

# Adjustable Sutures in Constant Exotropia

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Pak J Ophthalmol 2013, Vol. 29 No. 4

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**Purpose:** To evaluate the use of adjustable sutures in constant exotropia.

**Material and Methods:** The study was conducted in LRBT Free Base Eye Hospital Karachi from April 2010 to March 2011. This was a retrospective study of eighteen patients who were operated for strabismus by adjustable suture technique. Preoperative assessment and postoperative results, all were reviewed from hospital record. All patients included in this study were exotropic preoperatively. After the surgery, adjustment of sutures was done after the effect of anesthesia wore off. The main outcome measures were a need for reoperation, patients' satisfaction with regard to final cosmetic appearance, and change in angle of deviation at the end of follow up. Follow up period was six months.

**Results:** Eighteen eyes of eighteen patients who were operated for exotropia out of which 72.2% were male and 27.7% were female. Mean change in angle of deviation at the end of follow up was from  $60.55 \pm 11.75$  PD to  $15.22 \pm 5.15$  PD with a percentage change of 74.62% ( $p= 0.000$ ). Sixteen out of eighteen (88.8%) patients were satisfied with their cosmetic appearance.

**Conclusions:** Adjustment strabismus surgery is an easy, tolerable and effective surgery, and is recommended for patients who are cooperative.

**S**trabismus is misalignment of eyes resulting in failure of the two eyes to simultaneously focus on the same image, leading to loss of binocular single vision<sup>1</sup>. The incidence of adult strabismus is estimated to be 4%<sup>2</sup>. Strabismus may be present in adults for a variety of reasons, including uncorrected or consecutive childhood strabismus, thyroid eye disease, decrease vision in one eye, and surgical trauma to the extra ocular muscles. Strabismus in adults may be associated with diplopia, torticollis, impaired stereopsis, and negative psychosocial effects<sup>3</sup>. Strabismus surgery in adults has a high rate of success and has been shown to be beneficial in improving diplopia, binocular fusion, and psychosocial well being<sup>4</sup>. Furthermore, adult strabismus surgery has been shown to be cost effective, with a cost equivalent to cataract surgery<sup>5</sup>.

Unusual results after strabismus surgery have been frustrating for both surgeon and patient. The adjustable suture surgical technique offers the surgeon the opportunity to place the eye in the required

position within one day to few hours after surgery<sup>6</sup>. This technique allows the surgeon to fine adjust ocular alignment in the period just after surgery while patient is awake and free of the effects of anesthesia gases. The improved adjustable suture technique has improvised surgical results in strabismus patients and has markedly reduced the number of redo's, especially in more complicated cases<sup>7</sup>.

The adjustable suture technique is most effective in patients with complicated strabismus such as paralytic strabismus, large angle strabismus, reoperations, thyroid myopathy, and advancement of a lost or slipped muscle. In contrast, the adjustable suture technique has limited application in the patient with restrictive strabismus secondary to fat adherence syndrome, in which scarring of the globe or eye muscle causes the strabismus<sup>8</sup>.

Selection of patient is important, if not crucial, for successful implementation of the adjustable suture technique. The adjustment procedure is somewhat uncomfortable and in some patients evokes substantial

anxiety. The cotton-swab test, which consists of touching a cotton swab to the medial or lateral aspect of the bulbar conjunctiva, is a simple yet accurate way of identifying patients who will be suitable for the adjustment procedure. If the patient is able to tolerate manipulation of the bulbar conjunctiva without topical anesthetic, then he or she should do well with the adjustment procedure. Other indications of a patient's suitability for the adjustable suture technique include his or her facility with contact lenses, ability to undergo applanation tonometry, facility with topical drops, or cooperation with forced duction testing. It is mandatory to advise patients that the adjustment procedure will be uncomfortable, and it is best to avoid patients who are unwilling or fearful of the procedure<sup>9</sup>.

In this study all operations were performed under general anesthesia and the adjustment was done in the recovery room after 6 hours.

## MATERIAL AND METHODS

The research ethical committee of LRBT Free Base Eye Hospital, Karachi approved this study. A retrospective record review was done of all the patients who had undergone strabismus surgery by adjustable suture technique for exotropia in the practice of one surgeon (MS) from April 2010 to March 2011. The data collection was performed by two investigators (ZK and SAB) independently of the surgeon. There were 13 (72.2%) males and 5 (27.7%) females out of 18 patients. Age ranged from 16-30 years  $\pm$  4.30. All patients had exotropia (Fig 1) with a range of deviation from 30 prism dioptres to 80 prism dioptres with a mean of 60 prism dioptres. Patients having previous strabismus surgery, congenital sixth nerve palsy were excluded from the study.

All the patients had a preoperative ocular examination and orthoptic assessment, including angle of deviation for near (1/3m) and distant vision (6m) with and without correction, and measurement by prism cover test. Fusional ranges were also measured by prism. Written consent was obtained from all patients or first degree relatives. All patients were followed up to 6 months. The main outcome measures were a need for reoperation, patients' satisfaction with regard to final cosmetic appearance and change in angle of deviation at the end of follow up.

The statistical analysis of the data was done by the software Statistical Package for Social Sciences (SPSS) version 17. Descriptive statistics were calculated in

terms of mean, standard deviation, minimum, maximum and range. Mean and standard deviation were calculated for quantitative variable like age of the patients. Frequency and percentage were calculated for gender, cosmetic appearance and rate of reoperations. Paired sample test was used to calculate p-value, and p-value of  $< 0.005$  was considered significant.

## Surgical Technique

The eye was prepared and draped in the usual ophthalmic manner. Two fixation sutures with 6-0 silk were inserted near limbus at the points perpendicular to the muscles to be operated upon (that is, at 12 and 6 o'clock for horizontal muscle operation). Recession was done first. A limbal conjunctival approach was used with radial relaxing incisions. A double-armed 6-0 vicryl suture on a fine spatulated needle was placed near its insertion and locked at the sides with a double-throw knot to prevent bunching up of the muscle. The muscle was then cut. The arms of the suture were passed through the scleral tunnel starting near each end of insertion and emerging 1.5 mm apart. The suture was then secured with a double throw knot followed by half bow. Any redundant suture was shortened. Subsequent adjustment in all cases is eased by ability to fix globe which is best done with the aid of a bucket - handle suture with 6 - 0 vicryl placed in the sclera at or near the insertion. Resection of the antagonist if indicated was done as in conventional strabismus surgery.

The patient was seated up on the table after the general anesthesia effect wore off. The deviation was measured for near and far distant vision by a prism cover test by an orthoptist (Fig. 2). Propracaine 1% eye drops were instilled and adjustment was made until the deviation was less than 15 PD in the primary position, with no abnormal head posture (Fig. 3). The conjunctival incision was closed and the eye was padded for one more hour.

## RESULTS

Eighteen eyes of eighteen patients who were operated for exotropia ranging from 30 PD to 80 PD with a mean of 60 PD by adjustable suture technique in LRBT Free Base Eye Hospital Karachi. There were 13 (72.2%) males and 5 (27.7%) females out of 18 patients. Sixteen out of eighteen (88.8%) patients were satisfied with their cosmetic appearance (table 1). One out of eighteen (5.55%) patients needed reoperation because



Fig. 1: Right eye Exotropia (pre-operative)



Fig. 2: Post-surgery orthoptic assessment



Fig. 3: Post-adjustment

of residual exotropia of 30 PD (table 2). Mean change in angle of deviation at the end of follow up was from  $60.55 \pm 11.75$  PD to  $15.22 \pm 5.15$  PD with a percentage change of 74.62% ( $p= 0.000$ ).

The paired sample test, statistics and correlations are illustrated in table 3, 4 and 5 respectively.

**Table 1:** Patient satisfaction following surgery

Cosmetic Appearance (%) n = 18	
16 (88.88%)	

**Table 2:** Rate of re-operation following surgery

No. of Patients	Re-operations Required
18	1

## DISCUSSION

Adjustable strabismus surgery first described by Jampolsky<sup>10</sup>, it has the advantage of decreasing the redo surgeries and increasing the accuracy of end point in strabismus correction which has resulted in more surgeons opting for this technique in cooperative patients<sup>11</sup>. The post operative adjustment of the rectus muscle in two stages is commonly used, while an intra operative adjustment in one stage under local anesthesia is less commonly done<sup>12</sup>. Intra operative one stage adjustment has been limited in literature to few patients because it is a lengthy and tedious task & requires an experienced surgeon, as well as a cooperative candidate.<sup>13</sup> However, in a two stage adjustment procedure, there is usually time gap between surgery and starting adjustment. Some surgeons do adjustable surgery using retrobulbar anesthesia rather than general anesthesia, but the patient and surgeon should wait until the anesthetic effect wears away<sup>6</sup>. In this study all operations were performed under general anesthesia and the adjustment was done on recovery room after 6 hours.

In this study mean change in angle of deviation at the end of follow up was 74.62%, whereas in another study average change in angle of deviation was 87.5%<sup>14</sup>. Melhuish and Kemp presented a series of 20 patients operated using adjustable sutures and claiming an 85% success rate<sup>15</sup>.

Zhang M S also reported 74.8% success rate in patients undergoing strabismus surgery by adjustable suture method.<sup>16</sup> In this study Sixteen out of eighteen (88.8%) patients were satisfied with their cosmetic

**Table 3:** Paired Sample Tests

Pair I Pre-operative Post-operative	Paired Differences					T	Difference	Sig. (2-tailed)			
	Mean	Std. Dev.	Std. Error Mean	95% Confidence Interval of the Difference							
				Lower	Upper						
	41.77	10.09	2.37	39.75	49.79	18.82	17	0.00			

**Table 4:** Paired sample statistics

Pre-operative Post-operative	Mean	N	Standard Deviation	Std. Error Mean
	60.00	18	11.75	2.77
	15.22	18	5.15	1.21

**Table 5:** Paired Sample Correlations

Pre-operative and Post-operative	N	Correlation	Significance
	18	0.52	0.02

appearance, Tripathi A reported 96% of cosmetically satisfied patients with their appearance in his study<sup>14</sup>. One out of eighteen (5.55%) patients needed reoperation because of residual exotropia of 30 PD in this study, where as in the study of Tripathi A, 8.51% patients needed a reoperation<sup>14</sup>.

It is worth nothing, however, that adjustable suture strabismus surgery requires extra time and staff as well as additional recovery room space for orthoptic assessment and further adjustment, but on other hand it reduces the rate of reoperations.

## CONCLUSION

In conclusion, adjustable suture surgery allows the surgeon the ability to place the eye in a desired position within a few hours after surgery with the patient fully awake and free of the effects of anesthesia. It has improved surgical results in our strabismus patients and has markedly reduced the number of redo surgeries.

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