

Surgical Outcome of Disinsertion versus Myectomy for Eliminating Inferior Oblique Muscle Over-Action

Surgical
Outcome of
Disinsertion
versus Myectomy

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ABSTRACT

Objective: To compare the surgical outcome of disinsertion versus myectomy for eliminating inferior oblique muscle overaction.

Study Design: Experimental study

Place and Duration of Study: This study was conducted at the Al-Ibrahim Eye Hospital, Karachi from July 2021 to June 2022.

Materials and Methods: 80 patients with primary inferior oblique muscle overaction (IOOA) aged 6-20 years presenting to Al-Ibrahim eye hospital were included in the study after taking informed consent. A complete ophthalmic and orthoptic examination took place of all the patients, myectomy and disinsertion was performed on the patients by the same well experienced surgeon who had expertise in both these procedures. The follow up time period was 6 weeks and 12 weeks respectively with the data being collected on SPSS version 20.0. Chi-square test was used to determine the level of significance which was set at $p < 0.05$.

Results: 80 patients were part of the study, 39 (48.8%) were male and 41 (51.2%) were female with a mean age of 9.63 ± 3.21 years. On 38 (37.5%) patients myectomy was performed and on 42 (42.5%) patients disinsertion was performed. No significant difference was seen between grades of IOOA at 6 and 12 weeks of follow up ($p = 0.432$). No significant difference was also not seen between the two surgical procedures ($p = 0.173$).

Conclusion: Surgical outcome of disinsertion and myectomy both are equally effective and demonstrate no significant difference in eliminating inferior oblique overaction.

Key Words: Myectomy, Inferior Oblique muscle, Orthoptic

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INTRODUCTION

The eye is responsible for blessing us with vision because of which we are able to live and perform various tasks in our life. The movement of the eye provides us with vision as well as all the cooperation of our hand and body movements¹. Eye movement is controlled by both intraocular and extraocular muscles. There are seven extraocular muscles of the eyes, which include superior rectus, inferior rectus, lateral rectus, medial rectus, superior oblique, inferior oblique, and lastly the levator palpebrae superioris muscle². Of the extraocular muscles of the eye, the inferior oblique muscle presents with a pathology known as overaction.

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The inferior oblique muscle arises from the maxillary bone, lateral to lacrimal groove and has its insertion point at the posterior globe in proximity to the lateral rectus. The inferior oblique muscle is innervated by the oculomotor nerve (CNIII)³. Inferior oblique muscle overaction (IOOA) is a condition common to this extraocular muscle and is described as an overelevation during adduction⁴. IOOA is frequently correlated with horizontal deviations. The reports of IOOA are seen in patients with exotropia and esotropia. IOOA is further categorized into two types, primary and secondary⁵. Clinical features of primary IOOA include elevation of the involved eye on adduction, minor deviation vertically in the primary position, reduced head tilt, and finally a negative Bielschowsky test. Secondary IOOA features include major vertical deviation in the primary position, marked head tilt, on adduction elevation of the paralyzed eye, and lastly positive Bielschowsky test⁶⁻⁷. IOOA requires surgical treatment when the IOOA and strabismus interference with fusion or lead to esthetic problems⁸. There are multiple techniques through which IOOA can be surgically operated and successfully treated such as myectomy, disinsertion, recession, and anterior transposition⁹. Disinsertion and myectomy are the two most common of these

procedures performed widely and both have achieved great results in treating IOOA. As these two surgical techniques are the most widely used in treating IOOA, this study was conducted to determine the surgical outcomes of disinsertion and myectomy for elimination of inferior oblique muscle overaction.

MATERIALS AND METHODS

This experimental study was designed and conducted at Al Ibrahim eye hospital, Pediatric department Karachi. The study spanned for 12 months from July 2021 to June 2022. Using OpenEpi sample calculator, the sample size was determined as 80, keeping the confidence level at 95% and margin of error at 5%. The non-probability convenient sampling technique was used to find patients. Both sexes were included in the study with age range between 6 to 20 years. Patients that presented with primary inferior oblique over action unilateral or bilateral were included. Lastly, those patients that had an inferior oblique over action grading greater than grade 1 were included in the study. Patients with grade 1 were to be excluded. The inferior oblique over action grading is as follows:

- Grade 1- up to 15° angle with the horizontal line
- Grade 2- up to 30° angle with the horizontal line
- Grade 3- up to 60° angle with the horizontal line
- Grade 4- up to 90° angle with the horizontal line

Patients with craniofacial anomalies, neurological anomalies, history of squint surgery, dissociated vertical deviation, and incomitant squint were also not included in the study. Once ethical approval was taken from the institutional review board, patients matching the inclusion criteria were selected that presented to the OPD. All patients included in the study were informed about the participation in the study and written informed consent was obtained from the patients or their respective guardians. Patients who agreed to take part in the study underwent a complete ophthalmic and orthoptic examination. Both surgical procedures (disinsertion and myectomy) were performed by one surgeon who had expertise in both these procedures and had an overall experience of more than 10 years. The follow-up time was between 6 weeks and 12 weeks after surgery. Data was collected on a proforma and analyzed using Statistical package of social sciences (SPSS) 20.0. For quantitative variables data was presented in mean and standard deviation, while for qualitative variables frequency and percentage was used. Modifiers like age and gender were controlled using stratification. The chi square test was used to determine the level of significance, which has been set at <0.05.

RESULTS

Table 1: Shows the frequency and percentage of gender
 Table 2: Shows the mean and standard deviation of age

Table 3: Shows the frequency and percentage of type of squint

Table 4: Shows the frequency and percentage of grade of IOOA

Table 5: Shows the frequency and percentage of IOOA grading after 6 weeks of follow up

Table 6: Shows the frequency and percentage of IOOA grading after 12 weeks of follow up

Table 7: Shows the frequency and percentage of surgical procedure performed

Table 8: Shows the association of grades of IOOA with 6 weeks of follow up, no significant difference (p=0.432) was seen when comparing to grades with follow-up

Table 9: Shows the association of grades of IOOA with 12 weeks of follow up, no significant difference (p=0.432) was seen when comparing to grades with follow-up.

Table No.1: Shows the frequency and percentage of gender

Gender	Frequency (Percentage)
Male	39 (48.8%)
Female	41 (51.2%)
Total	80 (100%)

Table No.2: Shows the mean and standard deviation of age

Mean	N	Std. Deviation
9.63	80	3.215

Table No.1: Shows the frequency and percentage of type of squint

Type	Frequency (Percentage)
Hypertropia	35 (43.8%)
Esotropia	24 (30%)
V-pattern esotropia	2 (2.5%)
Alternate esotropia	19 (23.8%)
Total	80 (100%)

Table No.4: Shows the frequency and percentage of grade of IOOA

Grade	Frequency (Percentage)
2	6 (7.5%)
3	30 (37.5%)
4	44 (55%)
Total	80 (100%)

Table No.5: Shows the frequency and percentage of IOOA grading after 6 weeks of follow up

Frequency	Percentage
78	97.5%
2	2.5%
80	100%

Table No. 2: Shows the frequency and percentage of IOOA grading after 12 weeks of follow up

Frequency	Percentage
78	97.5%
2	2.5%
80	100%

Table No.7: Shows the frequency and percentage of surgical procedure performed

Procedure	Frequency (Percentage)
Myectomy	38 (47.5%)
Disinsertion	42 (52.5%)
Total	80 (100%)

Table No.8: Shows the association of grades of IOOA with 6 weeks of follow up

	6 weeks after follow-up		Total	p-value
Grade 2	6	0	6	0.432
Grade 3	30	0	30	
Grade 4	42	2	44	
Total	78	2	80	

Table No.9: Shows the association of grades of IOOA with 12 weeks of follow up

	12 weeks after follow-up		Total	p-value
Grade 2	6	0	6	0.432
Grade 3	30	0	30	
Grade 4	42	2	44	
Total	78	2	80	

DISCUSSION

In cases of esotropia and exotropia, the occurrence of IOOA is the highest, especially if these conditions are to coexist in either an A-pattern or V-pattern occurring due to dysfunction of the inferior oblique muscle. When both the A-pattern and V-pattern lead to dysfunction, then the correct course of treatment for IOOA is surgical¹⁰⁻¹². Multiple studies have been carried out to investigate the superiority of the operations, however, none of them are considered the gold standard for IOOA correction. This study was designed to determine the surgical outcomes of both myectomy and disinsertion related to the elimination of inferior oblique muscle overreaction. A total of 80 patients were in this study, with 39 male and 41 female included in the study. Females were more in the study than males, a finding like another cohort study of 51 patients that had 25 males and 26 females¹³. The mean and standard deviation of the 80 patients were 9.63 ± 3.21 . A similar study had 74 patients with a mean age of 13 ± 11.7 years¹⁴. Myectomy and disinsertion was performed in 38 (47.5%) and 42 (52.5%) patients respectively. After follow up of 6 and 12 weeks all of the patients included

in the study showed significant improvement and all had correction of inferior oblique overaction to grade 0, except for 2 who were in grade 1. When comparing the grades of IOOA and their association with follow-up of 6 and 12 weeks, no significant difference ($p=0.432$) was observed. Both disinsertion and myectomy showed great results and there was no significant difference when comparing both of the two procedures and their surgical outcomes with a p-value of 0.173. A similar finding was seen in a study by Aghdam et al who employed 36 patients with a mean age of 12.67 ± 4.05 years. The correction of abnormal fundus torsion of both procedures was non-significant ($p=0.821$), while in the normal range of torsional position postoperatively was also non-significant ($p=0.786$), with the study concluding that both the surgical techniques are equally effective in treating IOOA¹⁴. Another study comparing myectomy, anteriorization, and recession was carried out to compare the surgical outcomes and found that there was no difference once again among the type of surgery and outcome¹⁵. Both myectomy and disinsertion can achieve great results in treating IOOA. A success rate of 88% for primary IOOA and a success rate of 72% for secondary IOOA has been reported for disinsertion. Furthermore, a success rate of 73.6% has been reported for infantile esotropia and primary IOOA using disinsertion¹⁶⁻¹⁷. Another study also conducted on 50 patients showed that both myectomy and recession have satisfactory results and that both have a similar success rate¹⁸. It can be safe to say that both disinsertion and myectomy both produce similar results when treating IOOA. Future studies can be done to compare recession and anterior transposition with myectomy and disinsertion as well. However, both these procedures are safe and produce sound clinical results. Although, whenever performing IOOA surgery good treatment planning and an experienced surgeon that has the necessary skills to perform IOOA surgical procedures must be deployed.

CONCLUSION

The surgical outcome of disinsertion and myectomy for eliminating inferior oblique muscle overaction is similar without and significant difference. Both display similar clinical success and result in elimination of inferior oblique muscle overaction.

Author's Contribution:

Concept & Design of Study: Saira Bano
 Drafting: Sadia Bukhari, Israr Ahmed Bhutto
 Data Analysis: Faiza Rameez
 Revisiting Critically: Nasir Ahmed, Saira Bano
 Final Approval of version: Attiya Zahra Rizvi

Conflict of Interest: The study has no conflict of interest to declare by any author.

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