A-V PATTERN STRABISMUS - SIMPLIFIED APPROACH

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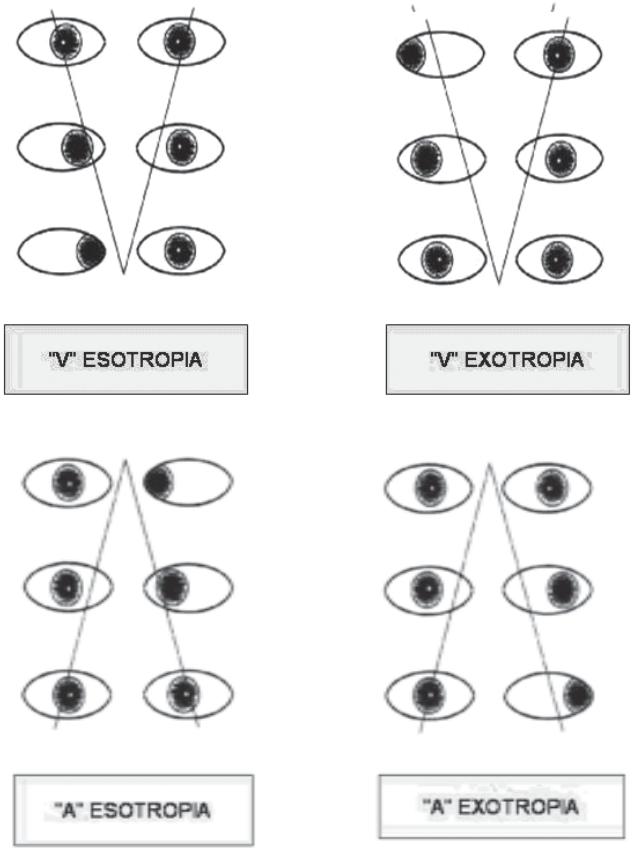
Alphabetic pattern strabismus, of which the most common examples are A and V pattern horizontal deviations, has gained a lot of importance during the last few decades. The emphasis on this important subject is not only due to the fact that it is a common condition when one is on the lookout for it, but 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.

Uretts- Zavatia in 1948 was the first to emphasize importance of measuring angle of deviation in cases of strabismus in the straight upward & 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.

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.

Definition and Classification

1. A- Pattern: - (Minimum of 10 prism dioptre of difference between up and down gaze).
   a) A - Esotropia (Esophoria):- Here, the convergent deviation increases in direct upward gaze and decreases in downward gaze.
   b) A - Exotropia (Exophoria):- Here, divergent deviation increases in downward gaze than when looking directly upward.
2. V- Pattern: - (Minimum of 15 prism dioptre difference between up and down gaze).
   a) V- Esotropia (Esophoria):- The convergent deviation is greater when looking directly downward than when looking directly upward.
   b) V- Exotropia (Exophoria):- The divergent deviation is greater when looking directly upward than when looking directly downward.
3. Other patterns:-
   a) X- pattern: Relative divergence on up and down gaze.
   b) Y- pattern: Eyes go out in upgaze, but straight alignment in primary and downgaze.
   c) Inverted Y- pattern (Lambda pattern):- Exotropia in downgaze only.
   d) Diamond pattern: Relative convergence on both up and downgaze.



Etiology

Three groups of etiological factors are described:-

a) The horizontal school of Urist (1951 -58).
b) The vertical school of Brown (1963)
1. Oblique muscle defect
2. Rectus muscle defect
c) Combined school.

The conclusions of the above Schools of thought are tabulated as follows:-

"A"-Pattern

A exotropia

A) Medial rectus underaction -So less adduction on depression.
B) High lateral rectus insertion - So more abduction on depression.
C) Inferior rectus underaction -So less adduction on depression.
Superior rectus overaction - So more adduction on elevation.
D) Superior oblique sagittalisation - So superior oblique overaction.
E) Mongoloid facial features.

A esotropia

A) Lateral rectus underaction - So less abduction on elevation.
B) Low medial rectus insertion - So more adduction on elevation.
C) Inferior oblique underaction -So less abduction on elevation.
Superior oblique overaction -So more abduction on depression.
D) Superior oblique sagittalisation - So superior oblique overaction.
E) Mongoloid facial features.

"V"-Pattern

V exotropia

A) A) Lateral rectus overaction - So more abduction on elevation.
B) Low lateral rectus insertion - So more abduction on elevation.
C) Superior rectus underaction - So less adduction on elevation.
Inferior rectus overaction - So more adduction on depression.
D) Inferior oblique sagittalisation -So inferior oblique overaction.
E) Antimongoloid facial features.

V esotropia

A) Medial rectus overaction - So more adduction on depression.
B) High medial rectus insertion -So more adduction on depression
C) Superior oblique underaction - So less abduction on depression.
Inferior oblique overaction -So more abduction on elevation.
D) Inferior oblique sagittalisation -So inferior oblique overaction.
E) Antimongoloid facial features.

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 underaction
- Inferior oblique underaction

V pattern

- Superior oblique underaction
- Inferior oblique overaction
- Superior rectus underaction
- Brown syndrome

Clinical Features and Diagnosis

1. An increase in deviation in downgaze (with A exotropia and V esotropia) may cause discomfort during reading or in near work.
2. A case of convergent squint showing a V pattern may be mistaken as a case of accommodative convergence excess type of deviation and vice versa. Similarly a case of V pattern in divergent strabismus (V exotropia) may be confused with divergence excess type of exotropia.

Hence the deviation should be measured in 3 sets of position:

- In primary position
- 25 degrees of upgaze
- 25 degrees of downgaze

In V pattern, there should be a minimum of 15 prism dioptres of difference between up and downgaze; and in A pattern, a minimum of 10 prism dioptres difference.

3. Chin elevation in A esotropia and V exotropia;

Chin depression in V esotropia and A exotropia.

Management

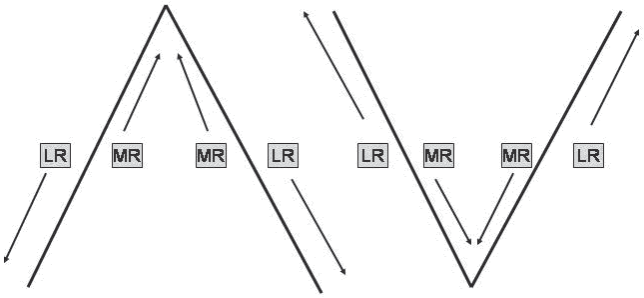
Treatment is indicated when binocular vision is disturbed, as in A exotropia and V esotropia, and the treatment is surgery. Guidelines for planning surgical correction are:

- 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 upto 15-20 prism dioptres of V pattern.

  Bilateral superior oblique tenotomies correct upto 35-45 prism dioptres of A pattern (i.e. produce 35-45 prism dioptres 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 rectii muscles. This technique was first described by Knapp (1969).

  The medial recti are always moved towards the direction of vertical gaze where convergence is greater or divergence is less (ie, 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 (ie, 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).



Direction of displacement of horizontal recti muscles in A & V pattern deviations

Stanworth A (1968) has very well described the surgical approaches in A and V syndromes. These are tabulated as follows:

1)A esotropia	Resection or tucking IO Tenotomy SO	Resection of IO	Resection of LR	Move LR Insertion downward	Anteroposition of SO	Temporal transplant of SR
2)A exotropia	Resection of IR Tenotomy of SO	----------	Resection of MR	Move MR Insertion upward	----------	Medial Transplant of IR
3)V esotropia	Recession of IO or myectomy Resection or tucking of SO	Anteroposition of IO	Recession of MR	Move MR Insertion downward	Anteroposition of IO	Temporal Transplant of IR
4)V exotropia	Recession or myectomy of IO Resection of SR	----------	Recession of LR	Move LR Insertion upward	----------	Medial Transplant of SR

Note: - MR-medial rectus; LR-lateral rectus; SR-superior rectus; IR-inferior rectus; SO-superior oblique; IO-inferior oblique

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