

Abnormal medial rectus insertion presenting exotropia: a case report and review of the literature

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Dear Editor,

I am Dr. Heeyoung Choi, from the Department of Ophthalmology of Pusan National University Hospital, Busan, Korea. I write to present a case report of abnormal medial rectus insertion presenting exotropia.

Isolated anatomical abnormalities of the extraocular muscles without craniofacial syndromes or other systemic anomalies are not common. In most of the cases, strabismus is usually combined with incomitance and abnormal ocular movement^[1]. There are a few reports of isolated anomalies of the medial rectus muscle^[2-4]. We report a case that an exotropic patient with abnormal insertion of the medial rectus muscle who achieved successful surgical outcome. A 16-year-old boy was referred to our clinic because of exotropia. He first noticed his eyes exodeviated when he was 7 years old. He denied any treatment, both non-surgical and surgical. His best corrected visual acuity was 20/40 in the right eye and 20/20 in the left eye. Refractive error was +0.5 diopters in the right eye and -1.0 diopters in the left eye. He had constant exotropia of 40 prism diopters upon distance and near fixation testing by prism and alternative cover test. He had poor stereoacuity (200 seconds of arc) which was evaluated by the titmus test. His near point of convergence was 30 cm. Duction and version was within normal range. He did not have any systemic disease or previous history of ophthalmic surgery.

We planned to perform right lateral rectus recession combined with right medial rectus resection. There were no abnormal findings in intraoperative forced duction test. After

performing 7.5 mm of recession of the right lateral rectus muscle, which was normally inserted, we noticed that the right medial rectus was attached to the sclera 12 mm from the limbus. The muscle itself looked healthy and of a normal size. The left medial rectus muscle was also attached 12 mm away from the limbus (Figure 1).

This finding required a modification of the planned surgical procedure. Instead of resection, we decided to perform advancement of the medial rectus by 5 mm. Limitation of ocular movement or symptomatic diplopia was not occurred after surgery. One year after surgery, the patient maintained orthotropia (Figure 2).

There are only a few reports about anomalies of the medial rectus muscle, presenting comitant strabismus^[2-3]. Choi *et al*^[2] reported that non-refractive comitant esotropia revealed the abnormal insertion of the medial rectus muscle during muscle surgery. Superior half of the muscle fibers fanned out in the anterior direction and broadly inserted on the sclera. He recessed the inferior half as planned and the superior half was attached next to the inferior half and sutured them together. Bifid medial rectus muscle insertion associated with intermittent distance exotropia was also reported. Both limbs of the anomalous medial rectus were resected by 4 mm and sutured together to reform a single continuous muscle insertion^[3]. In both of the cases, anatomical anomaly was found during the muscle surgery and the author modified the surgical method adequately. In our case, we performed medial rectus advancement, instead of resection. When regarding the condition of the patients as medial rectus being recessed by 5 mm, the advancement by 5 mm was expected that have the same effect as 5 mm resection.

Generally, it is known that placing a rectus muscle posterior to the equator may prevent its action, despite the fact that determination of the location of the equator is difficult. Kushner *et al*^[5] demonstrated that recessions of the medial rectus up to 1.5 mm posterior to the equator should not produce postoperative medial rectus underaction. Although we did not measure the axial length of the current patient, using the formula given by Kushner *et al*^[5] [axial length= 20.768+0.015 (age in months)-0.287 (refractive error)], we presumed the patient's axial length was 23.88 mm and 24.29 mm in the right and the left eye. Then the locations of the equator were calculated using the other formula of Kushner *et al*^[6] [37×π×2×radius of globe/360=mm of arc] -15.41 mm and 15.68 mm in the right and the left eye,

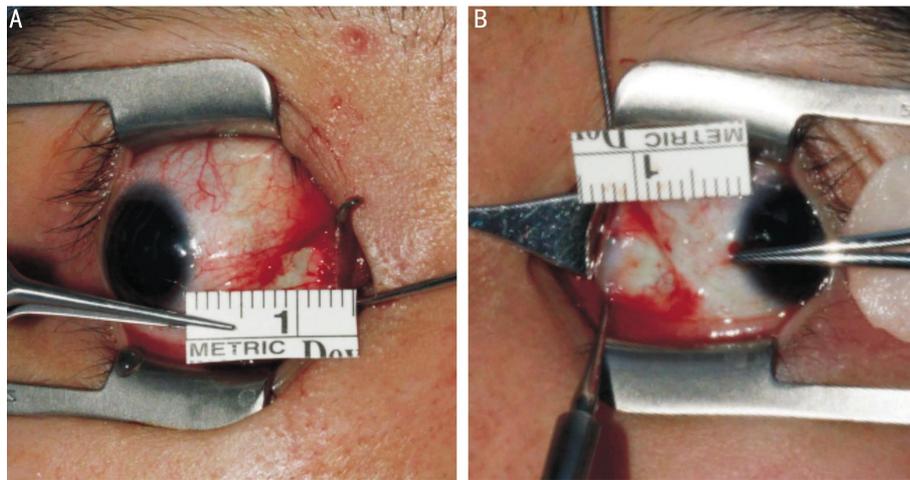


Figure 1 Intraoperative photographs A: Right medial rectus muscle hooked with a Jameson hook. The muscle was inserted at a site 12 mm from the limbus. The width and shape of the muscle insertion was normal; B: Left medial rectus muscle also showed same insertion site.



Figure 2 Ocular alignment of patient A: Forty prism diopters of exotropia was observed before surgery; B: The patient maintained orthotropia at 1y after surgery.

respectively. The original insertion of the medial rectus in the present case was located 12 mm from the limbus, which was anterior to the calculated location of the equator. Therefore, the abnormal insertion was not thought to restrict the action of the medial rectus muscle.

It is known that unless an anomaly of the extraocular muscles is extreme, such as total absence of a muscle, it is not likely to have a major effect on ocular alignment.

Experimental transposition of various extraocular muscles does not permanently destroy the coordination of ocular alignment^[7]. Although it is not certain, either the anisometric amblyopia or the posteriorly located medial rectus possibly could contribute to the presence of exodeviation in the current case. We did not evaluate the normality of the extraocular muscles other than the horizontal muscles. Previously reported cases of anomalous medial rectus

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insertions reveal absent inferior rectus muscles^[8]. The present patient appeared to have an intact downgaze, but there may have been some additional associated anomaly of the other extraocular muscles present.

To the best of our knowledge, this is the first report of comitant exotropia combined with abnormal posterior medial rectus insertion successfully treated with medial rectus advancement. Surgeons should be aware of the possibility of anatomical variations when planning surgery and should be able to modify the operation method accordingly.

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