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Sixth Nerve Palsy

Sixth nerve palsy, abducens nerve palsy, or lateral rectus palsy is a disorder associated with dysfunction of cranial nerve VI (the **abducens nerve**) which is responsible for contracting the **lateral rectus muscle** to **abduct** (i.e. turn out) the **eye**. The inability of an eye to turn outward results in an **esotropia** of which the primary symptom is **double vision** or **diplopia** in which the two images appear side-by-side. The condition is commonly unilateral, but can also occur bilaterally.

Characteristics

Limitation of **abduction** or the limitation to move the eye outward away from the nose. Patients sometimes adopt a face turn towards the side of the affected eye, moving the eye away from the field of action of the affected lateral rectus muscle, with the aim of controlling diplopia and maintaining binocular vision.

Diplopia is typically experienced by adults with VI nerve palsies, but children with the condition may not experience **diplopia** due to **suppression**. The neural plasticity present in childhood allows the child to 'switch off' the information coming from one eye, thus relieving any diplopic symptoms. Whilst this is a positive adaptation in the short term, in the long term it can lead to a lack of appropriate development of the visual cortex giving rise to permanent visual loss in the suppressed eye; a condition known as **amblyopia**.

Causes

In general terms, the most common causes of VIth nerve palsy in adults are:

- **More common:**
Vasculopathic (**diabetes**, **hypertension**, **atherosclerosis**), **trauma**, **idiopathic**.
- **Less common:**
Increased **intracranial pressure**, **giant cell arteritis**, **cavernous sinus mass** (e.g. **meningioma**, **aneurysm**, **metastasis**), **multiple sclerosis**, **sarcoidosis/vasculitis**, **postmyelography** or **lumbar puncture**, **stroke** (usually not isolated).

In children, a VIth nerve palsy could be due to traumatic, **neoplastic** (most commonly brainstem glioma), as well as **idiopathic**. Benign and rapidly recovering isolated VIth nerve palsies can occur in childhood, sometimes **precipitated** by ear, nose and throat infections.

Differential diagnoses

Differential diagnosis is rarely difficult in adults. Onset is typically sudden with symptoms of horizontal diplopia. Limitations of eye movements are confined to abduction of the affected eye (or abduction of both eyes if bilateral) and the size of the resulting convergent squint or esotropia is always larger on distance fixation - where the lateral rectii are more active - than on near fixation - where the medial rectii are dominant. Abduction limitations which mimic VIth nerve palsy may result secondary to surgery, to trauma or as a result of other conditions such as **myasthenia gravis** or **thyroid eye disease**.

In children, differential diagnosis is more difficult because of the problems inherent in getting infants to cooperate with a full eye movement investigation. Possible alternative diagnosis for an abduction deficit would include:

1. **Mobius syndrome** - a rare congenital disorder in which both VIth and VIIth nerves are bilaterally affected giving rise to a typically 'expressionless' face.
2. **Duane's syndrome** - A condition in which both abduction and adduction are affected arising as a result of partial innervation of the lateral rectus by branches from the IIIrd oculomotor cranial nerve.
3. **Cross fixation** which develops in the presence of **infantile esotropia** or **nystagmus blockage syndrome** and results in habitual weakness of lateral rectii.

Management

The first aims of management should be to identify and treat the cause of the condition, where this is possible, and to relieve the patients symptoms, where present. In children, who rarely appreciate **diplopia**, the aim will be to maintain binocular vision and, thus, promote proper visual development. In adults initial treatment may include Fresnel prisms, occlusion, or even BOTOX injections.

Thereafter, a period of observation of around 9 to 12 months is appropriate before any surgical intervention, as some palsies will recover without the need for surgery.

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