Early Onset Optic Neuritis Following Measles-Rubella Vaccination

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Purpose: To report two cases of optic neuritis with onset less than 24 hours following measles-rubella (MR) vaccination.
Case Report: Two teenage patients developed acute optic neuritis 6 to 7 hours after MR booster vaccination. The first patient demonstrated bilateral papillitis and severe visual loss but improved significantly with pulse intravenous steroid therapy with methylprednisolone 500 mg/day. The second patient had unilateral retrobulbar optic neuritis and demonstrated excellent visual recovery without intervention.
Conclusion: Acute optic neuritis is a rare complication of MR vaccination and may occur early after immunization.

J Ophthalmic Vis Res 2008; 3 (2): 118-122.

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Received: February 17, 2008 **Accepted:** March 29, 2008

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INTRODUCTION

Optic neuritis may occur following vaccinations against bacterial or viral infections; most cases are bilateral and may be anterior or retrobulbar.[1] Optic neuritis may develop after vaccinations against tuberculosis,[2] hepatitis B,[3] rabies,[4] tetanus,[5] meningitis,[6] anthrax,[7] measles and rubella.[8-11] The influenza vaccine is also commonly associated with optic neuritis.[12,13] Although most cases of post-vaccination optic neuritis tend to be anterior, retrobulbar optic neuritis has been reported following swine influenza vaccination.[14] Optic neuritis usually occurs one week to one month after vaccination,[8-11] but the patients reported herein developed this complication less than 24 hours after receiving a booster dose of measles-rubella (MR) vaccine in the national vaccination program performed in December 2003.

CASE REPORT

Case 1

A 15-year-old boy from the north of Iran experienced a mild vasovagal shock immediately after MR vaccination and was managed accordingly. Six hours after recovery, he noticed sudden and severe loss of vision in both eyes together with headache and dizziness. A local ophthalmologist was consulted who reported that visual acuity was hand motions in both eyes. There had been poor pupillary light reflexes making it difficult to determine relative afferent pupillary defect (RAPD). Extraocular and slitlamp examinations had been unremarkable but on fundus examination both discs had blurred margins. Brain and orbital MRI were normal. Similarly, complete blood count (CBC), erythrocyte sedimentation rate (ESR), blood

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chemistry and cerebrospinal fluid analysis were normal. Visual fields could not be performed due to severe visual loss. The patient was hospitalized two weeks later and received a 3-day course of pulse therapy with intravenous methylprednisolone (500 mg/day). His visual field is shown in figure 1. The patient was referred to our center one week later; visual acuity was 20/40 in right eye and 20/30 in left eye, ophthalmoscopy revealed +1 pallor in both optic discs and visual field testing revealed significant improvement (Fig. 2).

Case 2

A 17-year-old male patient presented with severe reduction of vision in his right eye 7 hours after MR vaccination. On examination, visual acuity was 20/400 and 20/20 in his right and left eyes, respectively and RAPD was +2 on the right side. External ocular, slitlamp and fundus examinations were unremarkable in both eyes. A diagnosis of retrobulbar optic neuritis was made and intravenous methylprednisolone therapy as described above was offered, but the patient declined the treatment. CBC, ESR, blood chemistry, and brain and orbital MRI revealed no abnormal findings. Automated perimetry revealed extensive visual field loss sparing only the superior nasal quadrant (Fig. 3). Four days later, visual acuity started to improve spontaneously and 2 weeks later, reached 20/20 in the affected eye. RAPD became negative and visual field testing 3 weeks later revealed significant improvement (Fig. 4).

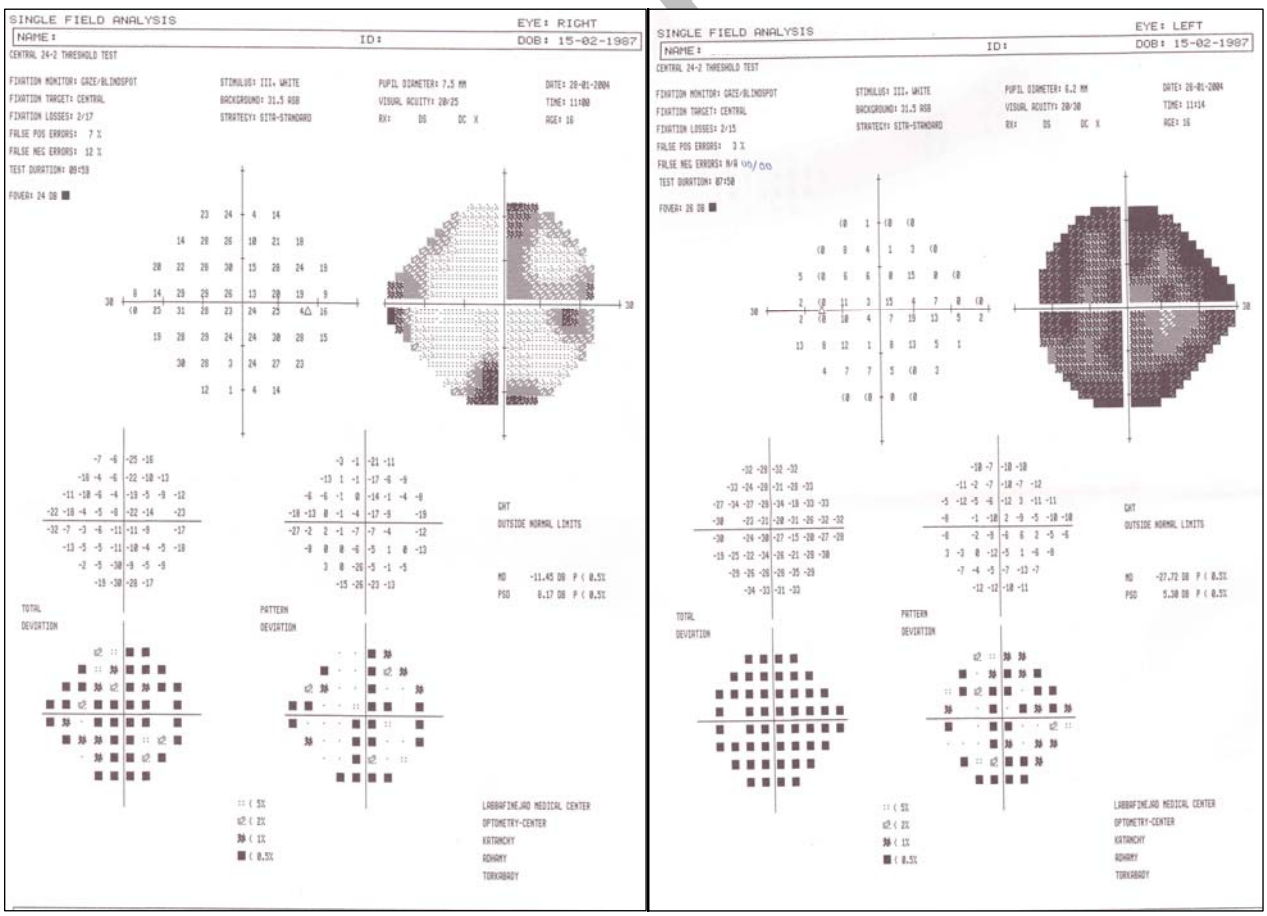

Figure 1 Visual fields (right and left eyes) 2 weeks after vaccination in case 1.

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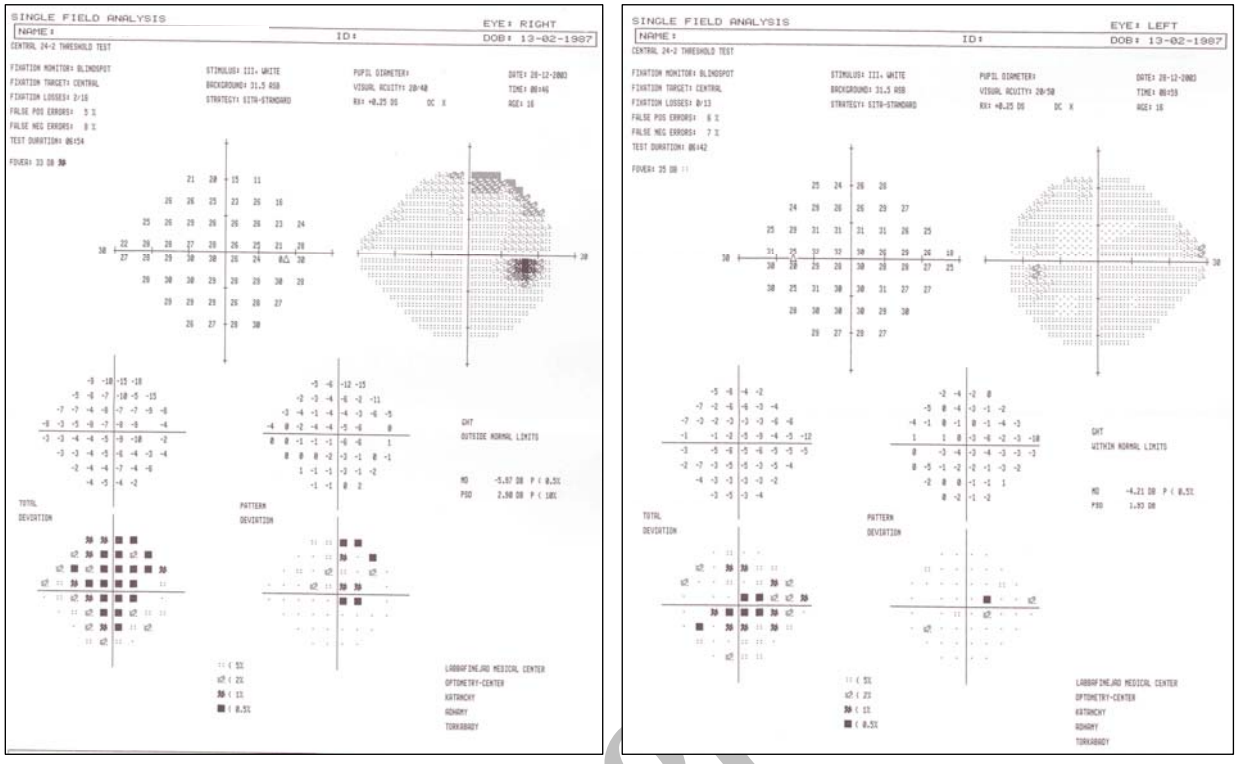

Figure 2 Visual fields at last follow–up, one month after vaccination, in the same patient as in figure 1.

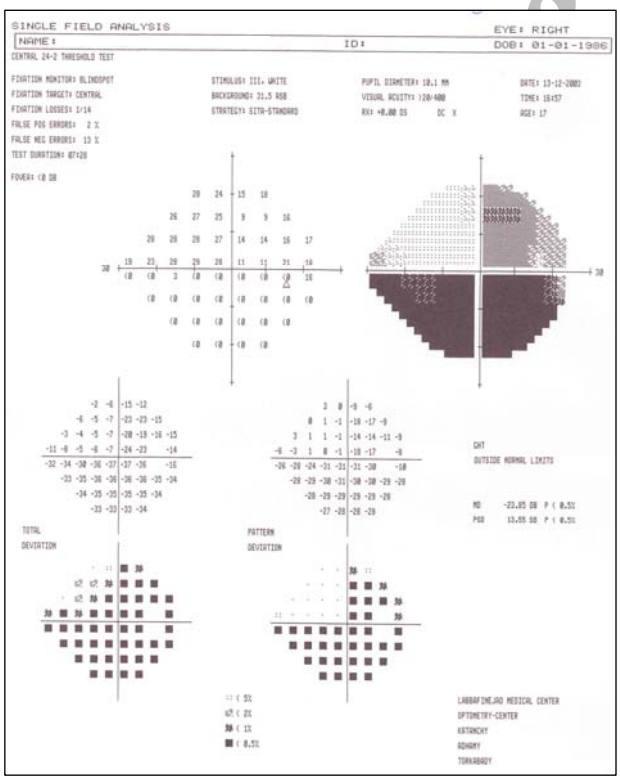

Figure 3 Visual field of the right eye in case 2 one day after vaccination.

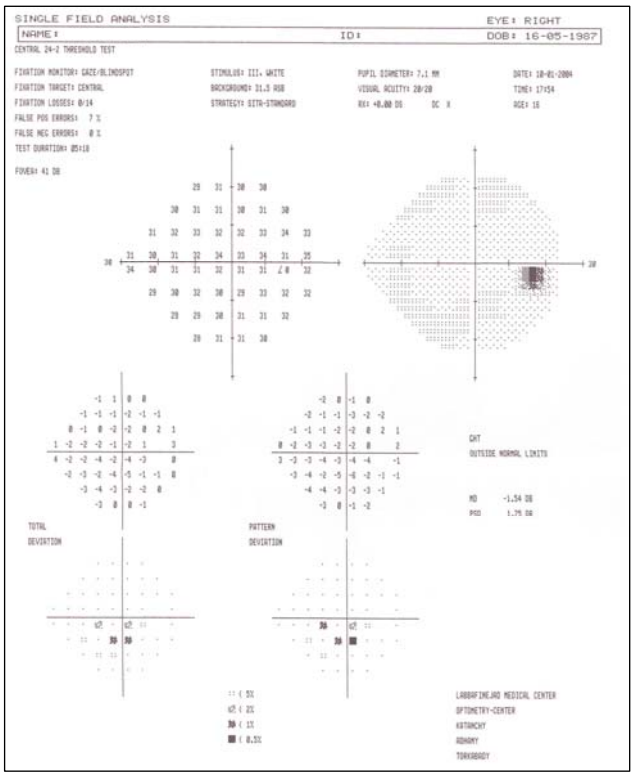

Figure 4 Visual field of the right eye in the same patient as in figure3, 3 weeks after vaccination.

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DISCUSSION

In December 2003, the Iranian Ministry of Health and Medical Education initiated an MR vaccination program with the goal of eliminating indigenous measles and congenital rubella. This 3-week program targeted 30 million participants 5 to 25 years of age. Vaccines against measles and rubella are available in Iran as monovalent measles (Attenuvax; Merck, Inc.), rubella (Meruvax; Merck, Inc.), or in combination (measles-rubella, M-R Vax; Merck, Inc.). Each dose of the mentioned vaccines contains approximately 0.3 mg human albumin, 25 μg neomycin, 14.5 mg sorbitol and 14.5 mg hydrolyzed gelatin.[15]

Adverse events associated with MR vaccination range from local pain and induration to rare systemic reactions such as anaphylaxis. Side effects tend to occur among subjects who are non-immune and therefore are very rare after booster vaccinations. There is significant evidence establishing a causal relation between MR vaccination and anaphylaxis, thrombocytopenia, febrile seizures and acute arthritis. Although vasculitis, otitis media, conjunctivitis, optic neuritis, ocular nerve palsies, Guillain-Barré syndrome and ataxia have also been reported after administration of combined MR vaccine and its component, no causal relationship has been established between these events and the vaccine.[15] Children rarely develop symptoms after rubella vaccination but reports of arthralgias, thrombocytopenic purpura, ataxia, aseptic meningitis, transverse myelitis and polyneuritis have been prevalent in adult females.[16] Fifty-nine of the 84 cases of neurologic disorders following measles vaccination reported to the Center for Disease Control from 1963 to 1974 occurred within 30 days of the vaccination date; 44 (76%) of which, occurred 6 to 15 days after vaccination.[17]

To date there are four published reports in the literature on optic neuritis following vaccination against rubella or measles. Kazarian and Gager[8] reported a 6-year-old boy who developed bilateral optic neuritis 18 days after administration of live attenuated trivalent mumps-measles-rubella vaccine. Kline et al[9] reported a 31-year-old woman who developed bilateral optic neuritis and myelitis 11 days after monovalent rubella vaccination. Riikonen[10] reported a patient with unilateral optic neuritis and later, multiple sclerosis, 4 weeks after rubella vaccination. And finally, Stevenson et al[11] reported two 13-year-old children who developed optic neuritis 2 to 3 weeks following MR vaccination.

Both of our patients developed optic neuritis a few hours following MR vaccination. Due to the atypical time frame of presentation, the mechanism of the early-onset post-vaccination optic neuritis observed in these two subjects remains elusive. Complications related to MR vaccination usually occur 1 week to 1 month after injection, corresponding with antibody titer rise against these attenuated live viruses resulting in immune complex mediated vascular injury leading to vascular hyperpermeability, perivascular inflammation, and blood-brain barrier disruption.[10,11]

In summary, optic neuritis is a rare complication of MR vaccination and may occur within hours after injection. This complication is probably independent of rising antibody titers against these live attenuated viruses and may represent a toxic reaction to non-viral vaccine components.

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