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Modified adjustable suture hang-back recession versus conventional adjustable hang back recession in Strabismus cases: A tertiary care hospital based study

Padmavathi CG[1], Nagendra Pasupuleti[2*]

[1]Assistant Professor, Department of Ophthalmology, Government Medical College and Hospital, Anantapuramu, Andhra Pradesh, India

[2]Assistant Professor, Department of Anesthesia, Government Medical College and Hospital, Anantapuramu, Andhra Pradesh, India

ABSTRACT

Aim: To describe and compare modified hang-back recession with conventional hang-back recession in large angle concomitant exotropia. **Methods**: A prospective, interventional, double blinded, randomised study on adult patients (>18 years) undergoing single eye recession-resection for large angle (>30Prism Dioptres (PD) constant concomitant exotropia (XT) was conducted between July 2014 to December 2015. Patients in Group M underwent modified hang-back lateral rectus recession (LR) with adjustable knot while in Group C underwent conventional hang-back recession with adjustable knot. Outcome parameters studied were readjustment rate, change in deviation at 6 weeks, complications and need for re surgery at 6 months. **Results:** The groups were comparable in terms of age and pre operative deviation. The patients with the modified hang back (Group M) fared significantly better ($p<0.05$) than the conventional hang back (Group C) in terms of lesser need for adjustment, greater correction in deviation at 6 weeks and lesser need for re surgery at 6 months. **Conclusion**: This modification offers several advantages, significantly reduces re surgery requirement and has no added complications

Key words: Concomitant Deviation, Hang Back, Modified Adjustable HangBack, Strabismus.

Introduction

Adjustable sutures are known to improve the surgical outcomes in several types of strabismus [1].Of the several techniques, hang back recessions are the best practiced while using adjustable sutures [2].Muscle recessions donewith the hang- back techniquehave advantages of better exposure and lesser complications such as scleral perforation [3].But it is observed that recessed muscle is prone to migrate anteriorly following the surgery resulting inunder correction [4].In hemi hang back method, thesuture needles are passed through the sclera approximately half the distance between the original insertion site and the desired new recession position [5-6].

**Correspondence*

Dr. P. Nagendra,

Assistant Professor of Anesthesia,

Government Medical College and Hospital,

Anantapuramu-515001, India

Owing to direct suturing of muscle to sclera at a new site, risk of scleral perforation is more [7].Readjustmentis uncomfortable with hemi-hang-back technique as it requiresmore manipulation of globe and conjunctiva as the site of new insertion is away from conjunctival wound.

A modification of adjustable hang-back recession that takes care of anterior migration of recessed muscle besides several other possible advantages is discussed and compared with conventional adjustable hang back sutures.

Technique

Pre operatively maximum and minimum recession requirement is estimated. For example, if a 8 mm recession of lateral rectus is expected to nearly correct the deviation the maximum requirement is taken as 10 and minimum as 6. So a 6(non reducible) + 4(reducible) recession is performed. All the cases were performed under sub tenon's anesthesia with Propofol sedation.After securing knots at the ends of disinserted muscle with 6-0 vicryl,using a curved ruler, sclera is

marked along the borders of original muscle at the desired length(6 mm). Small partial thickness bites are taken at this site. Muscle is brought anterior to rest against these bites. By this, in an event of pseudo tendon formation or anterior migration or inadvertent extra pull during adjustment at least 6 mm of recession would be maintained. The muscle is then allowed to hang back for another 4 mm giving additional 'adjustable' recession. Then sutures are passed at original insertion site. A bow type adjustable knot is tied to achieve this modified hang-back recession. Conjunctival wound is closed using fibrin glue. Required readjustment is done on 3rd post-op day by minimal conjunctival manipulation.

Materials and methods

After ethical clearance from the Institutional ethical committee a prospective, interventional, double blinded, randomised study on adult patients (>18 years)undergoing single eye recession- resection for large angle (>30Prism Dioptres (PD)constant concomitant exotropiawas conducted between July 2014 to December 2015 at Department of Ophthalmology, Government Medical College and General hospital Anantapuramu in Association with Life Line Hospital, Anantapuramu. Patients after informed consent were randomised by computer generated random tables into 2 groups. All the cases underwent surgery under Propofol sedation and sub tenon's anesthesia. Patients in Group M underwent modified hang-back lateralrectus recession (LR) with adjustable knot while in Group Cunderwent conventional hang-back recession with adjustable knot. Non adjustable medial rectus (MR) resection was done in all cases in both groups. The surgical dose was calculated according to pre-operative deviation by same normogram with 3.5 PD correction expected per mm of LR recession and 1.5 PD per mm of MR resection [8]. An additional 25% correction was expected with both procedures being performed simultaneously [9-10].The patient and the orthoptist were blinded to the type of intervention. The patients were followed up on 3rd day, 1 week, 6 week and 6 months.Outcome parameters studied were readjustment rate, change in deviation at 6 weeks, complications and need for re surgery at 6 months. Re surgery was advised for clearly unacceptable outcome i.e.>20 PD of residual XT with poor control or >20 PD of consecutive esotropia (ET). All the data is tabulated in a pretested proforma and were analysed by usingMann Whitney U testfor numeric data and Pearson's Chi-Square Testfor categorical data, p value <0.05 was considered significant.

Observations and discussion

26 patients were randomised to Group M and 22 to Group C. The groups were comparable in terms of age and pre operative deviation. Mean change in deviation at 6 weeks was 39 PD (range 24 to 49PD) in Group M and 37 PD (range 26 to 50PD) in Group C. The results are summarised in table 1.The patients in Group M fared significantly better (p<0.05) than in Group C in terms of lesser need for adjustment, greater correction in deviation at 6 weeks and lesser need for re surgery at 6 months.

Table 1: Patient Data in 2 Groups, Group M (modified adjustable hang back recession) and Group C (conventional hang back recession)

	Group M (modified) n=26	Group -C (conventional)n=22	P value
Mean Age (in years)	24.1 ± 4.5	25.9 ± 3.7	P=0.473*
Pre-operative deviation in PD	48.07 ± 3.5	46.0 ± 4.19	P=0.325*
Number of adjustment done for overcorrection	6	7	
Number adjustment done for under correction	1	6	
Number of patients not requiring Adjustment for overcorrection/ under correction in	19(73.07%)	9(40.90%)	P=0.0001**

first 6 month follow-up			
Change in deviation (PD) at 6 weeks	41.53	31.55	P=0.003*
Anterior migration (under correction >20 PD at 6 weeks)	0	5	P=0.000**
Need for Resurgery for undercorrection (>20 PD XT with poor control)	0	4	
Need for Resurgery for overcorrection (>20 PD ET)	1	1	
Re surgery rate at 6 months	**1 (3.8%)**	**5 (22.7%)**	**P=0.000****
Complications	0	0	

*Mann Whitney U test, **Pearson's Chi-Square Test

Table 1: Patient Data in 2 Groups. Group M (modified adjustable hang back recession) and Group M (conventional hang back recession)

Adjustable sutures are primarily indicated in strabismus surgeries with unpredictable results. These include long standing strabismus with secondary contractures, large angle strabismus, in concomitant strabismus, thyroid ophthalmopathy, blow out fractures, paralytic strabismus and more recently in concomitant deviations [12].Strabismus surgery with adjustable sutures has a statistically significant better result with good long-term patient satisfaction without specific problems of surgery [13-15].Suture knots placed near original insertion cause less discomfort while readjustment. Hang-back recession technique offers this benefit. However, with subsequent formation of pseudo tendon, or anterior migration the effect of recession is often reduced [15-16].We have conducted this study only on constant concomitant exotropia to reduce bias, keep the groups homogenous and to make the results reproducible. A simple modification of hang-back recession by taking an additional sclera bite at the point of minimum required recession has improved the surgical outcome as can be seen by significantly lesser re surgery rates. The significant difference in adjustment requirement and resurgery for under correction can be attributed to frequent anterior migration of the muscle [14].Under correction as a result of anterior migration or anterior pseudo tendon attachment is expected to occur with greater frequency when increasing length of sutures is left for larger hang back. It would logically be lesser when the same suture length is anchored to the sclera in Group M. The lesser mean correction in Group C is possibly because of anterior migration to various degrees (of the LR tendon) in different patients. Other advantages of taking the scleral bite in the suggested modification would be in case the adjustable knot accidently opens. This additional anchor would prevent muscle slippage. However, there is no data in the current study to support or refute this claim.

The middle anchor also makes the pulling up of the suture during adjustment more comfortable for the surgeon as accidental over pull is restricted by it. 2 patients in Group C initially adjusted for overcorrection eventually ended up with under correction probably due to over pull during adjustment. This is a significant advantage as the adjustment is done under topical anaesthesia with often compromised patient cooperation. If adjustments are being done on the 3rd day, as in our case, this discomfort is often significant. The cinch knot might provide a suitable solution for this.

Conclusion

At the end of the study period we would like to conclude that adjustable hang back recession has several advantages, significantly reduces re surgery requirement and pose little number of complications.

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