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RESEARCH ARTICLE

Sensory Outcomes of Strabismus Surgery for Exotropia in Patients Operated in their Adulthood

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Abstract

Sensory outcomes in terms of fusion and stereopsis were evaluated. Fusion was evaluated in 99 patients and binocularity was measured in 59 patients both pre and post operatively and only those patients were included who had 1 month follow up. All adult patients (more than 16 years of age) were treated surgically for various types of Exotropia by a single surgeon, were analyzed retrospectively in Indian Population. The patients were managed by single surgery to achieve the best possible surgical outcome in term of ocular alignment. It was analyzed post operatively as improvement, stable and deterioration in Worth Four Dot Test at 1 month of follow up and binocularity was evaluated in terms of improvement & deterioration at 1 month follow up.

INTRODUCTION

Stereoacuity is a hallmark of human race that has bestowed on it the supremacy in the hierarchy of animal kingdom. The basic principle of stereopsis is dissociation of the two eyes so that each gets a slightly different view of the same object and then fuses to form a single image with third dimension. Factors adversely affecting recovery of stereopsis are visual acuity < 20/60 due to any cause like optic neuritis, anisometropia and strabismus etc.[1] Fatima et al[1] evaluated the recovery of binocularity in 15 chronically exotropic, non-fusing adults following successful surgical alignment. They evaluated six weeks outcomes: fusion by Worth Four Dot Test and Bagolini Striated Glasses and stereopsis by Titmus test and the Netherlands organization for applied scientific research (TNO) test. They concluded that longstanding strabismic adults with good vision can recover fusion and stereopsis following successful squint surgery. Lal et al[2] retrospectively analyzed 21 adults with large angled acquired strabismus and reported measurable stereoacuity in 67 % and fine on the Titmus circles in 44 %. This was irrespective of the duration of exotropia. Fawcett's series[3-5] of 23 cases of acquired exotropia, 96% recovered some measurable stereopsis: 70 % demonstrating some fine stereopsis (less than 60 arc sec) on the Titmus Circles and 30 % on the Randot Preschool Stereoacuity Test.[3-5] Recent research suggests that a horizontal deviation less than 4 Prism Dioptre will enable macular fusion (less than 100 arc sec) whereas larger angles (5-10 Prism Dioptre) may be just sufficient for binocularity.[6] So these studies have reported recovery in binocularity postoperatively in adults.[2-5] Marilyn et al[7] did a retrospective study to determine the preoperative and postoperative binocular status of adults have undergone surgical correction of exotropia by a single surgeon, of which 72 were included in the study and 42% patients had improvement in binocularity function, 53% remained the same and 5% have decrease in binocular function. Kushner and Morton[8] demonstrated improvement in binocularity by 6 weeks postoperatively. Adams et al[9] prospectively

studied improvement in distance stereoacuity following surgery for intermittent exotropia in patients between 24 - 68 years of age.

Material and Methods

Retrospective analysis of case records of adult patients was done. Only those adult patients were included who were operated for exotropia after 16 years of age. Paralytic, restrictive, consecutive exotropia, previous history of strabismus surgery and less than a month follow up patients were excluded from the study. Data collection was started with demography details, history, chief complaints, birth, past, family and medical histories. On refraction, best corrected visual acuity, fixation, amblyopia, anisometropia were noted. Squint motor evaluation with prism cover test and modified Krimsky test was done. Ocular motility and oblique muscle overaction were noted. Squint sensory evaluation done for fusion and stereopsis. Stereopsis was measured with Titmus test or the Netherlands organization for applied scientific research (TNO) test or Randot Test and Fusion was measured with Worth Four Dot Test. Sensory surgical outcome were analyzed post operatively in terms of Fusion and Stereopsis. It was analyzed as improvement (if developed fusion or diplopia from suppression), stable (no change) and deterioration (if developed unilateral or alternate suppression) in Worth Four Dot Test at 1 month of follow up. Improvement in binocularity was at least 1 step shift from pre operative binocularity group to any higher group of binocularity & deterioration in binocularity was loss of preoperative stereopsis to at least 1 step lower group of binocularity at 1 month follow up. Patients were operated for medial rectus resection and lateral rectus recession, few had adjustable surgery, horizontal transposition and some were combined with oblique muscle surgery.

Results

Worth Four Dot Test was analyzed preoperatively and postoperatively on final visit after 1 month. On final post operative visit at 1 month, for distance, 44 (44.44%) patients had central fusion, 5 (5.05%) patients had diplopia, 20 (20.20%) patients had alternate suppression and 30 (30.30%) patients had unilateral suppression.

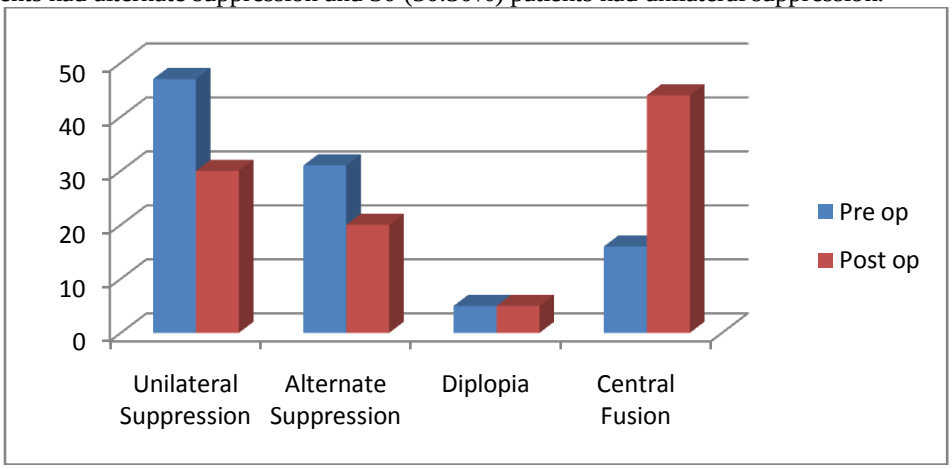

Fig – 1: Worth Four Dot Test at Distance – Preoperatively and Postoperatively

For near 49 (49.49%) patients had peripheral fusion, 4 (4.04%) patients had diplopia, 28 (28.28%) patients had unilateral suppression and 18 (18.18%) patients had alternate suppression.

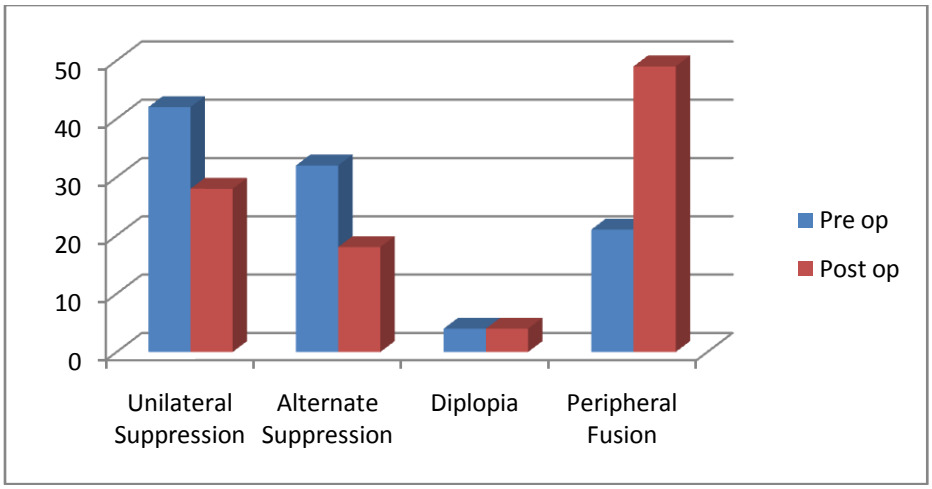

Fig – 2: Worth Four Dot Test at Near – Preoperatively and Postoperatively

For distance 31 (31.31%) patients had improvement to fusion or diplopia, 2 (2.02%) patients had deterioration and 66 (66.67%) patients had stable Worth Four Dot Test. For near 29 (29.29%) patients had improvement to fusion or diplopia, 5 (5.05%) patients had deterioration and 65 (65.65%) patients had stable Worth Four Dot Test. Non parametric paired comparison was done using Wilcoxon test for comparison of pre and post operative Worth Four Dot Test data and it was found that there was more improvement in Worth Four Dot Test for distance and near post operatively when compared with pre operatively (p=0.000) and it was highly significant statistically.

Binocularity was analyzed preoperatively and postoperatively on final visit after 1 month. Post operatively 20 (33.90%) patients had good stereopsis, 12 (20.34%) patients had fair stereopsis, 11 (18.64%) patients had coarse stereopsis, 1 (1.69%) patient had gross stereopsis and 15 (25.42%) patients had no stereopsis.

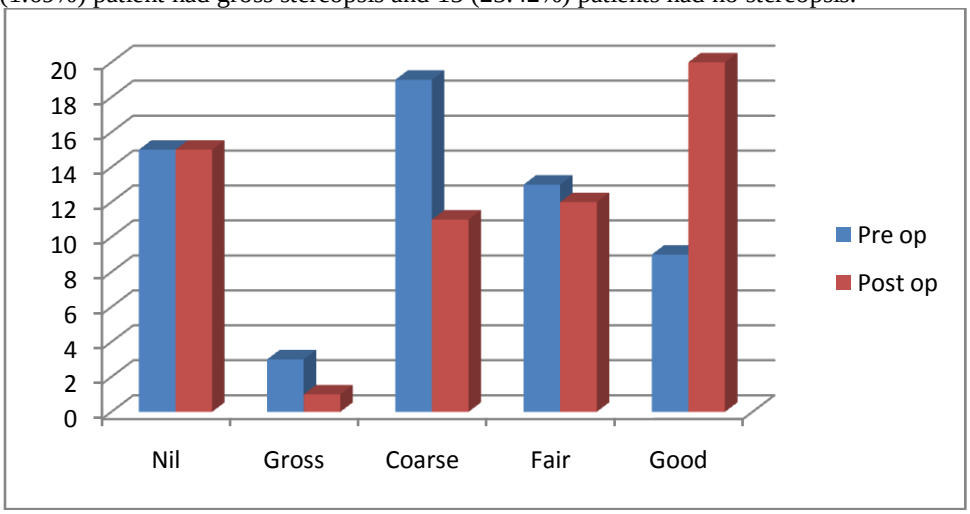

Fig – 3: Stereopsis comparison – Preoperatively and Postoperatively

16 (27.12%) patients had improvement in binocularity, 40 (67.80%) patients had no change in binocularity and 3 (5.08%) patients had deterioration in binocularity. Non parametric paired comparison was done using Wilcoxon test for comparison of pre and post operative stereopsis data and it was found that there was improvement in stereopsis postoperatively when compared to pre operatively (p=0.013) and it was significant statistically.

Discussion

In this study, Worth Four Dot Test for distance 31 (31.31%) patients had improvement to fusion or diplopia, 2 (2.02%) patients had deterioration and 66 (66.67%) patients had stable outcome. For near 29 (29.29%) patients had improvement to fusion or diplopia, 5 (5.05%) patients had deterioration and 65 (65.65%) patients had stable outcome. It was found that there was more improvement in Worth Four Dot Test for distance and near post operatively when compared with pre operatively (p=0.000) and it was highly significant statistically. Fatima et al[1] studied 15 adult patients who were operated for exotropia and found that 8 (53.33%) developed fusion and 7

(46.67%) developed diplopia for distance and 11 (73.33%) developed fusion and 4 (26.67%) developed diplopia for near after 6 weeks postoperatively.

In this study, out of 59 patients, 16 (27.12%) had improvement in binocularity, 40 (67.80%) had no change in binocularity and 3 (5.08%) had deterioration in binocularity. It was found that there was improvement in stereopsis postoperatively when compared to pre operatively (p=0.013) and it was significant statistically. Marilyn et al[7] did a retrospective study to determine the preoperative and postoperative binocular status of adults have undergone surgical correction of exotropia by a single surgeon, where a total of 112 adult (age range 16-80 years) patients underwent surgery, of which 72 were included in the study and 42% patients had improvement in binocularity function, 53% remained the same and 5% have decrease in binocular function.

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