateral anophthalmia with three affected members that displayed autosomal recessive inheritance pattern with non-variable expression. Unlike the previous families described, our family had uniform expression in all the affected members. Our family adds to the clinical spectrum of expression of this rare familial anomaly.

Craniopharyngiomas arise from the embryonic cell rests that are delivered to sellar/suprasellar area during the embryogenesis of adenohypophysis at 4 weeks of gestation. Anophthalmos results from embryological insult at around 8 weeks of gestation. Although both craniopharyngiomas and anophthalmos have embryological basis in their pathogenesis, there is no evidence that both could be the result of a common embryological insult. The occurrence of

craniopharyngioma and anophthalmos in the same patient could have been a coincidence.

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