

A-V Pattern Strabismus

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Alphabetic pattern strabismus, of which the most common example are A and V pattern horizontal deviations, has gained a lot of importance during the last few decades. The emphasis on this important subject is not only due to the fact that it is a common condition when one is on the lookout for it, but also that it is much more difficult to manage than are cases of comitant horizontal deviations. While the only effective treatment is surgery, routine surgery often fails and special surgical procedures have to be used.

A or V patterns occur when the relative contribution of the superior rectus and inferior oblique to elevation or of the inferior rectus and superior oblique depression are abnormal resulting in derangement of the balance of their horizontal vector in up and down gaze. They can also be caused by anomalies in the position of the rectus pulleys. Assessment is by measuring horizontal deviation in the primary position up gaze and down gaze. They can occur in both concomitant and incomitant deviation.

An A or V pattern is found in 15-25% of horizontal strabismus cases. An A-pattern is present when a horizontal deviation shows a more convergent (less divergent) alignment in upward gaze compared with down gaze. V-pattern describes a horizontal deviation that is more convergent (less divergent) in down gaze compared with up gaze.

Uretts-Zavatia in 1948 was the first to emphasize importance of measuring angle of deviation in cases of strabismus in the straight upward and downward positions of gaze in addition to the usual measurements in the primary straight-ahead position. In 1957, Albert suggested the excellent descriptive patterns of A-pattern and V-pattern.

Keywords: Deviation; A-Pattern; V-Pattern**Prevalence**

Since Uretts-Zavatia described them in 1948, A and V pattern have been commonly seen in at least one third of esotropia and exotropia. V pattern are more than A pattern while esodeviation are more common in the West, the exodeviation are more common in Indian and African races. The A-esotropia is the least type of pattern amongst the four main types, otherwise the diamond pattern is the least. At least of all.

Definition and classification

- A- Pattern: - (Minimum of 10 prism diopters of difference between up and down gaze).
- A - Esotropia (Esophoria): - Here, the convergent deviation increases in direct upward gaze and decreases in downward gaze.
- A - Exotropia (Exophoria): - Here, divergent deviation increases in downward gaze than when looking directly upward.
- V- Pattern: - (Minimum of 15 prism diopter difference between up and down gaze).

- V- Esotropia (Esophoria):- The convergent deviation is greater when looking directly downward than when looking directly upward.
- V- Exotropia (Exophoria):- The divergent deviation is greater when looking directly upward than when looking directly downward.
- Other patterns: -
- X- pattern: Relative divergence on up and down gaze.
- Y- pattern: Eyes go out in upgaze, but straight alignment in primary and downgaze.
- Inverted Y- pattern (Lambda pattern): - Exotropia in downgaze only.
- Diamond pattern: Relative convergence on both up and downgaze.

Figure 1

Etiology

Three groups of etiological factors are described: -

- The horizontal school of Urist.
- The vertical school of Brown.
- Oblique muscle defect.
- Rectus muscle defect.
- Combine school.

In this above school of thought are follows

A-pattern

An 'A' pattern is considered significant if the difference between upgaze and downgaze is ≥ 10 prism (\blacktriangle). A particular complaint may be difficulty with reading if the patient is binocular.

A exotropia

- Medial rectus under action - So less adduction on depression.
- High lateral rectus insertion - So more abduction on depression.
- Inferior rectus under action - So less adduction on depression.
- Superior rectus overaction - So more adduction on elevation.
- Superior oblique sagittalisation - So superior oblique overaction.
- Mongoloid facial features

A esotropia

- Lateral rectus under action - So less abduction on elevation.
- Low medial rectus insertion - So more adduction on elevation.
- Inferior oblique under action -So less abduction on elevation.
- Superior oblique overaction -So more abduction on depression.
- Superior oblique sagittalisation - So superior oblique overaction.
- Mongoloid facial features.

V- Pattern

- Minimum of 15 prism diopter difference between up and down gaze.

V exotropia

- Lateral rectus overaction - So more abduction on elevation.
- Low lateral rectus insertion - So more abduction on elevation.
- Superior rectus under action - So less adduction on elevation.
- Inferior rectus overaction - So more adduction on depression.
- Inferior oblique sagittalisation - So inferior oblique overaction.
- Antimongoloid facial features.

V esotropia

- Medial rectus overaction - So more adduction on depression.
- High medial rectus insertion - So more adduction on depression.
- Superior oblique under action - So less abduction on depression.
- Inferior oblique overaction - So more abduction on elevation.
- Inferior oblique sagittalisation - So inferior oblique overaction.

Structural factor

Variation in skull and orbital bones are known to have under action or overaction of oblique muscle. This may be due to variation in the site of origin and insertion of the inferior oblique or superior oblique muscle. The trochlea acts as the functional origin of the superior oblique.

Sagittalisation

It occurs when there is a small angle between inferior oblique, and superior oblique, or both, and sagittal plane. The muscle is closer to sagittal axis. This results in decreased torsional power and muscle overacts to compensate. Thus, it increases vertical, and reduces the torsional action.

Thus, to summarize the etiologies,

A-pattern

- Superior oblique overaction
- Inferior rectus under action
- Inferior oblique under action

V-pattern

- Superior oblique under action.
- Inferior oblique overaction.
- Superior rectus under action.
- Brown syndrome.

Management

Treatment is indicated when binocular vision is disturbed, as in A exotropia and V esotropia, and the treatment is surgery. Guidelines for planning surgical correction are:

- Primary and reading positions are functionally the most important positions of gaze.
- Patients with large A or V patterns usually also have significant corresponding oblique muscle dysfunctions.
- If the power is related to overaction of the oblique muscles, these are weakened as part of the surgical plan. Weakening the inferior oblique muscles or tightening the superior oblique tendons corrects up to 15-20 prism diopters of V pattern.

- Bilateral superior oblique tenotomies correct up to 35-45 prism diopters of A pattern (i.e. produce 35-45 prism diopters of esotropic shift in downgaze).

Displacing the horizontal rectus muscle insertions is indicated when there is no oblique dysfunction, but this is not an effective substitute for oblique muscle surgery when overaction is present.

The effect of surgery on horizontal recti can be enhanced or decreased by vertical transposition of the insertion of the horizontal recti muscles. This technique was first described by Knapp.

The medial recti are always moved towards the direction of vertical gaze where convergence is greater or divergence is less (i.e., upward in A pattern and downward in V pattern). The lateral recti are moved towards the direction of vertical gaze in which divergence is greater or convergence is less (i.e., upward in V patterns and downward in A patterns). These rules apply whether horizontal recti are weakened or tightened.

A useful mnemonic for these procedures is MALE: -medial rectus to the apex of the pattern, lateral rectus to the empty space. Thus a muscle is moved in the direction in which the muscle's horizontal effect is to be least (eg: medial rectus muscles downward for V pattern).

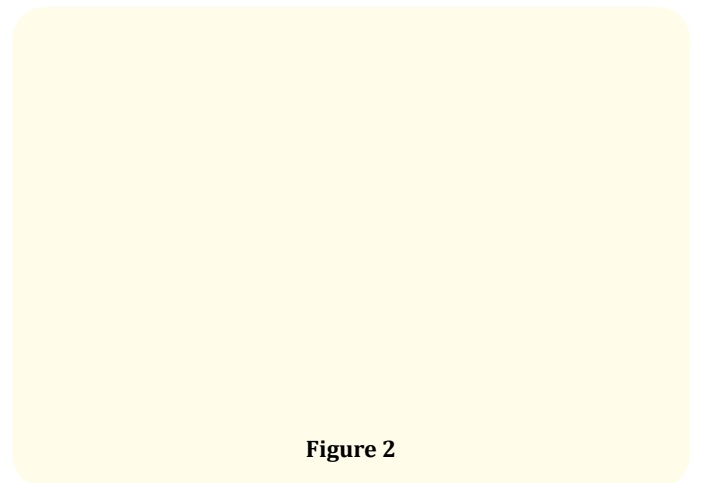


Figure 2

Direction of displacement of horizontal recti muscles in A and V pattern deviations.

Stanworth A (1968) has very well described the surgical approaches in A and V syndromes.

These are tabulated as follows:

A esotropia	Resection or tucking IO Tenotomy SO	Resection of IO	Resection of LR	Move LR Insertion downward	Antero position of SO	Temporal transplant of SR	Tabulate format
A exotropia	Resection of IR Tenotomy of SO	-----	Resection of MR	Move MR Insertion upward	-----	Medial Transplant of IR	
V esotropia	Recession of IO or myectomy Resection or tucking of SO	Anteposition of IO	Recession of MR	Move MR Insertion downward	Antero position of IO	Temporal Transplant of IR	
V exotropia	Recession or myectomy of IO Resection of SR	-----	Recession of LR	Move LR Insertion upward	-----	Medial Transplant of SR	

Table 1

Note: MR-Medial Rectus; LR-Lateral Rectus; SR-Superior Rectus; IR-Inferior Rectus; SO-Superior Oblique; IO-Inferior Oblique.

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