



Mobius Syndrome with Duane Retraction: Abducens Nerve Aplasia and Facial Nerve Hypoplasia

Duane Retraksiyonu Olan Mobius Sendromu: Abdusens Sinir Yokluğu ve Fasyal Sinir Hipoplazisi

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Summary

Mobius syndrome is a multisystem disorder and typically presents with 6th and 7th cranial nerves involvement. Neuroimaging studies have demonstrated crucial findings which may pave the way for understanding the basic pathophysiology of this rare entity. We report magnetic resonance imaging findings of a sporadic Mobius syndrome case with Duane retraction component which never took place in the local literature. (Turk J Ophthalmol 2013; 43: 294-6)

Key Words: Cranial nerves, duane retraction, Mobius syndrome, magnetic resonance imaging

Özet

Mobius sendromu tipik olarak 6. ve 7. kafa sinirlerinin tutulumu ile kendini gösteren bir çoklu sistem bozukluğudur. Nörolojik görüntüleme çalışmaları bu nadir olgunun temel patofizyolojisinin anlaşılmasına olanak sağlayabilecek önemli bulgular ortaya koymuştur. Biz ulusal literatürde daha önce yer bulmamış ve Duane retraksiyon komponenti olan sporadik bir Mobius sendrom olgusunu manyetik rezonans görüntüleme bulguları ile sunmaktayız. (Turk J Ophthalmol 2013; 43: 294-6)

Anahtar Kelimeler: Duane retraksiyonu, kafa sinirleri, manyetik rezonans görüntüleme, Mobius sendromu

Introduction

One extensive review characterized Mobius syndrome mainly by facial diplegia of the upper and lower facial muscles, bilateral eye abduction impairment, hypoglossia, craniofacial and limb malformations, and long tract symptoms.¹ Though the abducens nerve (CN6) and facial nerve (CN7) involvement is the main finding, it can be expanded to involvement of nearly all cranial nerves. As a member of congenital cranial dysinnervation disorders, few descriptions of radiological evaluation relating magnetic resonance imaging (MRI) have been reported for Mobius syndrome, but the pathogenesis of the syndrome remains unclear.²⁻⁸ We report the clinical and MRI (3-D FIESTA) findings of a sporadic case of Mobius syndrome.

Case Report

This patient was a 20-year-old male born to non-consanguineous parents and had no affected siblings. According to parents' statement, no pharmacotherapy was taken by the mother during pregnancy and no exposure to teratogens was present. His medical history was significant for clubfeet correction surgery in childhood. There was grossly limited abduction of both eyes with globe retraction and up-shoot in adduction. Additionally, alternating esotropia of 15 prism diopters was evident with preserved vision (20/20 without correction) on both eyes. Pupils had normal size and reactivity. Slit lamp and fundus examinations were unremarkable. Frontal inspection revealed epicanthus, low-set ears and typical fascial expression "mask-like appearance"

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Figure 1. Typical mask-like appearance in all photographs; Ocular versions demonstrating bilateral abduction limitation, up-shoot, and retraction on adduction



Figure 2. Photographs demonstrating a long narrow face, narrow nostrils, prognathism with dental anomaly (left) and an atrophic tongue with prominent clefts (right)

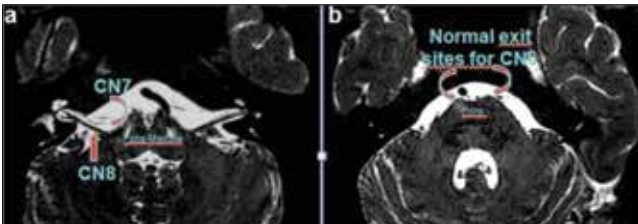


Figure 3. Axial T2-weighted MRI (a) Bilateral normal CN8 and hypoplastic CN7 in the cistern, (b) Both CN6 were absent in the cisternal segment

caused probably by bilateral facial nerve involvement (Figure 1). Prognathismus with dental abnormality and a small asymmetric tongue with irregular atrophic areas were observed (Figure 2). Finally, we diagnosed him with Mobius syndrome. There was no mental retardation or cognitive capacity restriction. Otolaryngologist reported a normal audiogram. Imaging of ocular motor nerves in the brainstem revealed bilateral absence of CN6 and bilateral relatively hypoplastic CN7 along its course at the ponto-medullary junction (Figure 3).

Discussion

The etiology of Mobius syndrome is multifactorial, and several theories have been proposed, with the most supported theory being that of ischemic or hypoxic insult to the fetus.⁹

Other infectious and genetic etiologies have also been proposed. In addition, the use of misoprostol, a prostaglandin-E1 analog, has been implicated.¹⁰ Cronemberger et al¹⁰ reported 18.8% use of misoprostol and Ghabrial et al¹¹ reported 43% significant event during intrauterine life among Mobius patients. However, no pharmacotherapies had been taken by the mother during uneventful pregnancy, and delivery was uncomplicated in the present case.

Neuroimaging (CT and MRI) findings of Mobius syndrome include hypoplasia of the pons or medulla with correspondent CN6 and CN7 hypoplasia, absence of the medial colliculus at the level of the pons, absence of the hypoglossal prominence suggestive of CN12 nuclei hypoplasia, cerebellar hypoplasia, depression of the 4th ventricle, and calcification in the pons in the region of the CN6 nuclei.²⁻⁸ Combined with the knowledge obtained from neuropathologic studies, ischemic/hypoxic theory came forward as the possible mechanism.¹² We observed a typical presentation of Mobius syndrome as both CN6 and CN7 were involved clinically and radiologically. Sano et al⁴ found absence of the facial nerve canal in the middle ear on CT, a narrow nerve in the middle ear on MRI but no associated CN6 finding. Verzijl and coworkers¹³ reported bilateral absence of cisternal and canicular portions of both facial nerves in six Mobius syndrome patients. Of these six, four had bilateral Type 3 Duane syndrome. Another study by the same group reported up to a 34% incidence of bilateral Duane syndrome in a series of 37 Mobius syndrome patients. Yong-Hong et al⁵ found absence of CN6 or hypoplasia in the brainstem and an extra branch of the inferior division of CN3 to the lateral rectus as the most common type of presentation of Duane retraction. There seems to be an alternative pathway, mostly from CN3, of innervation by other cranial nerves. However, we did not trace the CN3 up to the endpoint of innervation on MRI.

A large Italian case series demonstrated that nearly half of the patients had strabismus, most of whom were esotropic.¹⁴ However, they reported no Duane retraction component. As in our case, visual acuity was better than 20/50 in tested eyes as a result of alternating fixation. Their findings agreed with Verzijl et al's that Mobius syndrome is a complex syndrome of rhombencephalic maldevelopment involving predominantly motor nuclei and axons.¹⁵ However, Dumars et al¹⁶ reported extraneuronal findings which included hypoplasia of the posterior bony orbit, displaced rectus muscle paths, and abnormal insertions of the superior and inferior oblique muscles, which show that it is not only a brain stem dysplasia. Thereby, it remains unknown whether the primary defect is actually maldevelopment of brainstem nuclei, nerves, or their associated muscles, and whether the process is dysplastic or degenerative. Genetic testing or orbital imaging was not obtained in our patient and the patient was no longer available for follow-up. Direct imaging of extraocular muscles and innervating cranial nerves by MRI and further genetic analyses would provide relevant information regarding the diagnosis, etiology and treatment of this complex strabismus entity.

Though there are some reports especially regarding Poland-Mobius variant in the local literature, this is the first report that gives clinically relevant MRI findings in a Mobius syndrome case.¹⁷⁻¹⁹

References

1. Verzijl HT, Van Der Zwagg B, Cruysberg JR, Padberg GB. Mobius syndrome redefined: a syndrome of rhombencephalic maldevelopment. *Neurology*. 2003;61:327-33.
2. Matsunaga Y, Amamoto N, Kondoh T, et al. A severe case of Moebius syndrome with calcification on the fourth ventricular floor. *J Hum Genet*. 1998;43:62-4.
3. Kiratli H, Erdener U. Poland-Moebius syndrome: a case report. *Jpn J Ophthalmol*. 2000;44:679-82.
4. Sano M, Kaga K, Takeuchi N, Kitazumi E, Kodama K. A case of Mobius syndrome—radiological and electrophysiological findings. *Int J Pediatr Otorhinolaryngol*. 2005;69:1583-6.
5. Yong-hong J, Kan-xing Z, Zhen-chang W, et al. Magnetic resonance imaging of the extraocular muscles and corresponding cranial nerves in patients with special forms of strabismus. *Chin Med J*. 2009;122:2998-3002.
6. Pedraza S, Gamez J, Rovira A, et al. MRI findings in Mobius syndrome: correlation with clinical features. *Neurology*. 2000;55:1058-60.
7. Kuhn MJ, Clark HB, Morales A, Shekar PC. Group III Mobius syndrome: CT and MR findings. *AJNR Am J Neuroradiol*. 1990;11:903-4.
8. Saint-Martin C, Clapuyt P, Duprez T, Ghariani S, Verellen G. Möbius sequence and severe pons hypoplasia: a case report. *Pediatr Radiol*. 1998;28:932.
9. Abramson DL, Cohen MM Jr, Mulliken JB. Mobius syndrome: classification and grading system. *Plast Reconstr Surg*. 1998;102:961-7.
10. Cronemberger MF, de Castro Mereira JB, Brunoni D, et al. Ocular and clinical manifestations of Möbius syndrome. *J Pediatr Ophthalmol Strabismus*. 2001;38:156-62.
11. Ghabrial R, Versace P, Kourt G, Lipson A, Martin F. Möbius' syndrome: features and etiology. *J Pediatr Ophthalmol Strabismus*. 1998;35:304-11.
12. Towfighi J, Marks K, Palmer E, Vannucci R. Mobius syndrome: neuropathologic observations. *Acta Neuropathol*. 1979;48:11-7.
13. Verzijl HT, Valk J, de Vries R, Padberg GW. Radiologic evidence for absence of the facial nerve in Mobius syndrome. *Neurology*. 2005;64:849-55.
14. Carta A, Mora P, Neri A, Favilla S, Sadun AA. Ophthalmologic and Systemic Features in Möbius Syndrome: An Italian Case Series. *Ophthalmology*. 2011;118:1518-23.
15. Verzijl HTFM, Padberg GW, Zwarts MJ. The spectrum of Möbius syndrome: an electrophysiological study. *Brain*. 2005;128:1728-36.
16. Dumars S, Andrews C, Chan WM, Engle EC, Demer JL. Magnetic resonance imaging of the endophenotype of a novel familial Möbius-like syndrome. *J AAPOS*. 2008;12:381-9.
17. Bozaykut A, İpek İÖ, Atay E, Ünver O. Poland-Moebius sendromu: olgu sunumu. *Türk Pediatri Arşivi*. 2004;39:178-80.
18. Acer S, Türkoğlu EB, Atum M, Çelik E, Alagöz G, Günaydın C. Poland-Mobius Sendromu. *Türkiye Klinikleri J Ophthalmol*. 2012;21:120-4.
19. Kırbaş S, Arslan Ö, Bahçe B, Erdokur O, Civelekler M, Ertem B. Pektoral Kas Hipoplazisinin Eşlik Ettiği Möbius Sendromu: Olgu Sunumu. *Türk Norol Derg*. 2010;16:215-8.