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SURGICAL MANAGEMENT OF CONSTANT EXOTROPIA AT TERTIARY EYE CARE CENTRE

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ABSTRACT

OBJECTIVE: *To determine the post surgical stability of ocular alignment in constant exotropia.*
DESIGN: *Retrospective observational clinical analysis.*
SETTING AND PERIOD: *Department of ophthalmology, Unit-III. Liaquat University Eye hospital, Hyderabad from January 2003 to December 2008.*
METHODS: *This study was conducted on patients of all ages with socially noticeable exodeviation undergoing strabismus surgery. Anterior segment slit lamp examination and if possible posterior segment examination with 90 D and 78 D fundoscopes was performed. Angle of deviation was measured in prismatic diopters (PD). Surgical intervention was carried out under general anesthesia. Single surgery was performed on each registered patient. Postoperative follow-up was done at 3 days, 15 days, 3 months and 6 months.*
RESULTS: *Thirty five patients underwent surgical correction of exotropia. Twenty seven (77.1%) completed post-operative follow up of six months. 66.6% subjects retained orthophoria after surgery. 18.6% patients experienced residual deviation and 14.8% exhibited consecutive deviation at sixth month post-operative follow up.*
CONCLUSION: *The timely surgical correction of exotropia successfully restores visual alignment, binocular function and a high degree of patient's satisfaction.*

KEY WORDS: Exodeviation; surgical management; orthophoria.

INTRODUCTION

Strabismus is an ophthalmic syndrome characterized by a deviation of visual axis from bi-foveal fixation. It is a common problem in ophthalmology. The global prevalence of strabismus ranges from 3% to 5 %.[1, 2] According to one racial survey, the strabismus was detected in 2% to 4% of white population, 0.6 % in Asians [3] and Africans. [4] In a study from Sydney Australia the prevalence of strabismus was found in 48 patients (2.8% of total population). [5] In one local survey among Afghan refugees in Pakistan, the squint was detected in 1.4% subjects.[6] In another local study from Peshawar in 2004 the over all prevalence of strabismus was 2%. [7]

Exotropia is more common than esotropia in Asians and Africans. [8] In white population exodeviation is known to be rare in comparison to esodeviation. [9] The patients suffering divergent axis deviation for longer periods without treatment frequently develop amblyopia. [10]

The management of exotropia follows proper assessment, treatment of amblyopia, correction of refractive errors and surgery. The first surgery on strabismus was performed by a general surgeon Johann Friederich Dieffenbach in 1839. [11]

The ocular alignment of visual axis by surgical intervention in exodeviation becomes necessary when conservative treatment does not favor. The surgical intervention can help patient towards realigning the deviated eye ball [12], improvement of Diplopia, restoration of three dimensional visions, and widening of visual fields.

Different authors have suggested the techniques for surgical correction of exotropia. Bilateral lateral rectus recession is recommended for the subjects having good visual acuity in both eyes. [13] Lateral rectus recession and medial rectus resection in one eye is performed in exodeviation associated with amblyopia.[14]

We decided to evaluate the surgical approach and success rate of exodeviation because the previous data is not available or imprecisely documented in this region.

SUBJECTS AND METHODS

This is a retrospective clinical analysis conducted on the patients of both sexes presenting for the first time at a tertiary eye care centre. The study involved all cases of constant concomitant exotropia operated within the study period. All the subjects suffering constant concomitant exotropia with deviation under 75 PD without any associated vertical deviations were included.

The patients with history of paretic or restrictive extra ocular muscle element, nystagmus, angle deviations of more than 75 PD, prior strabismus surgery and consecutive deviation, with evidence of intra-ocular disease and any neurological involvement were excluded from this study. Initial examination was performed in out patient department by two permanently posted senior ophthalmologists and four medical officers. After getting informed consent, the subjects were assessed for;

a- General History including age, sex, residency, occupation, use of corrective lenses, eye affected. The children within ten years were enquired for the past photographs to exclude developmental element.

b- Best-corrected visual acuity, for dominant (fixating eye) and squinting (non-fixating) eye, using Snellen's chart and E-chart for illiterate children,

c- Slit lamp biomicroscopy, and applanation tonometry,

d- Dilated indirect ophthalmoscopy by 90D and 78D fundoscopes.

e- Ocular movements including versions and ductions in co-operative patients,

f- Measurement of deviation in prismatic diopter for both distance and near vision with and without correction as;

- The deviation was measured by prism and cover test for near (33 centee meters) and far (6 meters) distance using MSD Berens No. 14 prism bar and a fixation target in the subjects having good bilateral visual acuity. The deviation by modified Krimsky test was measured in patients with poor vision or dense amblyopia and children less than five years whom the measurement for distance was not possible.

g- The error of refraction was studied by skiascopy under cycloplegia using cyclopentolate 1% eye drops in children, and tropicamide 1% eye drops in adults. In children the element of accommodative component of more than 2.0 diopters was excluded pre-operatively through skiascopy.

h- Pre-operative amblyopia (difference of 2/10 or more between the two eyes) was determined using 2003 Clement Clarke Synoptphore.

TABLE - I :
GENERAL CHARACTERISTICS OF PATIENTS WITH CONSTANT EXOTROPIA: (N=35)

Sex	N/O Patients	Percentage %
Male	16	45.7
Female	19	54.3
Age in Yrs		
up to 20	13	37.2
21 to 40	17	48.6
41 to 60	05	14.2
Residency		
Rural	09	25.8
Urban	26	74.2
Use of lenses	14	40.0
Financial Status		
Upper	02	05.7
Middle	12	34.3
Lower	21	60.0

TABLE – II:
CLINICAL ANALYSIS AS PER SURGICAL PROCEDURE:
N = 27

Procedure	Orthophoria	Residual Sq.	Consecutive Sq.
Monocular MRS&LRC	9 Pts (33.3%)	2 Pts (7.4%)	2 Pts (7.4%)
Bilateral LRC	5 Pts (18.5%)	Nil	Nil
Bilateral LRC & One MRS	4 Pts (14.8%)	3 Pts (11.2%)	2 Pts (7.4%)
Total	18 Pts (66.6%)	5 Pts (18.6%)	4 Pts (14.8%)

N = Total number of patients; Sq = Squint; MRS = Medial Rectus Resection; LRC = Lateral Rectus Recession; Pts = Patients.

After admission routine investigations including blood complete picture, bleeding and clotting time, detailed urine analysis, X-Ray chest etc were carried out. The patients and concerned personnel were informed about the surgical out come and possible need of a second surgery. Prophylactic antibiotic ophthalmic drops e.g., Ofloxacin and Chloramphenicol were used three to four hours interval a day before surgery. All subjects were operated under general anesthesia. All patients underwent one single operation by one senior ophthalmic surgeon who performed the surgery during study period.

The surgical procedure thus employed consisted of recession and resection of horizontal recti muscles as;

The muscle was exposed by a limbal conjunctival incision with two radial relieving incisions. Muscle was then separated from its attachments by round edge curved conjunctival scissors and undermined with muscle hook. Two whip stitches were taken with 6'0 poly gelactin 910 absorbable sutures at the upper and lower edges of muscle near its insertion during recession, and away from insertion in muscle cone during muscle resection.

The muscle was cut near its insertion during recession and away from insertion during muscle resection and allowed to retract. Sutures were brought out of conjunctival incision and left loose with one edge at 12 O'clock and other at 6 O'clock position in opposite directions. The recession was measured with a caliper from the muscle



Figure: I-
23 years lady with right eye constant exotropia. (Junejo)



Figure: II-
37 years male with right eye constant exotropia. (Junejo)



Figure:III-
23 years lady after surgical correction of right exotropia.
(Junejo)



Figure:IV-
37 years male after surgical correction of right exotropia.
(Junejo)

insertion posteriorly and the muscle was sutured directly on sclera by piercing sclera with both the upper and lower suture needles facing each other. The needles were passed gently through half thickness sclera under resistance without penetrating deep in to uveal tissue. The smooth passage of a needle through sclera without resistance is the sign of uveal penetration. As the sutures were tied the retracted muscle pulled and brought forward to become adherent with the site of attachment. In case of muscle resection the retracted muscle was sutured at its anatomical insertion. Conjunctiva was closed with interrupted absorbable sutures. The antibiotic mixed steroid eye ointment (neomycin with betamethasone) was applied and the eye bandaged for 24 hours.

6 to 8 mm recession was performed on lateral rectus and 5 to 7 mm resection was planned on medial rectus muscle.

The surgical procedures thus carried out were;

Procedure No: 1 - Monocular medial rectus resection and lateral rectus recession,

Procedure No: 2 - Bi-lateral lateral rectus recessions,

Procedure No: 3 - Bi-lateral lateral rectus recessions combined with medial rectus resection in the more squinting eye.

On every post operative out patient follow up visit complete orthoptic assessment was done, including visual acuity, measurement of angle of deviation along with patients photograph. The final best-corrected visual acuity and angle of deviation was documented on sixth month post treatment follow up. All patients were requested to complete postoperative follow up criteria of this study.

RESULTS

A total of eight thousand and five hundred patients (approximately) visited out patient department within the study period. One hundred and three (1.21%) subjects presented with strabismus (esotropia and exotropia). Out of which forty seven patients (45.6%) with exodeviation full filled the study criteria. Twelve subjects refused to under go surgical intervention, while remaining thirty five were selected for surgery. The documentation of successful surgery (orthophoria) was done as an immediate post-operative esotropia of 15 PD or less, residual and consecutive squint as angle deviation more than 15 PD at sixth month post-operative follow up. The general characteristics of selected patients are shown in table- I.

Out of thirty five subjects, eleven (31.4%) had exodeviation less than 30 PD. Seventeen (48.6%) patients had exodeviation more than 30 PD and less than 50 PD. Seven (20.0%) subjects presented with exodeviation more than 50 PD and less than 75 PD (Figure-I, II). Five patients had developed amblyopia. Nineteen (54.2%) patients were operated by monocular medial rectus resection and lateral rectus recession. Six (17.2%) subjects were operated by bilateral lateral rectus recession, and remaining ten (28.6%) by bilateral lateral rectus recession combined with medial rectus resection.

Eight subjects were lost to follow up while remaining twenty seven out of thirty five

patients who underwent strabismus surgery attended post-operative out patient visits for six months.

The surgical success of patients (Figure-III, IV) operated through different procedures and those who exhibited residual and consecutive deviation is summarized in table-II.

Four (14.8%) subjects out of twenty seven developed suture related foreign body granuloma, which resolved within few weeks during the course of treatment. Two patients who underwent three muscle surgery experienced limitation in ocular movements. All the patients who exhibited residual and consecutive deviations were advised secondary surgical intervention after six months of follow up.

DISCUSSION

In this study our aim of performing strabismus surgery was to realign deviated eye ball by various surgical techniques. We performed monocular recession and resection of horizontal recti as this method is a recommended procedure for the patients suffering monocular concomitant squint and amblyopia. This technique avoids manipulation of a dominant eye and reduces surgical time.[15, 16]

Some times it becomes hard enough to get the eyes visually aligned by operating on one eye due to larger deviations. At this stage second surgery on dominant eye or binocular strabismus surgery involving more than two horizontal recti is the most widely used approach. [17] This technique also avoids limitation in ocular movements.[17, 18, 19] In this series we obtained compromising results by operating on three muscles in the patients with deviations of more than 50 prismatic diopters.

For surgical correction of exotropia bilateral lateral rectus muscle recession has also been generally used. This method can help an ophthalmic surgeon to improve results on secondary surgical procedures. [20] In the surgical management of exodeviation, an initial overcorrection is necessary to avoid post-operative exotropic drift. [21] In this study we considered post-operative esodeviation of 15 PD or less as orthophoria.

Some times there is an increased tendency of developing a consecutive esodeviation after primary exotropia surgery. Therefore the operating surgeon has to be very careful before planning the amount of muscle adjustment and surgical technique. [22]

The problem of limitation in ocular movements is usually encountered, after large recessions. Different authors strongly recommend not exceeding 7 mm recession on medial rectus and 8 mm recession on lateral rectus muscle to prevent ocular movement deficits.[23]

Development of Amblyopia is a major problem in long standing untreated exodeviation, because most of the times patients do not allow surgery on their concerned eyes. Traditional beliefs, cultural and socioeconomic factors also hamper the acceptance for surgery by patients. [24] In this study five subjects with large angle exotropia developed amblyopia probably due to ignorance or delay in the management. In this series we obtained a satisfactory surgical success rate of 66.6%, which is quite consistent with the results of different authors i.e. Côme Ebana Mvogo in 2007 with the outcome of 68.3% [10], Aslanis et al in 2006 with successful results of 69.0%. [20,] and Livir-Rallatos et al in 2002 having 71.0% outcome.[16]

As exotropia is more prevalent in Asians and if untreated can result in to many untoward effects, we ought to pay more attention on timely surgical management and follow up.

CONCLUSION

Monocular surgery is quite instrumental for exotropia of less than 50 prismatic diopters. It can also be satisfactorily performed in exotropia associated with amblyopia. Operating on three muscles successfully restores primary visual alignment, low incidence of ocular movement deficits and a high degree of patient satisfaction.

REFERENCES

1. Arora A, Williums B, Arora AK. Decreasing strabismus surgery. Br J Ophthamol 2005; 89: 409-12.
2. Abrahamsson M, Magnusson G, Sjostrand J. Inheritance of strabismus and the gain of using heredity to determine population at risk of developing strabismus. Eye 2002; 16: 519-21.
3- Hu DN. Prevalence and mode of inheritance of major genetic eye diseases in China. J Med Genet.1987; 24:584-588.
4- Abrahamsson M, Magnusson G, Sjostrand J. Inheritance of strabismus and the gain of using heredity to determine populations at risk of developing strabismus. Acta Ophthalmol Scand.1999; 77:653-657.
5- Dana Robaei, Kathryn A.Rose, Annette Kifley et al. Factors Associated With Childhood Strabismus: Findings from a Population-Based Study. Ophthalmology 2006; (113); 1146-1153.
6- H.R Awan and T. Ahsan. Prevalence of Visual Impairment and Eye Diseases In Afghan Refugees in Pakistan. Eastern Mediterranean Health Journal 1998 Vol-4(3); 560-566.
7- Nisar Ahmed, A.H Aamir, Iqbal Hussain, et al. Annual Prevalence of Various Diseases in Hospitalized Patients in a Tertiary Level Teaching Hospital at Peshawar. Pak J Med Res. 2004; 43(4):166-71.
08- Ebana Mvogo C, Ellong A, Owona D, et al. L'amblyopie chez le strabique en milieu camerounais. Bull Soc Belge Ophtalmol. 2005; 297:39–44.
09- Quere MA, Bouchut P. Les exotropies primitives. In: Bouchut P, Bourron M, Jeanrot N, et al., editors. Les exotropies. Nantes: Publisher; 1993. pp. 4–14.
10- Côme Ebana Mvogo, Assumpta Lucienne Bella, Augustin Ellong, et al. Surgical management of primary exotropia in Cameroon. Clin Ophthalmol. 2007 December; 1(4): 471–474.
11- Cooper J, Medow N. Major review, Intermittent Exotropia, Basic and Divergence Excess Type. Binocular Vision Eye Muscle Surgery. 1993; 8: 185-216.
12- Ko-i Chun, Sang-hoon Rah. The Comparison of Outcomes Between Lateral Rectus Muscles Re-recession and Medial Rectus Muscles Resection in Recurrent Exotropia. Korean J Ophthalmol. 2008 June; 22(2): 111–114.
13- Berland JE, Wilson ME, Saunders RA. Results of large (8–9 mm) bilateral lateral rectus recessions for exotropia. Binocular Vision Strabismus Q 1998; 13: 97–104.
14- Velez G. Surgical treatment of exotropia with poor vision. Strabismus II. Proceedings of the Fourth Meeting of the International Strabismological Association, 1984, pp 263–267.
15- Celebi S, Kukner AS. Large bilateral lateral rectus recession in large angle divergence excess exotropia. Eur J Ophthalmol 2001; 11(1):6–8.
16- Livir-Rallatos G, Gunton KB, Calhoun JH. Surgical results in large-angle exotropia. J AAPOS. 2002; 6(2):77–80.
17- Amitava AK, Goswami AK, Mishra A. Large-angle strabismus and primary true muscle transplantation. J Pediatr Ophthalmol Strabismus 2005; 42(4):211–5.
18- Currie ZI, Shipman T, Burke JP. Surgical correction of large-angle exotropia in adults. Eye 2003; 17(3):334–9.
19- Forrest MP, Finnigan S, Finnigan S. Three horizontal muscle squint surgery for large angle infantile esotropia. Clin Experiment Ophthalmol 2003; 31(6): 509–516.
20- Aslanis D, Follidi V, Constantopoulos I, et al. Résultats chirurgicaux des xotropies primitives concomitantes à grand angle chez les enfants. J Fr Ophtalmol. 2006;29:37–42.
21- Maruo T, Kubota N, Sakaue T, Usui C: Intermittent exotropia surgery in children: Long-term outcome regarding changes in binocular alignment. A study of 666 cases. Binocul Vis Strabismus Q 2001;16:265-270.
22- Se-Hwan Jung, Sang-Hoon Rah. The Clinical Course of Consecutive Esotropia

after Surgical Correction. Korean J Ophthalmol. 2007 December; 21(4): 228–231.
23- Tatiana Millán, Keila Monteiro de Carvalho, and Nilza Minguini. Results of Monocular Surgery under Peribulbar Anesthesia for Large-Angle Horizontal Strabismus. Clinics 2009; 64(4): 303–308.
24- Ndongo JA. Traitement chirurgical du strabisme en milieu camerounais. Thèse médecine, Yaoundé, mars 2006.