

## Amblyopia (lazy eye)

Amblyopia (often called a lazy eye) means that vision in one eye does not develop fully during early childhood. Amblyopia is usually a correctable problem if it is treated early. Late treatment can mean that the sight problem remains permanent. A squint (strabismus) is one of the most common causes of amblyopia.

Treatment of amblyopia involves making the lazy eye work harder to see. This is usually done by blocking the vision in the good eye with a patch or by making the eyesight in the good eye blurry by using atropine eye drops.

### What is amblyopia?

Amblyopia is a condition where the vision in an eye is poor because it is not used enough in early childhood and therefore doesn't develop as well. The reason for this underuse is that this eye has poorer vision than the other.

In most cases, only one eye is affected, although it can affect both eyes. Amblyopia is often called a lazy eye. In some cases of amblyopia caused by anisometropia (see below), the problem can sometimes be corrected by glasses. In most cases, however, glasses do not help.

### Understanding the development of vision

Newborn babies can see but their ability to focus on detail is limited. As they grow, the visual pathways continue to develop from the eye to the brain and within the brain. The brain learns how to interpret the vision signals that come from the eye.

This visual development continues until about age 7-8 years. After this time, the visual pathways and the parts of the brain involved with vision are fully formed and development is finished.

If, for any reason (such as a [squint](#) (strabismus) or a [cataract](#)), a young child cannot use one or both eyes normally then vision is not learnt properly by the vision centre in the brain. This results in poor sight (poor visual acuity) called amblyopia. The amblyopia develops in addition to whatever else is affecting the eye.

If the underlying eye problem (eg, squint, cataract) is not treated before the age of about 7 years, the visual impairment from amblyopia usually remains permanent.

## What causes amblyopia?

Various eye disorders can cause amblyopia. The three most common causes are:

### Squint

A squint (strabismus) is a condition where the eyes do not look together in the same direction. Whilst one eye looks straight ahead, the other eye turns to point inwards, outwards, upwards or downwards.

This may happen all the time or just when concentrating or when the eye is tired. If the eyes are not straight (aligned), they focus on different things. The result is that the brain ignores the signals from one of the eyes to avoid seeing double.

This means that only one eye is used to focus on objects and the other eye can become 'lazy' (amblyopic), not getting a chance to develop its brain pathways. Most cases of squint occur in early childhood – the critical time when the brain is learning to see.

In some children with squint, the vision in each eye remains normal. In these children, the eye that is used to focus changes from time to time. Consequently, the visual pathways get a chance to develop from both eyes.

However, in most cases of squint, one eye remains the dominant, focusing eye. The other turned (squinting) eye is not used to focus, then fails to develop the normal visual pathways in childhood and amblyopia develops. [See the separate leaflet called Squint in Children \(Strabismus\) for more details.](#)

## **Refractive errors – particularly anisometropia**

Refractive errors are eyesight problems due to poor focusing of light through the lens in the eye. These are the errors that mean people need spectacles for everyday vision. Refractive errors include: short sight (**myopia**), long sight (**hypermetropia**) and **astigmatism**.

See the separate leaflets called [Short Sight \(Myopia\)](#), [Long Sight \(Hypermetropia\)](#) and [Astigmatism](#) for more details.

If there is a refractive error in one eye, the other eye is usually the same or similar. A situation called anisometropia occurs where there is a difference of refraction between the two eyes. In anisometropia, one eye may be short-sighted (myopic) and the other normal or long-sighted (hypermetropic).

If this difference is large, the brain cannot understand the images coming from both eyes and will choose to ignore the signals coming from one eye. Usually the brain selects the eye with the better refractive error in preference. The other eye (often the most long-sighted one) then becomes 'lazy'.

Refractive errors can usually be corrected with glasses. Prescription lenses change how the lens of the eye focuses light. Unless vision is tested, a parent may not realise their child has a refractive error. This is particularly the case if the child has anisometropia. One eye might have good enough vision to cope well enough and, without anyone realising, amblyopia may develop in the eye not being used.

## **Other disorders that prevent clear vision**

Any disorder in a young child that prevents good vision can lead to amblyopia as the brain fails to develop the visual pathways. This is known as stimulus deprivation amblyopia. For example, a cataract in a lens of an eye or a scarred cornea stops light getting to the back of the eye. This is why it is important to remove a cataract in a child as early as possible. [See the separate leaflet called Cataracts for more details.](#)

Even a droopy eyelid can cause amblyopia if it covers enough of the eye to prevent it seeing properly.

## How common is amblyopia?

About 1 in 25 children develop some degree of amblyopia. Amblyopia is the most common condition treated by children's (paediatric) eye surgeons (ophthalmologists) and professionals who treat eye movement and vision problems (orthoptists).

## How is amblyopia diagnosed and assessed?

Amblyopia can be diagnosed by examining the eyes and testing vision. Different techniques are used to test vision depending on the age of the child. Children with a known squint (strabismus) are monitored carefully to see if amblyopia develops.

Children in the UK are usually offered a routine school-entry vision check. One of the main reasons for this is to detect amblyopia whilst it is still treatable. However, even if a child has had an eye check in the past, it is important to see an optician if there is suspicion that vision in one or both eyes has become poor. A very young (pre-school) child can be seen by an optician if there are concerns about their vision.

A baby or child with a suspected amblyopia is usually referred to an orthoptist. Orthoptists are specially trained to assess and manage children with squint and amblyopia. If necessary, an orthoptist will refer a child to an eye surgeon (ophthalmologist) for further assessment and treatment.

## Can amblyopia be corrected?

Treatments include:

- Correcting any underlying eye disorder, such as squint (strabismus), or correcting refractive errors - for example, long sight (hypermetropia) or short sight (myopia).
- Training the amblyopic eye to work properly, so that vision can develop correctly.

### Correcting the underlying eye disorders

Refractive errors such as short or long sight can be corrected with glasses. Cataracts can be treated with an operation. Improvement in eyesight after being fitted with glasses for a refractive error can take 4-6 months.

## **Making the affected eye work**

The main treatment for amblyopia is to restrict the use of the good eye. This then forces the affected eye to work. If this is done early enough in childhood, the vision will usually improve, often up to a normal level. In effect, the visual development of the affected eye catches up.

## **Eye patching**

The most common treatment for amblyopia is eye patching. This entails the good eye being covered with an eye patch, forcing the 'lazy' (amblyopic) eye to see. Eye patches are soft, with sticky edges that fix them to the skin surrounding the eyelids. Eye patching is also called occlusion.

The length of treatment with an eye patch is dependent on the age of the child and the severity of the amblyopia. Treatment is continued until either the vision is normal, or until no further improvement is found. Usually you would be followed up every three months.

If the vision is normal or stable for six months, use of the eye patch may be tailed off. If your child has had cataracts, full-time eye patching may be advised until the age of 7 years. Short breaks would be built into this time, to prevent the good, patched eye from becoming amblyopic due to disuse.

It may take several weeks to several months for eye patching to be successful. On average, patches may be worn for between two and six hours per day. However, in severe cases they may have to be worn for most of the day.

**Note:** some people wrongly think that eye patching is a treatment to correct the appearance of a squint. Eye patching and other treatments for amblyopia aim to improve vision and do not correct the appearance of a squint.

## **Further maintenance treatment**

The child will be followed up, usually until about 8 years of age. This is to make sure that the treated eye is still being used properly and does not become amblyopic again. Sometimes, further patch treatment (maintenance treatment) is needed before the vision pathways in the brain are fixed and cannot be changed.

## **Eye drops**

Other treatments for amblyopia include eye drops. Occasionally, eye drops are used to blur the vision in the good eye instead of an eye patch. Eye drops can be useful when a child refuses to wear a patch.

Once drops are put in a child's eye, the child can't change the blurring of vision; it simply wears off after time. Eye drops may need to be put in each day but sometimes it can be done just at weekends.

Some people find it difficult to hold their child and put drops in the eye but, with practice, it is possible to get used to using eye drops. From a cosmetic viewpoint, using eye drops is less obvious than an eye patch.

The eye drops used to blur the vision usually contain a medicine called [atropine](#). This can occasionally cause side-effects such as eye irritation, reddening (flushing) of the skin, a fast heartbeat ([tachycardia](#)) and hyperactivity.

## **Glasses**

Another option is to be fitted with glasses that prevent the good eye from seeing clearly. Usually, one lens of the glasses will be frosted so that it can't be seen through.

Obviously, a young child has to be persuaded to keep the glasses on. One problem with this method is that the child may look around the lens, defeating the object of preventing the eye from seeing.

Rarely, special contact lenses are used for the same job – to blur the vision in the good eye. Contact lenses can be difficult to use in young children. Careful hand washing when handling the lenses is essential to prevent eye infections.

## **Vision therapy**

Vision therapy can be used as a treatment to maintain the good work achieved by eye patching. This involves playing visually demanding games with a child to work the affected eye even harder – like eye training.

A child should do close-up activities when wearing a patch or using other amblyopia treatments. Activities such as drawing and colouring, reading and schoolwork are detailed and work the eye well.

# Why is treating amblyopia important?

In permanent amblyopia it is impossible to see properly out of one eye. The severity of sight impairment can vary. Although it is possible to function with only one eye, it is always best to have two fully functioning eyes. If there is only good vision in one eye, there is the risk of severe sight problems resulting from an injury or disease of the good eye later in life. So, treatment is usually always advised if it is likely to restore vision.

Even with mild amblyopia, three-dimensional (3D) vision may be affected and it may be hard to have a sense of distance and depth when looking at objects. This can affect eye-hand co-ordination when doing fine tasks like threading a needle or when judging distance for sports like tennis and rounders.

Without a three-dimensional image, people learn to compensate fairly well over time. They are able to judge depth in other ways, such as:

- By the position of other objects around.
- By shadows.
- By the way things move relative to each other in their vision as they move their heads.

A loss of binocular vision (visual input from both eyes) also reduces the size of the visual field, which is the whole area seen at any one time - central and peripheral vision. This is because, when both eyes are functioning normally and looking straight ahead, each sees a slightly different field of vision with the right eye seeing further over to the right and the left eye further over to the left.

When both eyes are working together the brain adds up those two images to produce the whole picture of the world that the brain sees. However, if one eye is being ignored by the brain, the size of the area will be reduced accordingly.

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## What is the outlook for amblyopia?

As a rule, the younger the child is treated, the quicker the improvement in vision is likely to be and the better the chance of restoring full normal vision. If treatment is started before the age of about 6-7 years then it is possible to restore normal vision.

If treatment is started in older children then some improvement in vision may still occur. However, full normal vision is unlikely to be achieved. About 1 in 4 children develop a recurrence of amblyopia on stopping treatment.

This risk is higher if patching is stopped abruptly; this is the reason for ongoing monitoring. If the problem returns, further treatment is usually needed. It is very important to follow the advice given by an eye specialist (an orthoptist or ophthalmologist) about patching (or other amblyopia treatments) carefully.

The most common reason for a treatment failure is because the patch has not been worn correctly for long enough. As your child grows older, the vision pathways will become fully formed and impossible to change, so early patching is essential.

It can be difficult to persuade a young child to wear an eye patch. The patch may be annoying and they are likely to try to remove it. Effectively, their sight is temporarily made worse whilst they are wearing the patch. By covering their good eye, they are being forced to use the amblyopic eye. This is often impossible for a young child to understand.

Rewards, such as stickers or star charts, can be used to encourage a child to wear their patch. It is usually easier to patch a baby's eye, as they are less able to remove it. If it is impossible for a child to wear the patch properly, the ophthalmologist or orthoptist may suggest using drops or another method to make the amblyopic eye work.

Hard work in persisting with treatment can give the long-term benefit of good vision so is worth it in the long run.

***Dr Mary Lowth is an author or the original author of this leaflet.***



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## Further reading

- [Guidelines for the Management of Strabismus in Childhood](#); Royal College of Ophthalmologists (2012)
- [Birch EE](#); Amblyopia and binocular vision. Prog Retin Eye Res. 2013 Mar;33:67-84. doi: 10.1016/j.preteyeres.2012.11.001. Epub 2012 Nov 29.
- [Lazy Eye \(Amblyopia\) in Children](#); Institute for Quality and Efficiency in Healthcare, June 2020
- [Success with Patching](#); Oxford University Hospitals

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Authored by:	Peer Reviewed by: Dr Colin Tidy, MRCP	
Originally Published: 19/11/2023	Next review date: 07/06/2023	Document ID: doc_4776

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