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CASE REPORT

Surgical Management of Manifest Exotropia and Its Effect on Cosmetic Appearance in Amblyopic Patients

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Abstract

Constant exotropia, defined by persistent outward deviation of the eye, can cause cosmetic concerns and disrupt binocular function if untreated. We report a case of a 26-year-old male with long-standing left-eye exotropia and amblyopia since early childhood. Preoperative assessment revealed a visual acuity of 6/30 in the left eye, 15° exotropia on Hirschberg testing, 30 prism diopters on prism alternate cover testing, alternating fixation with right-eye dominance, and left-eye suppression on the Worth Four Dot test. The patient underwent unilateral lateral rectus recession and medial rectus resection. One week postoperatively, ocular alignment was orthotropic with satisfactory cosmetic and motor outcomes, while functional binocular vision remained limited. This case demonstrates the effectiveness of surgical intervention in restoring alignment and appearance in adult sensory exotropia and emphasizes the importance of early detection and timely management to prevent irreversible sensory deficits.

Introduction

Strabismus is an ocular alignment disorder characterized by misalignment of one or both eyes, resulting in impaired binocular fixation [1]. It is among the most common pediatric ocular conditions, with a global prevalence estimated at approximately 3–5% [2]. Although typically diagnosed in childhood, strabismus may persist into adulthood or newly manifest later in life due to neurological or sensory abnormalities [3]. In Indonesia, epidemiological data remain limited and predominantly derived from hospital-based studies, with no recent community-level prevalence reports available. A study conducted at Dr. M. Djamil General Hospital, Padang (January–December 2017), identified exotropia as the most common type of strabismus (62.6%); among 57 exotropia cases, 41.7% were intermittent, and 20.9% were manifest [4]. To date, no published data have specifically reported the prevalence of strabismus in Aceh.

Exotropia is defined by outward ocular deviation, which may be intermittent or constant. Its etiology is multifactorial and may include binocular fusion disorders, sensory impairment, neuromuscular dysfunction, or structural abnormalities affecting ocular motility [5]. Clinically, it may progress from latent exophoria to intermittent, and eventually to constant, exotropia [6]. In children, untreated strabismus may lead to strabismic amblyopia, loss of stereopsis, and disruption of binocular fusion. In adults, beyond diplopia, misalignment may cause significant psychosocial distress due to cosmetic concerns. Early diagnosis and timely intervention during the critical period of visual development are essential to prevent irreversible sensory deficits, including amblyopia, a leading cause of preventable monocular visual impairment [4,6]. When exotropia is diagnosed and treated early, the prognosis is generally favorable [5].

Management strategies for exotropia range from conservative therapy to extraocular muscle surgery [5,6]. Surgical intervention is indicated when ocular deviation cannot be adequately

controlled non-invasively. The primary objectives of treatment include optimizing best-corrected visual acuity (BCVA), achieving satisfactory cosmetic alignment, preserving binocular function when possible, eliminating diplopia, correcting abnormal head posture, and preventing further complications [4].

The authors report a case of manifest exotropia in a 26-year-old male to highlight the long-term irreversible sensory consequences of untreated strabismus beyond the critical period of visual development, resulting in strabismic amblyopia, and to describe its surgical management, including the potential risk of postoperative recurrence in adult sensory strabismus.

Cases

A 26-year-old male patient presented to the Pediatric Ophthalmology and Strabismus Division Eye Clinic at Dr. Zainoel Abidin Regional General Hospital in Banda Aceh on July 22nd, 2025. He complained of an outward squint that he had noticed since age three and wanted his eyes to be straight again. As he grew older, the misalignment of his left eye became more noticeable, especially when he tried to focus on objects. He also experienced sensitivity to bright light, especially at night while driving. He also complained of blurred vision and difficulty maintaining focus when looking at distant objects. He had never worn glasses or undergone an eye examination. He did not report double vision but admitted to frequently blinking and unconsciously closing his left eye to improve his vision. There was no history of trauma, headache, nausea, or vomiting. The patient had no history of systemic illness such as diabetes mellitus or hypertension. A positive family history was noted, as his cousin had experienced similar ocular deviation. The patient and his family reported that medical consultation was sought only after observing improvement in his cousin following treatment.

On general physical examination, the patient was in good condition. The patient was alert and oriented, with a blood pressure of 110/79 mmHg, a pulse rate of 95 beats per minute, a respiratory rate of 20 breaths per minute, and a body temperature of 36.6 °C.

An ophthalmologic examination revealed a visual acuity of 6/6 in the right eye and 6/30 in the left eye. Pinhole testing showed no improvement. Cycloplegic refraction, followed by repeat subjective refraction, showed no visual improvement in the left eye despite full correction, supporting the presence of amblyopia. The Hirschberg test revealed 15° of exotropia in the left eye, and full ocular motility was observed in all directions of gaze. The cover-uncover test demonstrated alternating fixation with right-eye dominance. The Prism Alternate Cover Test (PACT) measured a deviation of 30 prism diopters at distance. Binocular Single Vision (BSV) testing using the TNO test revealed suppression in the left eye, which was confirmed by the Worth Four Dot Test (WFDT). Slit-lamp and fundoscopic examinations revealed no anterior or posterior segment abnormalities. A final diagnosis of left manifest exotropia with amblyopia was established.

Based on the results of the medical history and ophthalmological examination, the patient was first given informed consent. The patient was clearly informed that surgical intervention was primarily intended for ocular alignment and cosmetic improvement, and would not restore visual acuity in the amblyopic eye. The potential risk of postoperative recurrence was also discussed. Preoperative laboratory tests, chest X-rays, consultation with the cardiology department, and anesthesia assessment were performed. The patient was deemed fit for surgery under general anesthesia. Nine-gaze photographs were obtained pre- and postoperatively to objectively document ocular alignment, assess extraocular muscle function, and evaluate surgical outcomes.

On July 23rd, 2025, left eye lateral rectus recession and left eye medial rectus resection surgery were performed under general anesthesia. A unilateral procedure was selected because the right eye still had good visual function. The surgical dosage was determined based on standard surgical tables [7].

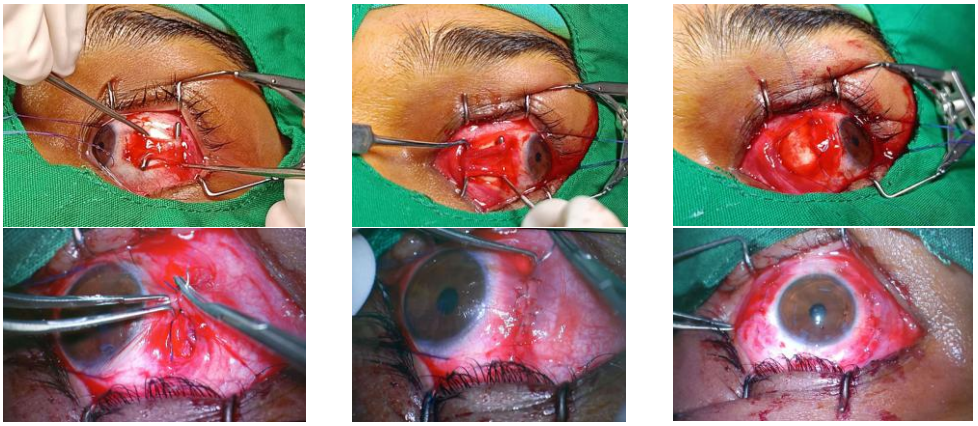

Figure 1. Intraoperative photo.

Undermining of the lateral bulbar conjunctiva was performed, followed by identification of the left eye's lateral rectus muscle. A 6.5-mm recession of the muscle was then carried out, and the bulbar conjunctiva was sutured using 10-0 nylon. Subsequently, undermining of the medial bulbar conjunctiva was performed, the left medial rectus muscle was identified, and a 5-mm resection of the muscle was completed. The bulbar conjunctiva was closed with 10-0 nylon sutures. Intraoperative photographs were obtained with patient consent and are presented to illustrate the surgical procedure (Figure 1). Topical antibiotic and corticosteroid eye drops were administered. The surgical wound was covered with sterile gauze, and the procedure was completed.

Postoperatively, the patient was given oral analgesics 50 mg three times a day, oral antibiotics 500 mg twice a day, a combination antibiotic-steroid eye ointment twice a day for the left eye, and antibiotic eye drops four times a day for the left eye. One week after surgery, the patient returned for a follow-up appointment at the Pediatric Ophthalmology and Strabismus Clinic at Dr. Zainoel Abidin Hospital in Banda Aceh.

(a) (b)

As shown in Figure 2, postoperative examination demonstrated an intact surgical site with minimal subconjunctival hemorrhage, no discharge, a clear cornea, orthotropic position on Hirschberg testing, no observable ocular deviation on the cover–uncover test, and the visual acuity of the left eye remained unchanged from the preoperative measurement. Early postoperative alignment was considered satisfactory.

Discussion

Exotropia is characterized by outward ocular deviation and may present as intermittent or manifest (constant) [5]. Over time, intermittent deviation may progress to constant exotropia,

representing the advanced stage of binocular decompensation. In this patient, the deviation had been present since early childhood and persisted untreated for more than two decades, consistent with long-standing early-onset manifest exotropia progressing into adulthood. The chronic disruption of binocular fusion during the critical period of visual development likely led to permanent sensory adaptation, including suppression and amblyopia in the left eye.

In long-standing sensory exotropia, the brain gradually suppresses visual input from the deviating eye to eliminate diplopia. This adaptive mechanism explains the absence of double vision in this patient despite a significant deviation of 30 prism diopters. The reported photophobia and intermittent voluntary eye closure are common compensatory behaviors in patients with decompensated exotropia, particularly when bright light interferes with fusional control [3].

The presence of a similar condition in a cousin suggests a possible genetic contribution. Strabismus is widely recognized as a complex and multifactorial disorder with a heterogeneous genetic basis, involving dysregulation of neuromuscular development and binocular fusion pathways [8,9]. Although causative genes have been identified in congenital cranial dysinnervation disorders, most common forms of strabismus are believed to result from interactions between multiple genetic susceptibilities and environmental influences [10]. In this case, long-standing visual impairment in the left eye prevented normal binocular development, and the coexistence of familial predisposition and untreated unilateral amblyopia may have contributed to the persistence of sensory exotropia into adulthood [11]. Additional risk factors reported in the literature include prematurity, perinatal morbidity, female sex, astigmatism, myopia, anisometropia, and others [12].

Comprehensive evaluation excluded paralytic or neurologic causes, as no history of systemic disease, trauma, or neurologic symptoms was identified, making secondary exotropia such as abducens nerve palsy unlikely [3]. Visual acuity testing confirmed unilateral amblyopia, with no improvement on pinhole or cycloplegic refraction [3,8]. Hirschberg testing demonstrated a 15° constant exotropia of the left eye. At the same time, the prism alternate cover test quantified the deviation at 30 prism diopters, a magnitude generally beyond the range that can be managed with conservative therapy and therefore warranting surgical correction. Sensory testing using the Worth Four Dot and TNO tests revealed suppression, confirming impaired binocular fusion. The cover–uncover test showed alternating fixation with right-eye dominance, consistent with long-standing sensory adaptation.

Surgical management of adult sensory exotropia primarily aims to restore ocular alignment for cosmetic and psychosocial benefit rather than to restore sensory fusion. Across multiple studies investigating surgical outcomes of exotropia in adults, surgery often yields satisfactory motor alignment and cosmetic improvement. However, restoration of functional binocular vision is limited and the risk of recurrence persists [13]. In this patient, unilateral surgery was selected because the fellow eye maintained normal visual acuity and served as the dominant fixing eye. The surgical dosage was determined according to established surgical tables described in *standard pediatric ophthalmology references*, including those *by Kenneth W. Wright*, which recommend approximately 6,5-mm lateral rectus recession combined with 5-mm medial rectus resection for deviations of around 30 prism diopters [7]. Careful dosage selection is essential to minimize the risk of overcorrection and postoperative consecutive esotropia, particularly in patients with longstanding sensory imbalance [3,13,14].

The primary objective of surgery was motor realignment. As expected in chronic amblyopia, restoration of binocular sensory function remains unlikely. A limitation of this case is the short postoperative follow-up period. Although early alignment was satisfactory, adult patients with long-standing sensory exotropia remain at risk of late exodrift or recurrence due to persistent sensory imbalance and limited fusional capacity. In uncomplicated cases, follow-up is typically

recommended for several months to years to ensure long-term stability of ocular alignment and to monitor for potential overcorrection or recurrent deviation. Therefore, the long-term surgical outcome in this patient cannot yet be definitively determined. Furthermore, visual rehabilitation was not expected to provide significant functional benefit postoperatively, as the long-standing amblyopia and suppression indicate irreversible sensory adaptation, limiting the potential for meaningful recovery of binocular function.

Conclusions

This case underscores the enduring impact of untreated childhood strabismus, illustrating that in adults with long-standing strabismic amblyopia, surgical intervention primarily achieves effective ocular alignment and satisfactory cosmetic outcomes. At the same time, recovery of functional binocular vision remains inherently limited. Although early postoperative alignment is typically favorable, patients remain susceptible to late recurrence, reflecting persistent sensory imbalance and reduced fusional capacity. These observations emphasize the critical importance of early identification and timely management during childhood, the sensitive period of visual development, to prevent irreversible sensory deficits. This case highlights the nuanced challenges in managing adult sensory exotropia and reinforces the necessity for individualized surgical planning. Future research with extended follow-up is warranted to delineate predictors of long-term surgical stability and to refine strategies for optimizing visual rehabilitation in adults with chronic strabismic amblyopia.

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