Managing V Pattern Exotropia

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Case 1

A case of V pattern exotropia with inferior oblique overaction in a young patient.

She had a best corrected visual acuity of 6/6 in both eyes with –1.25 D Sphere given after a cycloplegic refraction. She had a normal fundus with extorsion of the macula. On PBCT [Prism bar cover test] in upgaze horizontal, gaze and downgaze it was 60, 35 and 10 prism diopters on repeated examinations. Patient had alternate suppression with free alternation. Bilateral inferior oblique overaction was present.

The plan for surgery was decided. The clinical management of this patient is based on the following factors:

How is it decided what component of the “V” is contributed by the oblique muscle overaction?

How do we decide the surgical plan- The options being

1. Two horizontal muscle surgery with vertical shift of the horizontal muscles insertion—either bilateral lateral rectus (LR) muscle recession, or unilateral medial rectus (MR) resection with LR muscle recession

2. Inferior oblique muscle weakening procedure

3. Both a weakening procedure on inferior oblique with horizontal muscle recession or resection procedure with vertical shift of the muscle insertion

If both then what component of the exotropia would be corrected by the inferior muscle weakening and horizontal correction should be planned with which PBCT value in mind.

Strabismus surgery dictums have more or less been well established, but this is one situation that may be tricky.

Experts in the field of strabismus were consulted and their views are outlined below. To illustrate the variability in presentation Case 2 pictures are also attached.

Dr. T.S. Surendran

A good result can be achieved in such patients by taking the PBCT in horizontal gaze as base line subtracting 15-20 dioptres for inferior oblique overaction and then correct the horizontal muscles and shift the insertion
downwards in case of medial rectus and upwards in case of lateral rectus one half of its width of insertion. Do surgery in one sitting combining the horizontal muscle procedure and oblique muscle weakening.

For a basic exotropia lateral rectus recession 6mm and medial rectus resection 5mm can be done. Differential recession of horizontal recti is another useful way of tackling V pattern. In this for V exotropia the lateral rectus recession would be more for the superior fibres so that in upgaze the abduction is weakened more – exotropia is well controlled.

**Dr. Elizabeth Joseph**

V pattern eso deviation or exo deviation may be with or without inferior oblique overaction and success of surgical procedure depends on accurate assessment and titration of surgery. Accurate tables are not available to guide towards proper planning of surgery and every case should be assessed individually.

First is assessment of the angle of deviation in primary position, 25 degrees up and down gazes and lateral gazes to find out the horizontal deviation, amount of V and whether obliques are overacting. Examine the versions in extreme 9 positions of gazing to identify any oblique overaction or underaction and do double Maddox rod test, to document torsion. In patients with inferior oblique overaction, there will be extorsion of fovea as demonstrated by indirect ophthalmoscope or fundus photography.

Bilateral weakening of inferior oblique by recession or myectomy can correct 15 to 20 PD of pattern and will not affect the horizontal angle in primary position. Vertical transposition of horizontal recti can correct about 15 PD of pattern strabismus.

**Her Surgical Strategy Is As Follows-**

In a patient with primary position horizontal squint with inferior oblique overaction and the pattern around 20 PD (difference between gaze up and gaze down = 20 PD) (as in the second patient whose pictures are shown) I will correct the deviation in primary position by horizontal muscle surgery without any vertical shift and tackle the V pattern by inferior oblique recession. If the inferior oblique are not tackled in such a patient the pattern deviation will remain.

If the difference between upgaze and downgaze is as high as 30-40 PD in a patient with V pattern and inferior oblique overaction (as in the first patient whose pictures are given). I will prefer to do inferior oblique weakening and vertical transposition of horizontal recti to change the force vector. Some of these patients with a very large V may have primary superior oblique paresis and secondary inferior oblique overaction, these patients present with very large V pattern and may require 6 muscle surgery including superior oblique tucking. In those patients without oblique overaction, horizontal muscle supraplacement or infraplacement along with recess/resect procedure is good enough to correct a moderate A OR V pattern. Horizontal transposition of vertical recti combined with horizontal muscle surgery in large patterns of 40 PD is associated with problems of anterior segment ischaemia and should be undertaken only if a vessel sparing technique is resorted to.

**Dr. K. Ravisankar**

In this patient 2 aspects of the problem are correction of the V phenomena and that of the exotropia. Bilateral inferior oblique weakening procedures correct 15-20º of the horizontal squint. Bilateral lateral rectus recession will correct the horizontal squint, if exotropia at distance is 15 PD more than near in primary gaze. The primary gaze PBCT should be used to calculate the amount of recession needed. This can be combined with differential recession of the horizontal recti, where the superior and inferior ends are recessed in differing amounts making the muscle insertion slanting and not parallel to the limbus which implies that recession for superior end of the lateral rectus is more than inferior end. This further corrects the V pattern strabismus.

The medial rectus is always moved towards the closed end of the ‘V’ i.e. shifted downwards if its resection is done. Further the recessed lateral rectus is always shifted towards the open end of the “V”.

**Dr. Suma Ganesh**

She also affirmed the viewpoint of doing one stage procedure - bilateral inferior oblique weakening with horizontal muscle surgery. Recessing the inferior oblique would correct 15-20° of exotropia and amount of
horizontal muscle surgery has to be calculated in primary gaze. The insertion can be shifted half the muscle width downwards for medial rectus and upwards for lateral rectus.

**Dr. Santhan Gopal KS**

In V exotropia with inferior oblique overaction, first thing is to note the way the recti are inserted.

If one was to imagine a line passing thru the centre of the eye horizontally, and then see how much of the insertion of the horizontal recti were above and below it. There would be the following situations.

A. If LR insertion was either way more superiorly, i.e. the horizontal line passed through the lower half of the insertion, there is no point in further shifting up this insertion for a patient of V Exotropia, instead one needs to do the inferior oblique weakening.

B. If MR insertion was either way more inferiorly, i.e. the horizontal line passed through the upper half of the insertion, there is no point in further shifting down this insertion for a patient of V Exotropia, instead one needs to do the inferior oblique weakening.

C. If the imaginary line passes thru the centre of each horizontal muscle insertion, shifting the insertions vertically will help in rectifying the V pattern. The LR insertion gets shifted half width of the insertion upwards, and the MR insertion gets shifted downwards.

D. If LR insertion was either way more inferiorly, i.e. the horizontal line passed through the upper half of the insertion, there is point in further shifting up this insertion for a patient of V Exotropia, thus vertical displacement of the LR insertion would improve V pattern exotropias.

E. If MR insertion was either way more superiorly, i.e. the horizontal line passed through the lower half of the insertion, there is point in further shifting down this insertion for a patient of V Exotropia, thus vertical displacement by one half of insertion width would help correcting the V pattern exotropia.

He was of the opinion that shifting the horizontal muscle insertions vertically to correct V pattern would help only if their insertions were either horizontal or superior in MR and inferior in LR.

Exotropia can be corrected as usual with either bilateral LR weakening or unilateral combined LR recession and MR resection, done at the same sitting.

**Dr. Meenakshi Dhar**

Decision regarding a V pattern exotropia should be made on the table to a certain extent. Correcting only the horizontal muscles can help in correcting a small V pattern in many cases of exotropia, provided all the check ligaments are released during surgery. This can be combined with vertical displacement of the insertions keeping in mind Dr. Santhan’s ideology (as illustrated above) on muscle insertions. The amount of recession and resection needed can be calculated taking the PBCT in primary straight gaze.

Then at a second stage inferior oblique weakening can be planned if needed. It is surprising to see how many V patterns get corrected by just doing horizontal muscle surgery. This leads to lesser surgical manipulation. It is the long term results with minimal surgical handling, which should be the goal. Neither the surgeon nor the patient should be in a hurry.

Of course if the V pattern is large as in case 1, one stage procedure of horizontal muscle weakening taking the PBCT in horizontal gaze after subtracting 15 PD can be done. The simultaneously performed bilateral IO recession would correct the 15 PD XT.

**Conclusion**

15-25 % exotropias have pattern strabismus. While assessing V pattern exotropia oblique muscle overaction should be looked for. Measurements of deviation should be taken in all 9 gazes. It could be due to inferior oblique muscle overaction or superior oblique muscle underaction or increased action of LR in upgaze or decreased MR action in downgaze.

Primary and reading positions are functionally the important positions of gaze. Orbital configuration can change the force vectors of the extra ocular muscles as in cases of Crouzon’s and Apert Syndrome. Correction of these may alter the extra ocular muscle alignment and action. Thus this should precede muscle alignment.
In all cases of strabismus the difference between primary up and down gaze needs to be calculated. A difference of 15 PD between up and down gaze makes it a clinically significant V pattern, while in A pattern strabismus the difference should be 25 PD.

The presence or absence of inferior oblique muscle overaction determines the surgical plan. Weakening inferior oblique corrects 15-20 PD of V pattern.

The horizontal muscles are operated keeping in mind their original insertions, after good surgical dissection during their disinsertion for recession or resection procedures. The muscle is reinserted with either slanting insertions or vertical displacement of one half or both. A useful mnemonic for the surgical procedures is ‘MALE’: Medial rectus to the apex of the pattern and Lateral rectus muscles to the empty space. [fig.]. Some surgeons realign the rectus muscle insertion by placing the superior corner of say LR and inferior corner of MR further away from the limbus and other end vice versa. This is called slanted insertion.

Surgical results are good with functional development of binocularity, correction of extorsion of the fovea and decrease in the pattern strabismus of course.

References:


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