Case Series

Congenital and Acquired Malposition of Inferior Oblique

PJO – Official Journal of Ophthalmological Society of Pakistan

Fariha Taimur[1], Tayyab Afghani[2], Amna Manzoor[3]
Sumeya Ali Khan[4], Faizan Tahir[5]
[1-5]*Al-Shifa Trust Eye Hospital, Rawalpindi*

ABSTRACT

Purpose: To report and characterize malposition of the inferior oblique (IO) muscle observed during orbital surgeries for congenital and acquired pathologies.

Study Design: Descriptive case series.

Place and Duration of Study: Al- Shifa Trust Eye Hospital, Rawalpindi from June 2004 to June 2024.

Methods: In this study, all the patients who underwent orbital surgery during the 20 years, by one experienced orbital surgeon, were reviewed. Out of 1200 cases of orbital surgeries four cases were identified for the study. In all four cases, IO malposition was directly observed during orbital surgery. Pre-operative orbital imaging studies could not find the malposition. All surgeries were performed by the same surgeon under general anesthesia. In addition to the planned surgical procedure, an attempt was also made to re-position the abnormal-origin IO.

Results: Out of the four patients with IO malposition, there were two females and two males. Two patients presenting with congenital dermoid cysts had a normal birth history with no history of any surgery or trauma. The other two patients with acquired malposition had a history of trauma and previous surgery.

Conclusion: IO malposition is a rare entity. It is difficult to predict preoperatively so while performing orbital or strabismus surgeries, one should be careful and watchful to prevent damage to ectopic muscles.

Keywords: Inferior Oblique muscle, Congenital, Orbit, Extra ocular muscle.

How to Cite this Article: Taimur f, Afghani T, Manzoor a, Khan SA, Tahir F. Congenital and Acquired Malposition of Inferior Oblique. 2026;42(1):1-4. **Doi:10.36351/pjo.v42i1.2130**

Correspondence: Fariha Taimur
Al-Shifa Trust Eye Hospital, Rawalpindi
Email: drfarihaaslam@gmail.com

Received: June 16, 2025
Revised: September 10, 2025
Accepted: November 22, 2025

INTRODUCTION

IO muscle takes its origin near the anterior margin of the floor of the orbit posterior other im from the orbital surface of the maxilla lateral to the nasolacrimal groove. It inserts on to the globe posteriorly near the inferior border of the lateral rectus muscle. It makes an angle of 51 degrees with the globe in the primary position. The IO muscle externally rotates, abducts, and elevates the eye and isinnervatedbytheoculomotornerve.[1]Amongextraocular muscles,the IO most frequently shows anatomic variations, but that is also very rare.[2]In this article, we will discuss malposition of the IO diagnosed during orbitalsurgeries.Theindicationsforsurgerieswerebothcongenitalandacquiredpathologies.

METHODS

In this study, all the patients who underwent orbital surgery during the last20years, by orbital surgeon, were included and their charts were reviewed. The study was approved by the ethical review board of the institution **(ERC-22/AST-25)**. Out of 1200casesoforbitalsurgeries,four cases were identified to have IO malposition. In all four cases, the malpositionwasfoundduringorbitalsurgerybydirectobservation.Their medical records were reviewed which included age, gender, history, complete systemic and ophthalmic examination, pre-operative investigations including orbital imaging studies. All surgeries were

Table 1: *Four cases with Abnormal origin of the inferior oblique.*

	Case	Diagnosis	Site of origin of Inferior oblique
01	5-year-old, male	Congenital medial orbital dermoid	Medial orbital wall around 12 mm behind the orbital rim
02	4-year-old female	Congenital inferomedial orbital dermoid	Arising from the medial lobe of the multilobed dermoid cyst
03	35-year-old male	Traumatic Orbital floor fracture	Middle of the orbital floor from the inferior orbital margin
04	45-year-old male	Traumatic Orbital floor fracture	Middle of the orbital floor from the inferior orbital margin
	Normal Position of origin of inferior oblique		From the medial part of the orbital floor near the inferior orbital margin lateral to the lacrimal groove

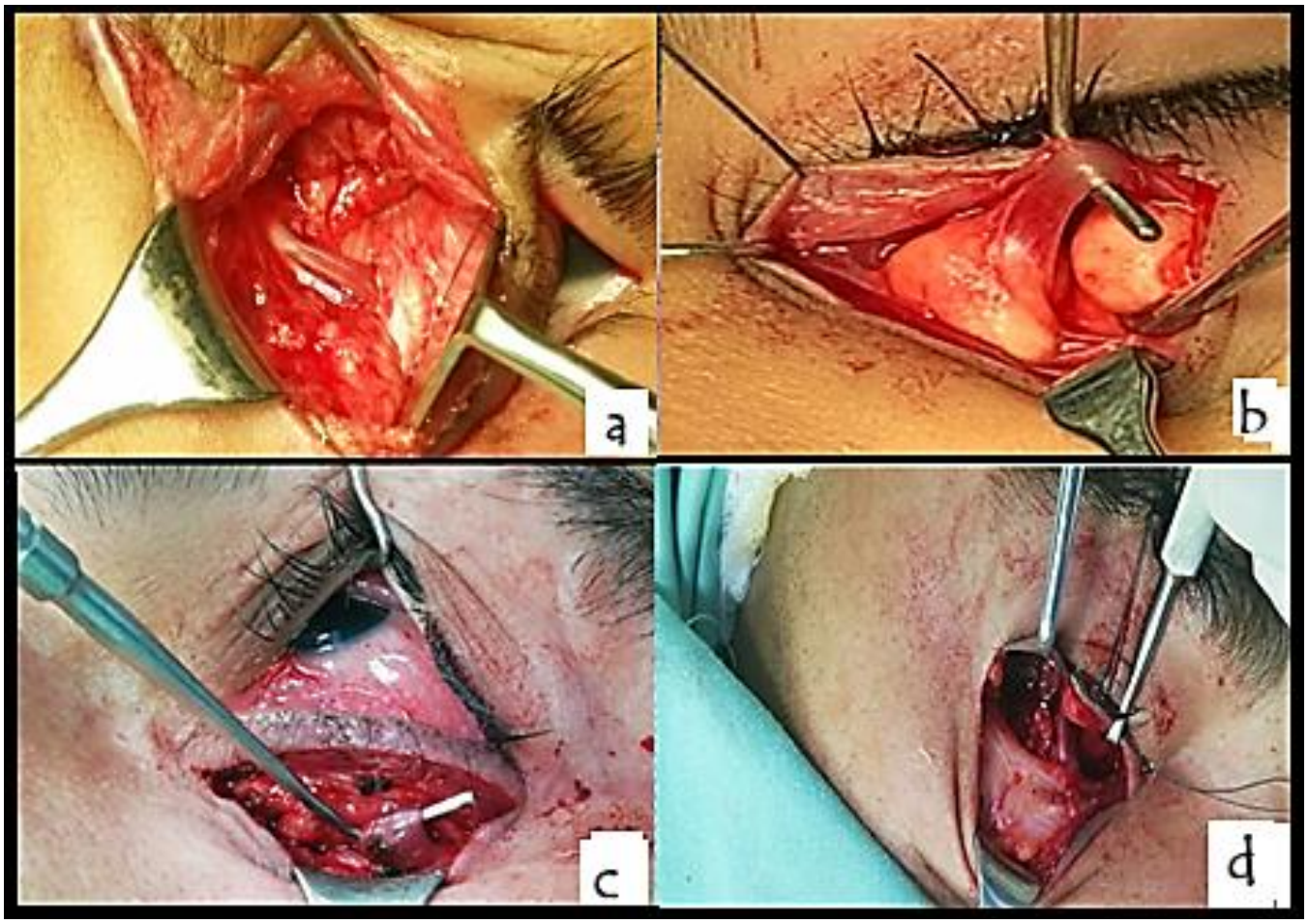

Figure 1(a): Case 1; abnormal origin of inferior oblique from the medial wall.**(b):** Case 2; inferior oblique arising from one of the lobes of the dermoid cyst.**(c) (d):** Case 3 and 4; inferior oblique taking its 'abnormal origin' from the middle of inferior orbital margin.

performed by the same surgeon under general anesthesia. In addition to the planned surgical procedure, an attempt was also made to re-position the abnormal-origin IO.

A five-year-old child presented with a congenital cystic lesion covering the left eyeball (Figure 1a) which was excised. In this case, the IO muscle was seen to be arising from the medial wall of the orbit. The muscle was found to originate 10-12mm behind the medial orbital margin, and going laterally, posteriorly, and downward. The muscle was making an angle of around 20° to its site of origin. The insertion of the muscle was at its normal site. In another case, during the excision of a trilobed dermoid cyst along the inferomedial wall of the orbit, the IO was seen to be arising from one of the lobes of the orbital dermoid (Figure 1b). The IO was dissected away from the dermoid cyst, and it was re-inserted to its normal anatomical position after excision of the dermoid cyst. In these two cases, congenital IO malposition was seen due to structural developmental anomalies.

Two patients presented to us with a history of trauma followed by orbital floor repair by a maxillofacial surgeon. Both complained of diplopia. On examination, in both cases, the eyeball was rotated upward and medially. We planned the patients for exploration surgery. During surgery, we found identical abnormal anatomy in both cases. The proximal part of the IO was seen to be glued to the inferior orbital margin up to its middle till it left the orbital margin moving towards its insertion to the globe. Although the IO had its normal anatomical origin, the abnormal adhesion of its proximal part to the orbital margin made the IO take its functional origin from the middle of the inferior orbital margin, (figure 1c, 1d) causing the unwanted deviation of the eyeball. The abnormally adherent muscle belly was detached from the orbital margin thus restoring the normal anatomical origin.

RESULTS

FourpatientsofIOmalpositionwereidentified, two femalesandtwomales.Inallpatients,theabnormaloriginof theIOwastheincidentalfindingduringthesurgery,whilepr eoperativeimagingstudiesdidnotprovideanycluetothese anatomicalvariations.Twopatientspresentingwithconge nitaldermoidcystshadanormalbirthhistorywithnohistory ofanysurgeryortrauma.Theothertwopatientswithacquire dmalpositionhadahistoryoftraumaandprevioussurgery. TheabnormalpositionsoftheIOinallfourcasesareoutline dinTable1.

DISCUSSION

IOdysfunctionanditsclinicalmanifestationsarewell-knownbutanatomicalvariationsarerarelyreported.Thisst udyretrospectivelyanalyzedtheanatomicalabnormalities ofextraocularmusclesincasesundergoingorbitalsurgerie s.Out of four cases with IO malposition, twocaseswereoperatedforcongenitaldermoidwithnohist oryoftraumaorsurgery,whiletwocaseshadahistoryoftrau maand previous urgery.

Literature showsvariousanatomicalvariationsoftheIOmuscle.Som e authors reported double bellies.[3,4]Inanothercase,amuscularbridgewasfoundbetw eentheIOandinferiorrectus.[5]Yet another case report describes IOtobearisingfromtheorbitalapexandinsertednearthein feriorrectus.[6]

Inclinicalpractice,anatomicalvariationoftheIOisara reentity or may be under-reported. Accurateper-operativediagnosisandproperrepositioningcan resultingoodsurgicaloutcomes.WangXiaojunreportedac aseof IOmalposition which was corrected surgically.[7]Linin2012reportedthreecasesofIOmalpositi on.Inonecase,theIOtendonwasanteriorlydisplaced,whil eintheothertwocases,theIObundlewassplitandfusedwith thelateralrectus.[8]QureshiandWatsonreported a unique case of absence of the IO.[9]

Inthefirsttwocases,webelievestructuralpathologies(congenitaldermoid)interferedwiththeextraocularmuscle developmentalteringtheirnormalanatomicalorigin.Thea bnormaloriginwasidentifiedduringsurgicalexploration, andthemusclewasreinsertedtotheirnormalanatomicalloc ation.InacquiredcasesofIOmalposition,eitherthetrauma orprevioussurgerycausedtheabnormaladhesionresulting inmalpositionoftheIOmuscle.Intheliterature, thereportedcasesaremostlyofabnormalorectopicIOinser tion.Inthisarticle,wediscussedthemalpositionofIOorigin causedbydevelopmentalabnormalitiesandacquiredcaus es.

The strengths of this study include long study duration (20 years) with a large pool of orbital surgeries (n=1200) reviewed by a single, experienced orbital surgeon, ensuring consistency in surgical technique and observation. Direct intraoperative visualization of inferior oblique (IO) malposition, provides reliable documentation of a rare finding and inclusion of both congenital and acquired cases, broadens the clinical spectrum of IO malposition. Moreover, detailed operative management, including attempts at re-positioning, adds practical clinical insight.

Although this condition is rare but small sample size of only 4 cases limit generalizability of the findings. The study was retrospective which can result in selection bias and reliance on operative notes. There was lack of standardized preoperative imaging correlation or postoperative functional outcomes (e.g., motility, diplopia, or long-term results).

CONCLUSION

IOL malpositionisa rareentity.Itisdifficulttopredictpre-operativelysowhileperformingorbitalorstrabismussurge ries,oneshouldbeverycarefulandwatchfultopreventdam agetoectopicmuscles.Musclemalpositionshouldbevigila ntly identified

andectopicmuscleshouldberepositionedtoitsnormalanatomicallocationforbestpostoperativeresults.

Funding: This study was not funded by any organization.

Patient's Consent: Researchers followed the guidelines set forth in the Declaration of Helsinki.

Conflict of Interest: Authors declared no conflict of interest.

Ethical Approval: The study was approved by the Institutional review board/Ethical review board **(ERC-22/AST-25).**

REFERENCE

1. **Shumway CL, Motlagh M, Wade M.** Anatomy, Head and Neck, Eye Extraocular Muscles. In: Stat Pearls. Treasure Island (FL): Stat Pearls Publishing; 2025 Jan-.Available from: https://www.ncbi.nlm.nih.gov/books/NBK519565/
2. **Jin ZW, Umeki S, Takeuchi Y, Yamamoto M, Murakami G, Abe S, et al.** Inferior oblique muscle of the eye: its foetal development with special reference to understanding of the frequent variants in adults. Folia Morphol (Warsz). 2022;**81(2):**442-450. Doi: 10.5603/FM.a2021.0043.
3. **Deangelis DD, Kraft SP.** The double-bellied inferior oblique muscle: clinical correlates. J AAPOS. 2001;**5(2):**76-81. Doi: 10.1067/mpa.2001.111780. PMID: 11304813.
4. **De Angelis D, Makar I, Kraft SP**. Anatomic variations of the inferior oblique muscle: a potential cause of failed inferior oblique weakening surgery. Am J Ophthalmol. 1999;**128(4):**485-488. Doi: 10.1016/s0002-9394(99)00225-1.
5. **Yalçin B, Kocabiyik N, Ozan H, Kutoglu T.** Muscular bridge between the inferior oblique and inferior rectus muscles. Am J Ophthalmol. 2004;**137(1):**121-124. Doi: 10.1016/s0002-9394(03)00787-6.
6. **Kocabiyik N.** Orbital muscles. In: Tubbs RS, Shoja MM, Loukas M, editors. Bergman's Comprehensive Encyclopedia of Human Anatomic Variation. 1st ed. Hoboken (NJ): Wiley & Sons; 2016. p. 207-211.
7. **Xiaojun W.** A case of congenital inferior oblique muscle ectopia in right eye. Chin J Ophthalmol. 1996;**32(4):**297. (In Chinese)
8. **Lin P.** Three cases of congenital abnormal inferior oblique muscle path. Chinese JPract Ophthalmol. 2014;**32(1):**96.
9. **Qureshi F, Watson NJ.** Congenital isolated absence of the inferior oblique muscle and compensatory aberrant insertion of the inferior and lateral recti. Semin Ophthalmol. 2011;**26(2):**50-51. Doi: 10.3109/08820538.2011.559514.

Authors Designation and Contribution

Fariha Taimur; Associate Professor: *Concepts, Design, Literature Search, Data Acquisition, Manuscript Preparation, Manuscript Editing.*

Tayyab Afghani; Professor: *Concepts, Design, Data Acquisition, Manuscript Editing, Manuscript Review.*

Amna Manzoor; Associate Professor: *Literature Search, Manuscript Preparation, Manuscript Editing.*

Sumeya Ali Khan; Assistant Professor:*Design, Literature Search, Manuscript Preparation.*

Faizan Tahir; Assistant Professor: *Literatures Search, Manuscript Preparation, Manuscript Editing.*