



Treatment Outcomes in Concomitant Esotropias

Authors

Dalia S¹, Anitha.S²

¹Email: drsdalia@yahoo.co.in, +919447142877

²Email: dranithab@rediffmail.com +919847022762

Corresponding Author

Dalia S

Shanti Bhavan, Near South Panchayath Office, Punnapra, Alappuzha, Kerala, India, Pin: 688004

Abstract

Purpose: To assess the outcome of various treatment modalities of concomitant esotropias.

Design: Prospective randomized population based study.

Materials & Methodology: 100 patients who attended squint clinic of Regional institute of Ophthalmology, Thiruvananthapuram were included in the study.

Results: Of the 100 cases in our study, 31% had amblyopia at presentation of which majority (61.29%) improved with occlusion therapy (improvement of 2 lines or more). Of the patients treated by non surgical methods (19 patients), 84.21% & 73.68% attained acceptable anatomical outcome and some form of BSV respectively by treatment. Of the surgically treated group not much difference in motor alignment was noted by symmetrical bimedial recession (70.21%) or asymmetrical recession-resection (67.86%) surgery for esotropia. The refractive status after surgery showed a Myopic change in both spherical and astigmatic component, but only meridional equivalent at 180° was statistically significant (-0.21 ± 0.28).

Conclusion: From the study it is evident that conventional occlusion therapy is a simple and cost effective treatment for amblyopia. Ideal treatment by non-surgical or surgical methods or combination of both if advocated early will help to attain acceptable anatomical and sensory outcome thus eliminating or else decreasing the density of amblyopia.

Keywords: Concomitant Esotropia, Amblyopia, Bimedial Recession, Recession-Resection.

Introduction

Strabismus is a significant problem both in paediatric and adult age groups because of its visual disability and cosmetic disfigurement. The crux of the problem lies usually in very late diagnosis because of social misconceptions and parental ignorance. Its treatment is central and vital not only to the visual development of the child but also has tremendous implications on the child's mental and social development.

Concomitant esotropia is one of the most common form of strabismus especially in children. The prompt recognition and timely intervention will save many patients from the crippling consequences of monocular vision. Since it was felt to be a significant health issue, a study was deemed necessary to evaluate the impact of the problem and the effectiveness of available management protocols.

Aims of the Study

To assess the outcome of various treatment modalities in concomitant esotropias.

Materials and Methodology

100 patients who attended the squint clinic of Regional Institute of Ophthalmology, Thiruvananthapuram were included in this prospective study. Those cases of esotropia operated earlier were excluded. Also those with a paralytic or restrictive component were not included in the study. The clinical examination included a general and systemic examination, examination of visual acuity with Snellen's visual acuity chart in verbal, Cambridge crowding card matching test in pre - verbal children. The ability to fix and follow lights and any resistance to occlusion was recorded in the case of infants. The refraction was carried out under full cycloplegia. Orthoptic assessment included measurement of angle of squint by the Hirschberg test and prism bar cover test for near and distance. Sensory status was assessed using Bagolini's striated glasses and if BSV was present it was graded using Synoptophore slides. Ocular movements were accurately noted and any abnormal movements, DVD, Nystagmus, pattern deviation were noted. AC/A ratio and fusional vergence were recorded in required cases. Anterior segment and fundus were examined in detail to detect any pathology and to assess the type of fixation.

The patients were treated either surgically, non surgically or a combination of both depending on individual cases as per standard guidelines. Non surgical treatment included correction of refractive error, prescriptions of bifocals in cases with increased AC/A ratio, occlusion therapy in cases with Amblyopia. Surgical treatment included either bilateral medial rectus recession or unilateral MR recession and LR resection or bilateral MR recession combined with LR resection of one eye.

Regular follow up of all patients were done at 1 month, 3 months, 6 months and 1 year interval. Post operative reassessment was done on the first

post operative day and after 1 week. In the follow up visits, special emphasis was given to assessment of visual acuity, refraction, angle of deviation, sensory status, fusional vergence and presence of any surgical complications. The treatment was modified accordingly and final outcome of treatment was recorded.

Observation & Results

In this study maximum number of patients were below 5 years of age ie; 51 patients. This was followed by 5-15 years age group which made 46% of the study group. Only 3 patients (3%) had an age of presentation above 15 years. Minimum age of presentation was 6 months and maximum was 24 years.

Of the 100 cases studied 58 patients (58%) had associated refractive error. Of these hypermetropia constituted the largest group with 32 patients (55.17%). 22 cases belong to the partially accommodative type. The purely refractive types were highly hypermetropic of the range of +7.000. Astigmatic shift in refraction was noted in 19 cases (32.76%). There were 7 cases with Myopia (12.07%), of which 4 cases were of the Basic type with moderate to high Myopia. Correction of refractive error partly or fully corrected the deviation in these cases.

Incidence of Amblyopia: 31 patients (31%) had Amblyopia at presentation.

Table .1 Age of presentation of Amblyopia

Age	< 5 years	6- 10 years	> 10 years
No of cases	7	16	8
Percentage	22.58	51.67	25.8

More than half of patients belong to 6 to 10 years of age rest were almost evenly distributed to less than 5 years and more than 10 years age group.

Table -2 Amount of Deviation (Measured by PBCT)

Deviation (PD)	No of cases
<20	2
20 - 40	32
41-60	51
>60	15

Majority of patients had deviation between 40 to 60 PD (51%). 32 patients had deviations between 20 and 40 PD. 15 Patients had very large angle of deviation of more than 60PD. In some of these patient, part of the deviations could be corrected by prescription of spectacles, the residual amount requiring surgery. 6 out of these patients required surgery on 3 muscles.

After giving full refractive correction, these patients were advised either part time or full time total occlusion depending on density of Amblyopia and the compliance. These patients were followed up initially fortnightly and then monthly. Those patients who underwent surgery were given pre- operative occlusion and in required cases continued post- operatively also

Table 3 Presenting visual acuity

Visual acuity	6/60 or less	6/36 - 6/24	6/18 - 6/12
No of cases	12	15	4
Percentage	38.7	48.39	12.9

Table 4 Visual Acuity at last follow up

Visual acuity	6/60 or less	6/36 6/24	6/18 6/6
No of cases	8	7	16
Percentage	25.81	22.58	51.61

19 patients (61.29%) improved for two lines or more in visual acuity whereas 12 patients

Table 5 Treatment Modalities

Non surgical	Surgical			Surgical & Non surgical	
	Bimedial recession	Recession / resection	3 muscle surgery	Bimedial recession	Recession/ resection
19	34	19	6	13	9
19	59			22	

Out of the 81 patients who underwent surgery Bimedial recession was done in a total of 47 patients (56.79 %). Unilateral recession- resection was attempted in 28 patients (37.03 %). 6 patients (6.17%) underwent 3 muscle surgery with Unilateral recession- resection with MR recession in other eye as the angle of squint were very large in these patients. Of the 19 patients who were given non surgical treatment with either refractive correction of Hypermetropia, Myopia or Astigmatism or bifocals in patients with increased AC/A ratio, there were 3 patients who belonged to partially accommodative variety who required surgery but were not willing for the same.

(38.71%) showed no improvement. Compliance was better in older age group than younger ones. Poor vision at the start of treatment was also associated with poor compliance. In the visual acuity group of 6/18 – 6/6, the number of patients after occlusion therapy increased to 16 (51.61%) from 4 (12.9%).

Treatment Modalities

After proper evaluation and diagnosis, appropriate therapy was instituted in each case as per standard guidelines. Full acceptable refractive correction was given to all required patients. Residual squint after refractive correction was treated by surgery. Patients with high AC/A ratio were prescribed executive bifocals with the bisecting line intersecting the pupil. Surgical treatment was either Bimedial recession in patients with free alternation and equal visual acuity in both eyes. or unilateral recession- resection in the non dominant eye in other cases. In cases with very large of deviation, 3 muscles were tackled as a first step itself. In cases with refractive errors the need for post operative spectacles was emphasized to the parents prior to surgery itself.

Change in Refractive status following surgery Pre operative and post operative refractive was compared in terms of spherical equivalent and cylindrical power. The results were statistically analysed with the help of unpaired T-test and paired T-test.

Table -6 Change in spherical equivalent (in Diopters)

Time	AV + SD
1Week	-0.08 ± 0.5
4 Weeks	-0.01± 0.52
12 Weeks	-0.01± 0.52
6 Months	-0.01 ± 0.49

Table -7 Change in Cylinder power at 180° and 90° (in Diopters, all cylinder transposed to minus form)

Time	AV + SD	
	180°	90°
1 Week	-0.32 ± 0.02	-0.14 ± 0.20
4 Weeks	-0.21 ± 0.28	-0.11 ± 0.22
12 Weeks	-0.22 ± 0.31	-0.10 ± 0.23
6 Months	-0.22 ± 0.30	-0.11 ± 0.24

There was a deviation in the uncorrected visual acuity post operatively which took about 4-6 weeks to stabilize. BCVA improved in 86.67% of patient post-operatively at 12 weeks follow up and continued the same after 1 year also. The spherical equivalent showed a myopic trend which was maximum in the first post operative week. It stabilized by 4 - 6 weeks and was persisting at 12 weeks post-operatively. Average change was -0.01 ± 0.52 . The differences from pre-operative values were not statistically significant. Astigmatism also showed a myopic trend post-operatively. The mean change in meridional equivalent at 180° was -0.21 ± 0.28 and the change was statistically significant. 34% of patients had a persistent change of $\geq 0.5D$ at 12 weeks post-operatively. Mean change in meridional equivalent at 90° was -0.11 ± 0.22 and the change was not statistically significant. Only 12% had a change $\geq 0.5D$. The change in refractive status occurring when two muscles were tackled in the same eye and when only one muscle was encountered was also statistically analysed using the paired T-Test and was found to be statistically significant. The mean change in refraction in the R-R group was -0.25 ± 0.17 and in eyes where Recession alone was done showed mean change of -0.13 ± 0.18 . In the Recession - Resection group 35.75% had a change in refraction of $\geq 0.50D$ compared to only 12.5% in the Recession alone group.

Table 8 Outcome of Treatment

OUT COME		GROUP			
		NON SURGICAL	SURGICAL		
			BMR	R/R	3 MUSCLES
ANATOMICAL	Orthophoria	7	33	19	1
	< 20pd	9	14	9	2
	>20pd	3	0	0	3
SENSORY (BSV)	Present	14	47	15	2
	Absent	5	0	13	4

Outcome of treatment

In the Bimedial recession group 33 patients (70.21%) attained orthophoria, 14 patients (29.79%) had eso or exo deviation within acceptable limits ($< 20pd$). In the Recession-Resection group 19 patients (67.86%) attained orthophoria and 9 patients (32.14%) within acceptable of $< 20pd$. None of the patients in above two groups required a second surgery. Of the 6 patients who underwent 3 muscle surgery in the first sitting itself. orthophoria could be attained in one patient (16.67%) and $< 20pd$ of deviation in 2 patients (33.33%). 3 patients (50%) still had a deviation $> 20pd$ and are waiting for second step surgery

Coming to the sensory outcome, all patients in the Bimedial recession group could attain some form of BSV, of which 4 patients had only intermittent BSV with poor fusional vergence. Of the 28 patients who underwent Recession - Resection surgery 15 patients (53.57%) attained some form of BSV. The rest 13 patients (46.43 %) who had suppression were moderate to high amblyopes including the sensory esotropias, who did not improve even after occlusion therapy to sufficient amounts as to attain binocular vision. 2 patients who underwent 3 muscle surgery attained BSV and these patients had surgery done below 3 years of age. 4 patients did not attain BSV and had surgery for cosmetic reasons. Among the non-surgical treatment group orthophoria was attained in 7 patients (36.84%) and $< 20pd$ of deviation in 9 patients (47.37%). 3 patients (15.79%) had $> 20pd$ deviation and these belonged to the Partially accommodative group who were advised surgery but not willing for the same. BSV in some form was present in 14 patients (73.68%) in this group after treatment with spectacles and occlusion therapy.

Discussion

At presentation, majority of patients (66%) had an angle of deviation more than 40pd. This might be one of the factors which contributed to earlier age of presentation by many, because our population is more cosmetically aware. Amblyopia poses an important socio-economic problem. It is avoidable, to a degree treatable and deserves the best attention of the Ophthalmologists. In the study 31% had Amblyopia at presentation and the causes included strabismic, anisometropia, ametropia and sensory causes. More than half of the patients belonged to 6 to 10 years age group. Costenbader reported the incidence of Amblyopia as 40% in a study of patients with congenital Esotropia³

The presenting visual acuity in 48% was 6/36 to 6/24. By conventional occlusion therapy, there were 51.61% of patients with visual acuity 6/18 as against 12.9% prior to treatment. 61.29% showed an improvement of 2 lines or more. In study at Aravind Eye Hospital, Coimbatore, 64.7% achieved a visual acuity of 6/18 and 76.4% showed an improvement of 2 lines or better by Occlusion therapy⁴. Factors which affected the outcome included visual acuity at presentation, age of child, and compliance. Poor visual acuity at the start of the treatment is associated with poor compliance to treatment. Compliance was also better in the older age group than younger ones. So conventional occlusion therapy is a simple, coseffective and ideal treatment for Amblyopia

19 patients were treated by non-surgical methods alone giving them acceptable refractive correction or executive bifocals in those with increased AC/A ratio. Of these 16 patients (84.21%) acceptable anatomical outcome (7 patients orthophoric and 9 patients < 20pd) and 14 patients (73.68%) of this group attained some form of BSV following treatment. Review of literature also revealed that many authors like Noorden, Parks, Pollard and Costenbader advocate the same modality of treatment^{2,5,6,7} while Dyer has advocated surgery either in lieu of glasses or to decrease a stronger correction⁸.

81 patients underwent surgical treatment, of which 23 patients in addition to surgery were prescribed refractive correction or bifocals for the accommodative part of their deviation. 47 patients underwent bimedial recession, 28 patients unilateral recession-resection and 6 patients had 3 muscle surgery in the first sitting. 70.21% patients in BMR group and 67.86% of patients in R-R group attained orthophoria. Thus not much difference in motor alignment was noted by symmetrical bimedial recession or asymmetrical Recession-Resection surgery for Esotropia. The results were similar to those of Von Noorden et al. J.B. Arnoult et al and P. Vijayalakshmi et al^{9,10,11}. However it was different from the reports of Bartley et al who obtained a better alignment after Recession-Resection than after BMR surgery¹². 79.01% patients attained some form of BSV after surgical treatment, with spectacle correction and occlusion therapy in required cases.

The refractive status after surgery showed a Myopic change in both spherical and astigmatic component, but only meridional equivalent at 180° was statistically significant (-0.21 ± 0.28) and these changes were found to get stabilized by 4 to 6 weeks post operatively and persisted even at 12 weeks and 6 months post operatively. Also the change in refraction was more when 2 muscles were encountered in one eye (-0.25 ± 0.17) compared to when only 1 muscle was tackled (-0.13 ± 0.18). Fix A and Barker reported changes more than 1 Dioptre and Snir et al have reported a Myopic change (mean 1.3 ± 0.97 D). This is much higher than results in this study. The study at Guru Nanak Eye Centre New Delhi has reported similar results. In their study a change in both spherical and meridional equivalent was found statistically significant (0.27 ± 0.61 and 0.28 ± 0.35). These changes in refraction are attributed by many authors to the change in corneal curvature due to change in vector forces on the cornea resulting from alteration in the location of extra ocular muscle insertions. A non corneal aetiology for post operative changes was also put forward. Segmental interruption of ciliary body vascular

supply with the removal extra ocular muscles may affect the lenticular curvature and thus produce refractive changes after surgery^{13 14 15}.

Conclusion

- Majority of cases presented before 10 years of age
- Full acceptable refractive correction and /or executive bifocals (increased AC/A ratio) helps control of accommodative part of Esotropias.
- Treatment of Amblyopia has to be given prime importance and conventional occlusion therapy is simple and cost effective treatment for Amblyopia
- Both Bimedial recession and unocular Recession - Resection works well as the initial procedure in attaining motor alignment within acceptable limits.
- Early diagnosis and appropriate treatment is advocated for attaining Binocular single vision and thus prevent Amblyopia in cases of Esotropias.
- A myopic change in refraction was noted after surgical treatment both inspherical and astigmatic component, but only meridional equivalent at 180° was found to be statistically significant ($P < 0.01$).
- Change in refractive status was more when two muscles were tackled in the same eye. ($P < 0.002$)

Bibliography

1. Krzystkova.K and Pajakowa J - The sensorial state of strabismus in orthoptics,1972; Excerpta Medica Foundation, p.72.
2. Costenbender.F.D: Clinical course and management of Esotropia, Strabismus Ophthalmology symposium 2, St.Louis, 1958.
3. Costenbender. F.D: Infantile Esotropia, Trans Am.Ophthalmol. Society,1961
4. Efficacy of conventional occlusion therapy in Amblyopia- Dr.Kalpna Narendran and Dr.Ramakrishnan, Aravind Eye Hospital, Coimbatore, India 1999
5. Noorden, G.K,Morris.J and Edelman. P: Efficacy of bifocals in the treatment of accommodative esotropia, Am.J. Ophthal, 1978
6. Parks, M.M: Abnormal accommodative convergence in squint.Arch.Ophthal,1958
7. Pollard. Z.F: Accomodative Esotropia, Arch.Ophthal,1976
8. Dyer.J.A: Non surgical treatment of Esotropia. Trans. New Orleans Academy of Ophthalmology, St.Louis,1971
9. Von Noorden, G.K, et al: Surgical treatment of congenital esotropia. Trans. Am. Acad Ophthal,1972
10. Arnoult.J.B. et al: Comparitive study of surgical management of congenital esotropia. Peadiatric Ophthal and Strabismus,1976.
11. Surgical results of congenital esotropia: BMR vs Unocular R/R, Dr. Vijayalekshmi et al Madurai,India 1999.
12. Barley et al: Characteristics of R/R and BMRfor childhood esotropia. Arch Ophthal,1985
13. Fix.A, Barker JD. Refractive changes following strabismus surgery. Am Orthoptic Journal,1985
14. Snir.M, Nissenkorn.I, Buckman.G et al. Post operative refractive changes in congenital esotropia.1989
15. Dr. Kamallesh, Dr. Shailley Jain, Guru Nanak Eye Centre, New Delhi. Change in refractive status following strabismus surgery.