Figure 2 Mutations in GRM6 gene.

Comment

Mutations in *GRM6* cause some cases of ARCSNB. In darkness, glutamate is tonically released from the photoreceptor presynaptic terminal while light induced photoreceptor hyperpolarisation diminishes its release. The reduced stimulation of the "on" bipolar cell in light conditions results in its depolarisation. Absence of the mGluR6 receptor as a result of *GRM6* gene mutation causes the "on" bipolar cells to be relatively depolarised (light adapted) in darkness, causing the symptom of night blindness. Both this form of ARCSNB and XLCSNB1 appear to profoundly affect the "on" bipolar cell retinal pathway only and therefore have similar waveforms: specifically grossly subnormal, often absent scotopic b-wave response, an absence of scotopic oscillatory potentials but a relatively well preserved 30 Hz flicker response. In subjects with XLCSNB2, in which abnormalities in function of the L-type calcium channel appears to impair both the ON and "off" bipolar pathway: scotopic b-waves and oscillatory potentials are usually recordable but the 30 Hz flicker response is grossly subnormal.

The striking similarities between *GRM6* CSNB and CSNB1 caused by *NYX* mutations suggest that nyctalopin (encoded by *NYX*) plays an important part in signalling through the "on" bipolar pathway. Since little is known about the function of nyctalopin these clinical observations may help to guide further studies of its function and any interaction with mGluR6 in bipolar cell function.

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References

- 1 Jacobi FK, et al. Phenotypic expression of the complete type of X-linked congenital stationary night blindness in patients with different mutations in the NYX gene. *Graefes Arch Clin Exp Ophthalmol* 2002;**240**:822-8.
- 2 Dryja TP, et al. Night blindness and abnormal cone electroretinogram ON responses in patients with mutations in the GRM6 gene encoding mGluR6. *Proc Natl Acad Sci USA* 2005;**102**:4884-9.
- 3 Nakajima Y, et al. Molecular characterization of a novel retinal metabotropic glutamate receptor mGluR6 with a high agonist selectivity for L-2-amino-4-phosphonobutyrate. *J Biol Chem* 1993;**268**:11868-73.
- 4 Slaughter MM, Miller RF. 2-amino-4-phosphonobutyric acid: a new pharmacological tool for retina research. *Science* 1981;**211**:182-5.
- 5 Schiller PH, Sandell JH, Maunsell JH. Functions of the ON and OFF channels of the visual system. *Nature* 1986;**322**:824-5.
- 6 Zito I, et al. Mutations in the CACNA1F and NYX genes in British CSNBX families. *Hum Mutat* 2003;**21**:169.
- 7 Allen LE, et al. Genotype-phenotype correlation in British families with X linked congenital stationary night blindness. *Br J Ophthalmol* 2003;**87**:1413-20.
- 8 Sieving PA, et al. Dark-light: model for night blindness from the human rhodopsin Gly-90→Asp mutation. *Proc Natl Acad Sci USA* 1995;**92**:880-4.
- 9 Al-Jandal N, et al. A novel mutation within the rhodopsin gene (Thr-94-Ile) causing autosomal dominant congenital stationary night blindness. *Hum Mutat* 1999;**13**:75-81.
- 10 Dryja TP, et al. Heterozygous missense mutation in the rhodopsin gene as a cause of congenital stationary night blindness. *Nat Genet* 1993;**4**:280-3.

Metastatic choriocarcinoma causing cavernous sinus syndrome

Choriocarcinoma is a rare trophoblastic tumour.^{1,2} We describe a case of metastatic choriocarcinoma to the cavernous sinus

causing complete ophthalmoplegia and ptosis, following an uneventful pregnancy.

Case report

A 28 year old woman was referred to the oculoplastic and orbital service with a 1 week history of right sided ptosis and 6 weeks of right facial pain. Six weeks earlier she underwent evacuation of retained products of conception, following spontaneous vaginal delivery. Facial pain immediately ensued and her dentist extracted a right wisdom tooth, but the pain continued to worsen. The visual acuity was 6/9 right eye, 6/5 left eye, with complete right sided ptosis, total ophthalmoplegia, and a dilated unreactive pupil (fig 1A, B). Reduced sensation in the distribution of right trigeminal branches V1 (including cornea) and V2 was noted. There was no relative afferent pupillary defect, visual field or colour vision defects, or proptosis.

Magnetic resonance imaging (MRI) scans of brain and orbits (fig 1C, D), revealed a right cavernous sinus mass extending to right temporal lobe. Image guided biopsy of the temporal lobe revealed a dural encased highly vascular choriocarcinoma. Subsequent computed tomography (CT) imaging revealed a grossly enlarged uterus and multiple large pulmonary metastases. Serum β -HCG levels were markedly elevated at 2.5×10^7 IU/L, consistent with choriocarcinoma. She was commenced on systemic and intrathecal chemotherapy. Five months later, β -HCG levels returned to normal, her facial pain and sensation improved, and her ptosis resolved. Between 9 months and 18 months, ocular motility examinations revealed a stable right esotropia with poor abduction and reduced elevation. She underwent lateral transposition surgery to superior and inferior recti (combined with botulinum toxin chemodenervation of ipsilateral medial rectus) to improve ocular alignment.

MRI scans at 6 months revealed a reduced tumour size (fig 1E and F). She remains clinically stable 18 months after presentation with a useful field of binocular single vision.

Comment

This patient had a potentially fatal cavernous sinus and intracranial metastasis from choriocarcinoma. Patients can become symptomatic long after an uneventful pregnancy.¹⁻³

Figure 1 (A, B) Right sided complete ptosis, fixed dilated pupil, and total ophthalmoplegia. (C, D) Axial and coronal post gadolinium T1 MRI brain scans, showing enhancing right cavernous sinus mass extending to right temporal lobe surface. Arrows illustrate tumour location. (E, F) MRI scans 6 months after chemotherapy, showing reduction in tumour size. Reproduced with permission.

Table 1 Causes of sphenocavernous or orbital apex syndrome

Differential diagnosis of sphenocavernous or orbital apex syndrome

Inflammatory

- 1 Sarcoidosis
- 2 Tolosa-Hunt syndrome
- 3 Systemic lupus erythematosus
- 4 Churg-Strauss syndrome
- 5 Wegener granulomatosis
- 6 Giant cell arteritis
- 7 Orbital inflammatory pseudotumour
- 8 Thyroid orbitopathy

Infection

- 1 Fungi: aspergillosis, mucormycosis
- 2 Bacteria: *Strep* spp, *Staph* spp, *Actinomyces*, Gram negative bacilli, anaerobes, *M tuberculosis*
- 3 Spirochaetes: *Treponema pallidum*
- 4 Viruses: herpes zoster

Neoplasia

- 1 Neural tumours: meningioma, neurofibroma, schwannoma, ciliary neurinoma
- 2 Endocrine tumours: Pituitary with or without apoplexy
- 3 Head and neck tumours: pituitary, naso/craniopharyngeal, squamous cell, adenoid cystic carcinomas
- 4 Metastatic tumours: lung, breast, renal cell carcinoma, malignant melanoma
- 5 Haematological: non-Hodgkin's lymphoma, Burkitt lymphoma, leukaemia
- 6 Perineural invasion of cutaneous malignancy

Trauma/iatrogenic

- 1 Traumatic: penetrating, non-penetrating injury, orbital apex fracture, retained foreign body
- 2 Iatrogenic: orbital/facial, sinonasal, surgery

Vascular

- 1 Carotid cavernous aneurysm or fistula
- 2 Cavernous sinus thrombosis
- 4 Sickle cell anaemia

Other

- A Mucocoele

and may present to a variety of specialists, including ophthalmologists, as illustrated by our case. A high index of suspicion, rapid diagnosis, and multidisciplinary care are essential when managing women of child-bearing age with neurological or orbital symptoms, as early treatment is curable.

Multiple cranial nerves palsies, particularly 3, 4, 6, and 5 divisions V1 and V2, while sparing optic nerve function are strongly suggestive of cavernous sinus pathology.^{4,5} Common neoplastic causes of sphenocavernous syndrome include nasopharyngeal carcinoma, lymphoma, meningioma, lung and breast metastases (see table 1 for other aetiologies); however, metastatic choriocarcinoma has, to our knowledge, not been reported.

Although a less favourable prognosis is associated with central nervous system (CNS) metastasis,³ newer intensive chemotherapy regimens such as high dose EMA-CO (etoposide, methotrexate, actinomycin-cyclophosphamide, and vincristine), have encouraging results,⁶ as highlighted by this patient. In sufficiently chemosensitive tumours, the blood-brain barrier does not prevent treatment from eliminating CNS

disease.⁶ Additional modalities for treating cerebral metastases include intrathecal chemotherapy and neurosurgery.¹⁻³ Cranial irradiation may be used in selective cases; however, there is no consensus regarding its role.^{3,6}

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References

- 1 Altintas A, Vardar MA. Central nervous system involvement in gestational trophoblastic neoplasia. *Eur J Gynaecol Oncol* 2001;**22**:154-6.
- 2 Pihl K, Malmstrom H, Simonsen E. Choriocarcinoma presenting with cerebral metastases after full-term pregnancy. *Acta Obstet Gynecol Scand* 1990;**69**:433-5.
- 3 Semple PL, Denny L, Coughlan M, et al. The role of neurosurgery in the treatment of cerebral metastases from choriocarcinoma: a report of two cases. *Int J Gynecol Cancer* 2004;**14**:157-61.
- 4 Yeh S, Foroozan R. Orbital apex syndrome. *Curr Opin Ophthalmol* 2004;**15**:490-8.
- 5 Lin CC, Tsai JJ. Relationship between the number of involved cranial nerves and the percentage of lesions located in the cavernous sinus. *Eur Neurol* 2003;**49**:98-102.
- 6 Newlands ES, Holden L, Seckl MJ, et al. Management of brain metastases in patients with high-risk gestational trophoblastic tumors. *J Reprod Med* 2002;**47**:465-71.

Primary posterior continuous capsulorhexis; a new technique

Posterior capsule opacification (PCO) is by far the most common complication of cataract surgery, with a reported incidence of 10% to 50%.^{1,2} Primary posterior continuous curvilinear capsulorhexis (PCCC) has been employed to prevent PCO,³⁻⁶ based on the theory that removing the scaffold for the migration of lens epithelial cells will provide a permanently clear optical zone.

Case reports

We prospectively recruited 48 emmetropic patients with senile fibrous posterior capsular cataracts, but the decision to perform PCCC was made intraoperatively after attempts to remove the fibrotic plaques were unsuccessful. All patients gave informed consent and ethics committee approval was obtained for the study. The mean age of the patients was 73 years. All patients had negative ocular and systemic history. Complete ophthalmic examination and central macular thickness (CMT) was recorded on optical coherence tomography (OCT) scans (six radial lines, OCT 2, Carl Zeiss Meditec AG, Germany) through best possible fixation preoperatively and postoperatively at 1 week, 1 month, and 3 months.

Routine phacoemulsification was performed. The posterior capsular fibrous plaque was successfully removed in 18 patients. In the remaining 30 patients, a PCCC was performed. After intraocular lens (IOL) implantation in the capsular bag a thin film of viscoelastic was spread inferior and superior to the IOL, causing the IOL to have

Figure 1 Size of PCCC is smaller than the size of intraocular lens optic (white arrows).

anterior tilt superiorly. Under high magnification, a flap of posterior capsule was raised with the tip of standard 25 gauge cystotome and a PCCC was performed smaller than the optic diameter (fig 1) with capsulorhexis forceps. After PCCC, viscoelastic was washed out with standard irrigation/aspiration (IA) handpiece. All patients were given a routine postoperative course of combined topical drops of dexamethasone 0.1%, neomycin sulphate 0.35%, and polymyxin B sulphate 6000 IU for 4 weeks.

In two eyes, PCCC was poorly controlled. These eyes exhibited positive vitreous pressure manifested by convex posterior capsule during phacoemulsification. At the point when it extended towards the capsular equator, attempts to complete it were abandoned. It was sufficient to clear the central visual axis. No other intraoperative and postoperative complications were encountered.

Preoperative CMT (mean (SD)) was 170.4 (5.6) μ m compared to 174.6 (4.7), 179.1 (5.0), 172.6 (5.7) μ m at 1 week, 1 month, and 3 months respectively. IOP remained normal. All patients achieved best corrected visual acuity of 6/6 6 weeks postoperatively and maintained it throughout the follow up.

Comment

Posterior capsule opacification (PCO) continues to stimulate important work towards understanding its causes, prevention and effectively treating it. It is visually debilitating if the posterior capsular plaque was unsuccessfully removed preoperatively.

In 1996, Galand *et al* suggested primary posterior capsulorhexis as a routine procedure during cataract surgery in adults. In their retrospective series of 319 eyes, 12 intraoperative complications occurred. Postoperatively, three of 49 eyes showed cystoid macular oedema on fundal fluorescein angiography, anterior vitreous prolapse occurred in three eyes and one retinal detachment was noted at 4 weeks. In 2001, Hugkultstone reported the incidence of intraoperative complications and visual results of suction posterior capsulorhexis. In his elective 86 eyes requiring suction posterior capsulorhexis two eyes had intraoperative vitreous prolapse during IOL insertion and viscoelastic removal.

The lack of complications in this series of patients is attributed to two factors; firstly, PCCC is performed in a closed chamber only