VER
Vascular & Endovascular Review

Surgical Outcome of an Isolated Inferior Rectus Muscle Palsy: A Case Report

Ria Indah Wahyuningtyas[1], Rozalina Loebis[2]

[1]Department of Ophthalmology, Faculty of Medicine, Airlangga University / Dr. Soetomo General Academic Hospital, Surabaya, Indonesia
[2]Head of Pediatric Ophthalmology and Strabismus Division, Department of Ophthalmology, Faculty of Medicine, Airlangga University / Dr. Soetomo General Academic Hospital, Surabaya, Indonesia.

ABSTRACT

Introduction: Isolated inferior rectus muscle palsy is an uncommon disorder of ocular motility that produces vertical deviation and double vision. The condition most often follows orbital trauma and can resemble other vertical strabismus entities, making diagnosis challenging.
Case Presentation: A 27-year-old man presented with persistent vertical diplopia in his left eye for one year after blunt ocular trauma. Clinical findings indicated left hypertropia with limited depression, consistent with inferior rectus muscle palsy. Orbital imaging revealed no evidence of fracture or entrapment. After a year of conservative therapy without improvement, surgery was performed—consisting of a 4-mm superior rectus recession and a 4-mm inferior rectus resection on the affected eye. Postoperative recovery was excellent, with restoration of normal alignment, full ocular motility, and complete resolution of diplopia within two weeks.
Discussion: Traumatic isolated inferior rectus palsy is rare and may be mistaken for other causes of vertical misalignment. When spontaneous recovery does not occur, a balanced surgical approach involving both recession and resection provides predictable alignment and satisfactory binocular function.
Conclusion: Combined superior rectus recession and inferior rectus resection represent an effective and reliable option for achieving stable ocular alignment and eliminating diplopia in chronic traumatic inferior rectus palsy resistant to conservative treatment.

KEYWORDS: inferior rectus palsy, strabismus surgery, ocular motility disorder, diplopia, trauma.

How to Cite: Ria Indah Wahyuningtyas, Rozalina Loebis., (2025) Surgical Outcome of an Isolated Inferior Rectus Muscle Palsy: A Case Report, Vascular and Endovascular Review, Vol.8, No.9s, 277--280.

INTRODUCTION

Isolated inferior rectus muscle (IRM) palsy is a rare ocular motility disorder that causes vertical misalignment and diplopia. It is characterized by selective dysfunction of the inferior rectus muscle, typically without involvement of other extraocular muscles innervated by the oculomotor nerve.(1) Because the condition is uncommon, its recognition can be challenging and may mimic other vertical strabismus entities such as superior oblique palsy or skew deviation.(2)

The etiology of isolated IRM palsy is diverse and may include trauma, vascular, inflammatory, and congenital causes. (1-3) Among these, trauma—particularly orbital contusion with or without an associated orbital wall fracture—is the most frequently reported cause. (2,3) The underlying mechanism may involve direct muscle injury, partial transection, ischemia, or neuropraxia of the motor branch supplying the inferior rectus. (2, 4)

Given its rarity and overlapping clinical presentations, a thorough diagnostic evaluation—including motility testing, imaging, and systemic workup—is required to rule out restrictive or neurogenic etiologies. (1,3) Most traumatic cases recover partially or completely within several months; however, when diplopia or abnormal head posture persists more than six months, surgical alignment is indicated to restore binocular function. (2,5)

This report describes the clinical presentation and successful surgical management of a young adult with traumatic isolated inferior rectus muscle palsy who underwent combined superior rectus recession and inferior rectus resection, resulting in complete resolution of diplopia and restoration of ocular alignment.

CASE PRESENTATION

A 27-year-old man presented to the Ophthalmology Department of Dr. Soetomo General Academic Hospital, Surabaya, with a one-year history of persistent vertical diplopia in his left eye. The symptom began approximately one week after both eyes were struck by a friend's hand while he was asleep. The patient experienced brief loss of consciousness and periorbital bruising on the left side. Visual clarity returned spontaneously, but vertical diplopia persisted. He had no history of ocular surgery, thyroid dysfunction, or systemic illness.

The diplopia was most pronounced in the morning and on downward gaze. There were no associated headaches, ocular pain, or photophobia. He had been treated conservatively with citicoline 1000 mg daily, artificial tears, and ocular exercises for several months without improvement.

At presentation, best-corrected visual acuity was 20/20 in both eyes. Intraocular pressure was 16 mmHg in the right eye and 14 mmHg in the left. The anterior and posterior segment examinations were unremarkable.

Ocular alignment testing revealed approximately 15° of left hypertropia with mild exotropia in primary position. The deviation increased on right head tilt and in left gaze. The Park three-step test localized the dysfunction to the left inferior rectus muscle. The Worth Four Dot test demonstrated diplopia, and Maddox rod testing showed a 7-prism-diopter vertical and 5-prism-diopter horizontal deviation. Extraocular motility evaluation revealed a mild (-2) limitation of depression in the left eye, while all other movements were full (Figure 1).

Contrast-enhanced orbital computed tomography (CT) scan showed intact extraocular muscles without evidence of entrapment, fracture, or intracranial pathology (Figure 2). Optical coherence tomography (OCT) findings were within normal limits, and laboratory tests—including thyroid function, blood glucose, and erythrocyte sedimentation rate—were normal.

A diagnosis of isolated left inferior rectus muscle palsy secondary to blunt trauma was made. After twelve months of persistent diplopia and no spontaneous recovery, surgical intervention was performed. Under general anesthesia, a 4-mm superior rectus recession and a 4-mm inferior rectus resection were carried out on the left eye. Intraoperative forced duction testing confirmed the absence of mechanical restriction.

On the first postoperative day, Hirschberg testing demonstrated orthophoria with mild subconjunctival hemorrhage in the superior and inferior quadrants (Figure 3). The cornea was clear, and no anterior segment ischemia was observed. The patient received topical and oral antibiotics and corticosteroids for one week.

Two weeks after surgery, the patient reported complete resolution of diplopia. Hirschberg testing confirmed orthophoria, and the Worth Four Dot test demonstrated single binocular vision. Extraocular motility was full in all directions, with no residual hypertropia. At two months, ocular alignment remained stable, and the patient resumed daily activities without visual complaints (Figure 4).

Figure 1. Preoperative extraocular motility showing limitation (-2) of inferior, inferolateral and inferomedial in the left eye.

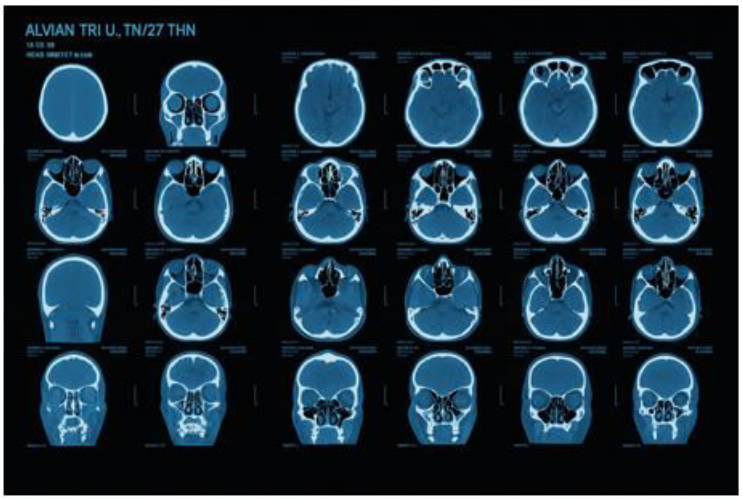

Figure 2. Orbital CT-scan showing normal-appearing extraocular muscles without entrapment or structural abnormalities.

Figure 3. One-day postoperative image demonstrating orthophoria with mild subconjunctival hemorrhage in the left eye.

Figure 4. Two-week postoperative evaluation showing normal extraocular motility and restored ocular alignment.

DISCUSSION

Isolated inferior rectus muscle (IRM) palsy represents one of the least common forms of ocular motility disturbance. (1) Most cases are acquired rather than congenital, and trauma is consistently cited as the leading cause. (2,3) The inferior rectus muscle may be affected by direct contusion, stretching of its motor branch, or secondary ischemic changes following orbital impact. (2,4) Even in the absence of a blow-out fracture, blunt trauma can result in focal injury to the muscle or its innervating nerve, leading to persistent vertical diplopia.

The clinical presentation can mimic other causes of vertical deviation, including contralateral superior oblique overaction, partial oculomotor nerve palsy, thyroid ophthalmopathy, or skew deviation. (1,5,6) Distinguishing among these entities requires detailed ocular motility testing, neuroimaging, and systemic evaluation. In the present case, the absence of neurological findings, normal orbital imaging, and a characteristic pattern of hypertropia on head-tilt testing confirmed an isolated IRM palsy.

Previous studies have demonstrated variable outcomes in traumatic IRM palsy. A studies reported that most patients recover spontaneously within several months, but persistent diplopia may occur when fibrosis or axonal injury is present. (2) Combined vertical rectus surgery provides the most predictable results, particularly when both weakening and strengthening procedures are performed to balance vertical forces. (7) In their series, each millimeter of superior rectus recession and inferior rectus resection achieved approximately 2.5 to 2.9 prism diopters of correction, leading to orthophoria in most patients after a single operation. (7)

In our patient, surgical management was chosen after one year of persistent diplopia despite conservative therapy. The combination of a 4-mm superior rectus recession and a 4-mm inferior rectus resection resulted in complete alignment and restoration of single binocular vision. This approach follows the established principle of reducing the action of the antagonist muscle while strengthening the affected one. (1,5,8) The outcome in this case supports the effectiveness of such combined procedures for traumatic IRM palsy, achieving both functional and cosmetic improvement.

Although traumatic inferior rectus palsy is often self-limiting, persistent vertical deviation significantly affects visual function and quality of life. Early diagnosis, appropriate evaluation, and structured follow-up are essential to determine the timing for surgical correction. (1,2) The resolution of diplopia and achievement of orthophoria after surgery in this case underscore the benefit of timely, targeted vertical rectus surgery in managing chronic isolated IRM palsy.

CONCLUSION

Traumatic isolated inferior rectus palsy is rare but can cause persistent diplopia and vertical deviation. When conservative management fails, combined vertical rectus surgery can effectively restore ocular alignment and binocular vision.

ACKNOWLEDGMENTS

Ethics approval and consent to participate

The patient provided written informed consent for participation and publication of this case report.

Consent for publication

Not applicable.

Competing interests
The authors declare no conflict of interest.

Funding
This research received no external funding.

REFERENCES

1. Goyal S, Pless ML. Isolated inferior rectus palsy: a case report and review of literature. **Neuro-Ophthalmology.** 2009;33(1–2):52–58.
2. Awadein A. Clinical findings, orbital imaging, and intraoperative findings in patients with isolated inferior rectus muscle paresis or underaction. **J AAPOS.** 2012;16(4):345–349.
3. Choi KD, Choi JH, Choi HY, et al. Inferior rectus palsy as an isolated ocular motor sign: acquired etiologies and outcome. **J Neurol.** 2013;260:47–54.
4. Iliff N, Manson PN, Katz J, Rever L, Yaremchuk M. *Mechanisms of extraocular muscle injury in orbital fractures.* **Plast Reconstr Surg.** 1999;103:787–799.
5. von Noorden GK, Hansell R. Clinical characteristics and treatment of isolated inferior rectus paralysis. **Ophthalmology.** 1991;98(2):253–257.
6. Wong AM. Understanding skew deviation and a new clinical test to differentiate it from trochlear nerve palsy. **J AAPOS.** 2010;14(1):61–67.
7. Akbari MR, Mehrpour M, Karimian M, Mirmohammadsadeghi A. Clinical findings and surgical outcomes of patients with traumatic isolated inferior rectus muscle paresis. **J AAPOS.** 2019;23(6):315.e1–315.e5.
8. Khan AO, Peter CTC, El-Dairi MA, et al. *Pediatric Ophthalmology and Strabismus.* Basic and Clinical Science Course. American Academy of Ophthalmology; 2021.