Horizontal Strabismus Surgical outcomes in a Teaching Hospital

Abstract:
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Abstract
Strabismus may result in impaired stereopsis, diplopia, undesirable appearance, amblyopia and negative psychological impact, and severe ocular morbidity. This study reviewed amblyopic cases in University College Hospital Galway requiring strabismus surgery. We report a retrospective analysis of 75 consecutive patients, who had strabismus surgery performed over a 6 month period. Of the 75 patients, 45 (60.0%) had strabismus surgery. Thirty-four (45.3%) patients had amblyopia and nine (12%) required further treatment. A cosmetically acceptable result with a post-operative ocular deviation within 25 prism dioptres of straight (grade 2) was achieved in 70/75 (93.3%) of patients. The overall mean change in ocular deviation per mm of muscle operated was 3.25 prism diopter/mm. The outcomes of strabismus surgery in an Irish hospital compare very favourably with other jurisdictions. This data will help plan service delivery.

Introduction
Strabismus refers to ocular misalignment, which may be caused by abnormalities in binocular vision or by abnormalities of neuromuscular control of ocular motility. Strabismus may lead to amblyopia, impaired stereopsis, diplopia, altered cosmesis, and affect social standing. A variety of risk factors for strabismus have been identified which include anisometropia, hyperopia, myopia, family history, maternal cigarette smoking during pregnancy, neurological disorders, low birth weight, pre-term, anatomic anomalies and substance abuse during pregnancy. Strabismus in childhood is relatively common and therefore has a significant impact on ophthalmological service. The prevalence of strabismus has been reported from 3-4%. Esotropia is the most common strabismus of childhood. Amblyopia has an estimated prevalence in childhood of 0.5% – 0.59%. There are three primary types of amblyopia: 1. anisometropic, (difference in refractive errors between the eyes); 2. strabismic, (due to strabismus, or inaccurate accommodation); and 3. cataract, corneal opacities, or vitreous opacities. Current practice in Ireland is to screen by checking visual acuity of children at primary school entry (age 4-5 years) and at primary school exit (approximately 12 year old).

Interventions for the treatment of strabismus include optical manipulation with corrective glasses and occasionally prisms. Surgery on extra ocular muscles may be employed to correct the deviation. Penalisation of the non-amblyopic eye with occlusion therapy or cycloplegic medication maybe used in children with strabismus who also have amblyopia. The aim of management is to optimise the best corrected visual acuity (BCVA) of both eyes, maintain normal binocular fusion and improve cosmesis, and affect social standing. Clinical benefits of realignment include: improved cosmesis, potential re-establishment of binocular fusion, elimination of diplopia, expansion of visual field, improvement of head posture, and psychosocial well being.

Results
Ninety patients had strabismus surgery, 15 patients were excluded from further analysis (8 vertical squint, 7 incompletely follow up). The inclusion criteria were met by 75 patients (under care of two consultant ophthalmologists). There were 44 (58.7%) female and 31 (41.3%) male patients. Fifty (66.7%) patients had exotropia and twenty-five (33.3%) had esotropia. Thirty patients were under 10 years of age, sex, diagnosis, age, and sex were recorded pre- and post-operatively. The surgical techniques employed varied according to the clinical scenario, 39 (52%) cases were monocular recess/resect procedures, 29 (38.7%) were binocular recession/resection procedures, 4 (5.3%) were bimedial recessions, 5 (6.7%) were bilateral lateral rectus recession and there were 2 (2.6%) bilateral lateral rectus resections.

The mean preoperative angle of deviation was 46.4 PD. The mean post-operative angle of deviation was 10.2 PD. The post-operative alignment was: Grade 1 (d 10 PD) in 69.3% (n = 52), grade 2 (11-25 PD) in 24.0% (n = 18), grade 3 (26 – 35 PD) in 6.7% (n = 5), and grade 4 (> 35 PD) in 0.04% (n = 1). Ninety two (97.3%) of patients achieved a cosmetically acceptable result of a post-operative ocular deviation within 25 prism dioptres (PD) of straight (grade 2). Two patients who had poor surgical outcome (grade 4) had very large ocular deviations and were followed-up over a mean of 5.1 – 2.1 years, with a mean of 18 – 9.7 visits. The mean number of visits for patients without a history of amblyopia was 10 – 6.7.

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We examined the change in ocular deviation and calculated the mean change in ocular deviation per unit of muscle operated (recessed or resected in PD/mm). For all 75 patients there was a mean 3.25 PD/mm. Looking at the surgical outcomes by tropia type we found that, in the 59 cases of exotropia the mean effect was 3.41 PD/mm and in the 26 cases of esotropia the effect was 2.9790 PD/mm. Then when we looked at the surgical approach we found that the 2binomial recessions yielded a mean change in ocular deviation per unit of muscle operated of 3.03 PD/mm, while monocular recess/resect (n = 39) gave a mean of 3.66 PD/mm and bilateral lateral rectus resections (n = 9) only yielded a mean of Horizontal Strabismus Surgical outcomes in a Teaching Hospital
1.46 PD/mm. BMR gave a greater surgical effect on near deviation (3.59 PD/mm), but this was not significantly different to the distance figure. Table 1 illustrates the effect of size of preoperative deviation upon patients outcomes. Patients were pre-operatively divided into two groups, one with preoperative angle of deviation for distance of 30 PD or less, and other with angle greater than 30 PD for distance. This demonstrates that a greater change in angle of deviation was achieved per millimetre of extra ocular muscle recessed or resected for larger pre-operative angle of deviation, which is statistically significant (p = 0.0001, 95% CI(-2.48, -.98) Mean Difference -1.73 (One Way Anova Test).

Discussion

It is remarkable that in a system where screening for ocular deviations occurs at two set-points, only 13.3% of referrals were from these screening services. The vast majority (86.7%) were from doctor visits (community, ophthalmologists, OPs and other hospital specialities). It would seem that the benefit of screening for strabismus at four to five years and again at 12 years of age has limited effect and may need to be revaluated, especially if amblyopia is to be detected in a timely manner. There is evidence that early detection through screening at 9 months of age can significantly alter the course of amblyopia and strabismus. This study highlights the significant work load associated with running a strabismus service. Amblyopia and younger age were associated with even higher clinical visit rates, which has been previously reported. Amblyopia is the commonest preventable cause of visual loss in children, and while it is more responsive to treatment among children younger than 7, some children 7 to less than 13 years of age show a marked response to treatment. Over 13.3% of our patients required treatment for amblyopia and 77.8% improved to 6/9 or better and 100% were 6/12 or better in the amblyopic eye. No patients lost any vision throughout this study.

Our results compare favourably to those reported in other jurisdictions. We recorded 69.3% within 10 PD of alignment, whereas, Wisnicki et al reported alignment of 58% with 10 PD in resident (trainee surgeons) group, and 69% within 7 PD in the attending (consultant surgeon) group. Kampanartsanyakorn et al. reported a success rate of 60.2%. Success was associated with younger age (> 6 years) and preoperative deviation less than 30 degrees, this reflects our experience. Gogate et al reported that 77.9% (260/461) had a post-operative ocular deviation less than 20 PD and large pre-operative deviations and amblyopic eyes accounted for 63/101 (62.3%) cases of poor outcome. They found a trend of recession-resection procedures to had better outcome as compared to bilateral recession procedures, but it was not statistically significant. We found a similar trend but it did not achieve significance. This study provides an insight into our current practice at University College Hospital, Galway. This is the first time such data has been published from an Irish teaching hospital. It highlights the significant impact this group of patients have on the ophthalmic service. Treatment efficacy has been analysed and comparison of different treatment methods are reported. Our results compare favourably with international reports. This is a source of epidemiological data, which can help plan future healthcare delivery.

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References


