Original article

Simulation in ophthalmology


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ABSTRACT

Clinical cases: Four cases of patients simulating eye problems are reported. The patients included: an adopted 9-year-old girl complaining of bilateral visual loss, a 10-year-old girl with school and family problems complaining of decreased visual acuity, a 22-year-old female mentioning unilateral visual loss after a car accident, and a 30-year-old female complaining of decreased visual acuity after refractive surgery. Structural and functional tests were performed on all 4 patients and none of the tests revealed any pathological findings. The 4 cases were diagnosed as patients simulating ophthalmological symptoms.

Discussion: A non-organic cause of visual loss is a common problem in Ophthalmology. Simulation is the diagnosis used when an adult consciously tries to obtain some kind of benefit without proven pathology. In the case of children, obtaining benefit is not their intention, but psycho-social and psychiatric problems are frequently associated in these cases.

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Simulación en oftalmología

RESUMEN

Casos clínicos: Se exponen 4 casos de pacientes simuladores: una niña de 9 años, adoptada, con pérdida visual binocular; una niña de 10 años con baja visión y problemas familiares y escolares; una mujer de 22 años que alegaba pérdida de visión monocular tras un accidente de tráfico, y una mujer de 30 años con afectación de su visión tras cirugía refractiva. En ninguno de los casos las pruebas estructurales y funcionales mostraron alteraciones que justificaran la afectación. A través de exploraciones específicas de la función visual se llegó al diagnóstico de simulación en todos los casos.

Discusión: La pérdida visual de causa no orgánica es un problema común en oftalmología. Cuando el sujeto es consciente de la misma y pretende obtener algún beneficio se trata de una simulación. En el caso de los niños no existe dicha intencionalidad, sino posibles problemas psicosociales y psiquiátricos asociados.

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Introduction

Visual alterations without evidence of ocular or extra-ocular disease are frequent in ophthalmological practices, accounting for approximately 1% of visual problems managed by ophthalmologists in emergency areas. The term "non-organic visual loss" (NOVL) has been coined to describe any visual alteration in which any dysfunction of the structures between the cornea and the occipital cortex cannot be determined. The said NOVL could be psychogenous or the results of simulation. In the case of psychiatric disorders, the patient experiences symptoms and is not aware of the existence of said alteration. However, a simulator knows that he or she is not suffering any visual alteration but claims said disorder to obtain some sort of psychological benefit (being the center of attention, receiving care, etc.) or for obtaining financial gain (insurance, compensations, etc.).

This paper presents 4 clinic cases, 2 children and 2 adults, who were simulators and were diagnosed in the Neuro-Ophthalmology Unit of the San Carlos Clinical Hospital of Madrid.

Clinic cases

Clinic case 1

The first case is that of a girl aged 9 who is referred for blurred vision. The visual acuity was of 0.2 and 0.3 respectively according to Snellen’s optotype. Refraction under cycloplegia was determined in order to discard refractive defects and the result was of +0.75 in both eyes. The rest of the ophthalmological exploration was normal, with stereopsis of 60–40˚.

A deeper anamnesis revealed that the girl had been adopted at age 7. In the waiting room we noticed that she made drawings and moved about without difficulty, even with dilatation, so the symptoms seemed disproportionate and a simulation was suspected. The mirror test was applied and that she could see line 0.4 with both eyes. Considering that flat mirrors duplicate distances, her actual visual acuity should be of 0.8 (Fig. 1). We commented the case with the parents and regular checkups were decided. The patient’s visual acuity improved up to 1 with both eyes after 3 months.

Clinic case 2

The second case is that of a girl aged 10 who was referred from another hospital due to poor vision without apparent organic cause. The patient presented a report showing a visual acuity of 0.0 one in both eyes with refraction under cycloplegia of +1.00. All the ophthalmological explorations gave normal results. Supplementary tests, comprising the visual evoked potentials (VEP), electroretinogram (ERG), angiofluorescein test (AFG), computerized axial tomography (CAT) and magnetic resonance (MR) did not reveal any alteration either. As simulation was suspected, we inquired about the familial, social and schooling situation of the patient. She was the younger of 4 siblings with a large age difference, and in the past few months her behavior had worsened together with poor school performance, social problems with the classmates, in addition to an ankle injury which required the use of crutches. It was decided to carry out the confusion test with lenses, placing in a test frame a lens of +6.00 which was subsequently neutralized gradually with negative lenses (Fig. 2). The monocular VA was of 0.8 and 0.6 respectively, and 0.8 in binocular vision. The stereopsis values were normal, 40˚. We had a conversation with the parents to reassure them about the child’s eyesight and referred her back to the reference center for control and follow-up.

Clinic case 3

The third case is that of a female, age 22, referred to the neuro-ophthalmology unit of our hospital due to unilateral visual deficit secondary to a traffic accident without identifiable organic injury which could explain said visual loss. Both of the functional tests (VEP) and the structural tests (CT and MR) gave normal results. The patient’s visual acuity was of light perception with RE and of one with LE. Binocular vision and stereopsis were normal (60˚). The Bravais test gave a positive result which led us to suspect simulation (Fig. 3). Even though monocular campimetry showed a general depression of sensitivity in the RE, the binocular visual field (Humphrey, binocular Esterman) (Fig. 4) revealed a complete scotoma in the right hemifield.

After undergoing the tests, the patient requested a report because she wanted to pursue compensation from an insurance company on the grounds of blindness. However, she referred leading a normal life and maintained her job as a supermarket cashier without exhibiting any difficulty to carry out her usual work.

Clinic case 4

The fourth case is that of a female, age 30, who referred the visual loss after LASIK refractive surgery one year earlier. Her personal history included a doubtful diagnosis of multiple sclerosis dated 20 years back without supporting imaging tests. In the assessment, the patient exhibited a vision of 0.0 5 and hand movement. The flap of the intervention did not exhibit alterations (Fig. 5). The ocular fundus exploration revealed the presence of myelin fibers in the right optic nerve and slight paleness in the left one (Fig. 6). Simulation was suspected when we observed that the patient moved about perfectly well in the practice and even sent a text message with her mobile phone. In addition, she referred that she worked and drove vehicle even with her alleged poor vision. In the exploration, binocular vision and stereopsis were normal (120–60˚). Specific tests such as Bravais and writing or Roth were positive. The patient was able to write down her name with monocular vision along the line despite being interrupted while doing so. She also was able to draw a straight line and resumed drawing it at the same point she left off after intentionally being distracted (Fig. 7). Supplementary tests such as AFG and ERG gave results within normal parameters. The VEP revealed a slightly diminished transmission in the left optic nerve. The neurology service discarded multiple sclerosis with normal MR and lumbar puncture results.
Fig. 1 – Mirror test. (A) It determines VA at a given distance. (B) The mirror doubles the distance and therefore VA is double the value referred by the patient.

Discussion

NOVL is more common in females and during the first 2 decades of life. The most frequent alteration is diminished VA which can be accompanied by alterations in the visual field.2

The determination of true VA in simulators can be carried out in a variety of ways. The Roth test or the writing test (Fig. 7) consists in asking the patient to write his name, interrupt him in the middle of the writing and watch if he resumes at the same point where he left off. If so, the visual acuity is at least 0.1. Alternatively, ask the patient to draw a straight line and subsequently ask him to extend it; when asked to do so, the simulator would say he is unable to do so.

In the first case, the mirror test was very useful to determine the real VA. This test is based on the property of flat mirrors have 2 duplicate distance. The patient VA is assessed at 5 m and then placing a mirror in front of the patient showing the optotype at his back. If the patient is unable to see the

Fig. 2 – Confusion test with lenses. (A) A lens of −6.00 is placed in a testing frame; (B) the lens is then progressively neutralized with positive lenses. It can be done inversely, inserting a positive lens in the frame and neutralizing it with negative ones. It is done with monocular and binocular vision.
same line of the optotype, it means that his visual acuity is
double the value he referred initially.

In addition, special optotypes can be utilized such as Ter-
son optotypes in which the characters corresponding to all
the VAs are not in order, or the Thibaudet optotypes that use
signs similar to the letter E, the value of the VA being inversely
proportional to the thickness of the arms of the signs and not
their size, which causes confusion in simulators.

A very simple test to apply involves confusion with lenses
such as in case 2. This test consists in placing +6.00 diop-
ter spherical lenses in front of both eyes and subsequently adding
negative lenses to the allegedly affected eye until neutraliza-
tion. The acuity obtained would be that of the eye with the
alleged poor vision.\textsuperscript{3}

The Bravais methods is a subjective test that applies col-
ored tests and lenses. Red and green letters are shown on a
white surface. When placing a red lens in front of a healthy eye,
the red letters would disappear and the patient would see only
the black letters. In the third case, the patient was able to read
the entire words proving she was a simulator because she was
reading with the allegedly amaurotic or affected eye. Other
similar methods utilize mathematical additions instead of let-
ters or words, or phrases such as the Guijarro technique which
in addition provides visual acuity measurement (Fig. 3).\textsuperscript{3}

Stereopsis is a unique quality of binocular vision which
allows us to perceive depth in the visual space. It arises out
of the horizontal disparity of retinal images projected in the
2 foveas or other corresponding retinal points. Stereopsis is
measured in terms of lower horizontal disparity of retinal
images that produce an impression of depth. Various alter-
ations of the visual system, both monocular and binocular,
diminish stereopsis. There is very little data about the rela-
tionship between VA and stereopsis. Simons and Reinecke\textsuperscript{4}
emphasized that if stereopsis was of 100'' or better in the Tit-
mus test, the difference is not greater than one line between
both eyes and the visual acuity was of 20/30 or better in the
eye with the poorer vision. Patients with a difference of 2 lines
or more, or of vision in one of the eyes below 20/300. exhib-
ited stereopsis values of 140''. In a subsequent study, Goodwin
and Romano\textsuperscript{5} concluded that the stereopsis values in the Tit-
mus test were proportional to monocular as well as binocular
visual acuity (Snellen). No subjects with monocular or binocu-
lar vision under 20/40 reached a stereopsis of 40'' in the Titmus
test. With reference to cases 3 and 4, such a thin stereopsis was
incompatible with the poor vision the patients referred.

The defect observed in the monocular visual field of the
third case, i.e., a generalized depression of the sensitivity of
the right eye, did not match any optic nerve disorder cours-
ing with the rest of normal tests such as funduscopy, pupil
reflexes, visual evoked potentials and imaging tests.

The contribution of the visual field by the 2 eyes is known
as the joint visual field and comprises the points in space that
are seen with focused binocular vision without moving the
head. This joint visual field is made up by the binocular visual
field (the region of space seen with both eyes, about 120')
and the extreme temporal or rising temporal regions (visible
for only one eye) which extend through a region exceeding 180'
horizontally, although there are regions that are invisible for
each eye due to the nose.\textsuperscript{6} In the case of a genuinely amauro-
otic individual, the binocular visual field should appear to be
practically normal with the exception of a half-moon scotoma
in the lateral end of the field between 60' and 90' correspond-
ning to the temporal rising areas. In the third case, the scotoma
comprises the hemifield that the patient believes corresponds
to be supposedly blind eye, without knowing that a part of that
region of space is also seen by the healthy eye.

Fig. 3 – Bravais method. (A) Red and green letters are shown on white surface. (B) When placing a red lens in front of the
healthy eye, (C) the red letters disappear and the black letters would be seen if the patient can see only with that eye. (C) The
tests can also be done with numbers.
The simulation of the visual field defects can have other patterns such as concentric width reduction or spiral-shaped alteration, requiring specific perimetric methods to detect them.³

The simulation diagnostic is possible only when all organic alterations of the visual system are excluded.⁷ To this end, in addition to the ophthalmological clinical exploration it is necessary to obtain objective data by means of various supplementary tests such as image and electrophysiological tests. Differentiating between a psychiatric disorder such as conversion and the fictitious or simulated disorder is difficult when the psychopathological involvement is not obvious.⁸ Diagnosis is usually assisted when a secondary benefit is determined and by the demanding attitude of the patient.

Childhood simulation or functional visual loss (FVL) is not infrequent and could constitute 1–5% of children visiting a general ophthalmology practice.² This entity is significantly unlike evidence simulation, mainly because of exaggeration or deliberately referring specific symptoms in order to attain a personal benefit. Children generally do not have that intention. Several authors have demonstrated that psychosocial problems (in the family, at school, etc.) and psychiatric

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Fig. 4 – Visual field (VF) of patient 3. (A) Monocular VF, left eye: normal. (B) Monocular VF, right eye: generalized sensitivity reduction. (C) Binocular Esterman VF: abolition of the right hemifield.
disorders (anxiety, stress, hyperreactivity, attention deficit, depression, etc.) are quite prevalent in children with FVL. The expressions of FVL include monocular or binocular VA reductions, campimetric defects, anomalies in color vision, loss of stereopsis and paralysis or spasms in accommodation which may be associated to headache, periorbital pain, dysopia, photopsia or photophobia. FVL should be suspected when symptoms are inconsistent with exploration, together with the data obtained in anamnesis referred to family, social, economic or schooling conditions. The majority of cases resolve spontaneously by advising the parents and referring to psychological or psychiatric treatment when necessary.
In summary, simulation is a frequent disorder which can be diagnosed with numerous outpatient tests prior to imaging and electrophysiological tests.

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**Conflict of interests**

The authors have no conflict of interests to declare.

**REFERENCES**