

Long Term Surgical Outcome of Large Angle Exotropia Using Hang Back Procedure

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ABSTRACT

Purpose: To determine the long-term surgical outcome of large angle exotropia using Hang back procedure in children.

Methods: 40 eyes of 20 exotropia patients underwent bilateral lateral rectus muscles recession using Hang-back procedure were retrospectively reviewed. Age range of the patients were 12-16 years, and mean age was 14 ± 0.5 years. Distant exotropia was targeted for surgical correction. Pre-operative and post-operative orthoptic assessment, cycloplegic refraction and fundoscopy were done. All patients underwent bilateral lateral rectus muscles recession (BLR) with Hang back procedure and were reviewed 1 week, 4 weeks, 3 months and 6 months interval.

Results: Out of 20 patients, 8 (40%) were male and 12 (60%) were female. Pre-operative distant deviations were 40-50PD exotropia. Post-operatively satisfactory alignments were obtained in patients having 40 PD and 45PD exotropia at final follow up. Remaining 2 patients having 50PD exotropia showed 10PD exotropia at final follow up.

Conclusion: Hang back technique is a simple, safe and effective procedure for bilateral lateral rectus muscle recession in large angle exotropia in children.

Keywords: large angle exotropia, Hang back procedure, long term outcome

INTRODUCTION

Exotropia is a manifest outward deviation of eyeball which cannot be controlled by fusion. In cases where exotropia occurs, there are two surgical options: the conventional recession of the lateral rectus and the alternate muscle weakening procedure known as the hang-back technique ^[1]. The conventional recession is a measured retro-placement of the muscle from its original insertion. The change from original position to a new one further back on the sclera relaxes the pull of the muscle and allow the eye to attain a straighter position. The muscle should be re-inserted along its arc of contact. Hence, there is difficult exposure at the site of sclera sutures. When a muscle is reattached to the sclera, the needle may pierce the sclera, which seems to be the time

when the risk of scleral perforation is highest. The thinner the sclera, the risk of scleral perforation during conventional recession is more [2].

A “hang back procedure” on the lateral rectus muscle refers to a surgical technique used in strabismus surgery where, instead of completely detaching the lateral rectus muscle from its insertion point on the eye, a suture is used to “hang back” the muscle at a more posterior position, effectively weakening it and allowing for greater eye movement control. This method is often considered to have advantages like improved surgical exposure, a reduced risk of scleral perforation and a shorter learning curve compared to a conventional recession procedure [3].

Hang back method was firstly tested for esotropia repair adjustable suture technique only [4], but later it was also examined for vertical deviation repair [5] as well as for exotropia [6][7].

So, the aim of this study is to evaluate the long-term surgical outcome of large angle exotropia using Hang back procedure.

PATIENTS & METHODS

40 eyes of 20 exotropic patients underwent bilateral lateral rectus muscles recession (BLR) using Hang back procedure by single surgeon were retrospectively reviewed. The study was done at Chittagong Eye Infirmary and Training Complex, Chattogram, Bangladesh between January 2019 to December 2023. Data were included on age at surgery, gender, visual acuity, refractive status, pre-operative and post-operative deviation, extraocular movement and fundoscopy, intra-operative measurement of muscle recession. Inclusion criteria of the study was pre-operative exotropia 40 PD or more with full duction & version having no previous extra-ocular muscle surgery. Patients with neurological disorders, developmental delay and vertical deviation were excluded from the study. Follow up period was at least 6 months. All patients were underwent orthoptic evaluation & cycloplegic refraction. Dilated & detailed fundoscopy were done in every patient.

All patients were between 40-50 PD exotropia (XT). BLR were done 8 mm for 40PD, 9 mm for 45PD and 10 mm for 50PD [8]. Muscle & tendon were exposed using fornix-based incision. The muscles were isolated and a double armed 6-0 vicryl suture were woven through it.

At first, needle was partially passed through the muscle starting from the centre near its insertion. Then full thickness bite was taken with two knots. At last, Single full thickness bite were taken at the site of previous knot. This manoeuvre was done in both sides of the muscle. The muscle was disinserted with spring scissor from its insertion. Then with the calliper measurement of the vicryl suture were taken and fixed with the locking needle holder and five overhand knots were tied and trimmed. The needle holder was then removed, and the muscle was allowed to fall back from the original insertion while the eye was rotated in the opposite direction. Finally, the calliper was used to confirm that the desired amount of recession was correct. The conjunctiva was repositioned and closed with 8-0 vicryl suture in an interrupted fashion. The eye was padded with antibiotic drop and ointment up to 4 hours. Post-operatively systemic antibiotic and analgesic were given. Topical steroid & antibiotic combination were continued up to 1 month. Artificial tear eye drops were given up to 2 months in every cases.

Convergence exercises were given in every case from 1st post-operative day. The patients were followed up at 1 week, 1 month, 3 months & 6 months interval. In every follow up, vision, refractive correction, orthoptic assessment and fundoscopy were done.

RESULTS

Out of 20 patients 10 patients (50%) had 40 PD, 8 patients (40%) had 45 PD and 2 patients (10%) had 50 PD exotropia (XT) preoperatively. Post-Operatively satisfactory alignments were obtained in patients having 40 PD and 45 PD XT at final follow up.

10 patients (50%) having 40 PD XT were orthophoric at immediate & final post-operative follow up.

8 patients (40%) having 45PD XT were orthophoria at immediate post-operative follow up. But at final follow up these patients had exophoric within 5 PD which was cosmetically acceptable.

Remaining 2 patients(10%) having 50 PD XT showed 5PD exotropia at immediate and 10 PD XT at final post-operative follow up. Convergence exercise was advised in those exophoria and exotropia patients.

Table 1: Demographic profile of patients

Age at surgery	
Range	12-16 years
Mean	14±0.5 years
Gender	
Male	8 (40%)
Female	12 (60%)

Post-operatively no narrowing of palpebral aperture was noticed. No gaze incompetence, convergence insufficiency or diplopia were noticed. No induced vertical deviation was found. One patient with pre-existing physiological optic disc cupping; had developed steroid induced glaucoma postoperatively which was manage conservatively.

Table 2: Pre-operative characteristics and surgical outcome

Number of cases	10 (50%)	8 (40%)	2 (10%)
Angle of deviation	40 PD	45 PD	50 PD
Amount of muscle recessed	8 mm	9 mm	10 mm
Post-operative alignment	Orthophoric	5PD exophoric	10PD exotropia

As a simple procedure, wide surgical field, better exposure was obtained. No slipped or lost muscle, scleral perforation occurred. Post-operatively no significant change in refraction was found. Fundoscopy were revealed normal in all cases.

DISCUSSION

Exotropia is a common type of strabismus accounting for 25% of all ocular misalignment in early childhood ^[9]. Intermittent exotropia forms about 90% of all exodeviations and is controlled by fusional mechanisms ^[10]. About 60-70% of normal new-born infant have a transient exodeviation that resolves by 4-6 months ^[11]. Many factors may affect the surgical outcome of exotropia, the first presentation, age at surgical intervention, angle of deviation, an error of refraction, presence of amblyopia, binocular vision, the state of fusion and type of surgical procedure ^[12]. The goal of surgery is getting single binocular vision of near and far gazes, the best corrected visual acuity in both eyes and good cosmetic appearance ^{[13][14]}.

Some studies on the comparison of hang-back with conventional bilateral lateral rectus recession for exotropia have not found any significant difference in the surgical success rates ($\leq 10\Delta$ of deviation) between the two techniques ^{[15][7][16][17]}.

Whenever the hang back technique is performed by taking a central locking knot in the muscle bulk near its insertion point and two locking sutures at the two edges of the muscle then the tendon of insertion is cut from

the sclera and is inserted into the tendon stump instead of sclera. Thus, the muscle suspends posterior to the scleral insertion with sutures to weaken the muscle. This hang back minimizes the risk of perforation by avoiding scleral pass and allows more recession to be planned.

Multiple studies have been conducted in the literature on the lateral recti's hang-back recession technique for exotropia correction, perhaps to evaluate this procedure in a wider field of lateral recti, rather than to evaluate in the narrower field of recessing medial recti in esotropia, wherein the dissection of the medial recti from the intermuscular septum carries the risk of loss of the muscle in case of slipping ^{[18][19]}.

To overcome this risk of muscle loss, a small modification is performed, in this study, two central locking knot is taken in the central part of the muscle bulk, then one locking knot at each edge of the muscle, so that the muscle is totally secured when clearly dissecting the intermuscular septa ^[20].

The Hang back recession technique represents a simple, safe & effective alternative to conventional lateral rectus recession ^{[3][6]}. It offers a shorter surgical time ^[15], less chance of perforating sclera and better exposure, especially when a larger recession is needed in small eye or when the technique is performed with an inexperienced assistant who may be less skilled at providing good exposure for conventional surgery ^[3]

In our study no residual exotropia was observed in 18 patients at final follow up. these patients had 40-45PD exotropia preoperatively. So, it can be concluded from our study that hang back technique is safe upto 45PD exotropia.

In cases of Hang back procedure there is no narrowing of palpebral fissure occurred. Convergence exercise can be given immediately after surgery. It is a simple, safe & a shorter learning curve for the beginner in the field of strabismus surgery.

Limitation of our study was that it was performed on small number of patients and no comparative analysis was done with conventional recession technique.

CONCLUSION

Hang back technique is simple, safe and effective procedure in children for bilateral lateral rectus muscles recession up to 45PD exotropia.

Conflicts of interest: Authors have no conflicts of interest.

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