CONDITION

Astigmatism

Learn how astigmatism affects vision, what causes it, how eye doctors diagnose it, and the options for correction and follow-up.

WHAT IT IS
Common refractive focusing error

BODY SYSTEM
Eyes and vision

MAIN SYMPTOMS
Blurred or distorted vision, squinting, eye strain, headaches

WHAT CAUSES IT
Natural or inherited eye shape

HOW IT IS DIAGNOSED
Eye examination and refraction testing

MAIN TREATMENT
Vision correction with glasses or contact lenses

CAN IT BE CURED?
Sometimes, surgery can reduce refractive error

IS IT AN EMERGENCY?
No, unless sudden severe eye pain with reduced vision

LONG-TERM OUTLOOK
Usually manageable with vision correction

Overview

Astigmatism is a common focusing problem caused by the shape of the eye. It is a type of refractive error, meaning that light does not focus properly on the retina. The retina is the light-sensitive layer at the back of the eye that sends visual information to the brain.

In an eye without astigmatism, the cornea-the clear front surface of the eye-and the lens inside the eye help focus light evenly. With astigmatism, the cornea or lens has different curves in different directions. Light may focus at more than one point instead of forming one sharp image. This can make vision look blurred, stretched, or distorted at both near and far distances.

Astigmatism often occurs together with nearsightedness or farsightedness. Nearsightedness makes distant objects harder to see clearly. Farsightedness can make near vision difficult, although its effects vary with age and severity.

Eye doctors may describe astigmatism as corneal or lenticular, depending on whether it comes mainly from the cornea or the lens. They may also call it regular or irregular. Regular astigmatism follows a predictable pattern and is usually corrected well with glasses or standard contact lenses. Irregular astigmatism can occur when the corneal surface is uneven because of disease, injury, or surgery. It may require specialized contact lenses or treatment of the underlying condition.

Astigmatism is usually manageable. However, uncorrected astigmatism can interfere with reading, driving, school, work, and other activities. In young children, significant uncorrected astigmatism may affect visual development.

Symptoms

Mild astigmatism may cause no noticeable symptoms. When symptoms occur, they may include:

These symptoms are not specific to astigmatism. Dry eye, cataracts, other refractive errors, and several eye conditions can cause similar problems. An eye examination is needed to identify the cause.

Children may not realize that their vision is blurred because they have no basis for comparison. Possible signs include squinting, sitting close to screens, avoiding reading, losing their place while reading, or having difficulty seeing the board at school. These signs do not prove that a child has astigmatism, but they are reasons to arrange an eye evaluation.

Astigmatism usually does not cause a sudden loss of vision. New or rapidly worsening vision changes should be assessed rather than assumed to be a routine prescription change.

- Blurred or distorted vision at near or far distances
- Trouble seeing fine details
- Squinting to make objects appear clearer
- Eye strain or tired eyes
- Headaches after reading or prolonged visual work
- Difficulty seeing clearly at night
- Glare, halos, or streaking around lights

Causes and risk factors

Most astigmatism results from the natural shape of the cornea or lens. It can be present from birth and may run in families. The amount and direction of astigmatism can change as the eye grows or ages.

Astigmatism is not caused by reading, using digital screens, sitting too close to a television, or using the eyes in dim light. These activities may make eye strain more noticeable, but they do not create the underlying refractive error.

Some eye conditions can cause or worsen astigmatism. Keratoconus is one example. In keratoconus, the cornea becomes thinner and gradually changes shape, often producing irregular astigmatism. Frequent prescription changes, increasing astigmatism, or vision that cannot be corrected well with ordinary glasses may lead an eye doctor to check for this condition.

Other possible contributors include:

Astigmatism may also change after cataract surgery or corneal transplant surgery. In these situations, the amount and pattern depend on healing, the shape of the cornea, and the type of procedure performed.

A family history of astigmatism or keratoconus may increase the chance of having a similar problem. Rubbing the eyes forcefully or often has been associated with keratoconus and may worsen an already vulnerable cornea. Persistent itchy eyes should be discussed with a clinician so the cause can be treated and rubbing can be reduced.

- Scarring from an eye injury or infection
- Previous corneal surgery
- Changes after certain eye procedures
- Conditions that affect the eyelids or put pressure on the cornea
- Age-related changes in the eye's natural lens
- Cataracts, which cloud the lens and may alter the prescription

Diagnosis

Astigmatism is diagnosed during an eye examination. An optometrist or ophthalmologist can evaluate how clearly each eye sees and how the eye focuses light. An ophthalmologist is a medical doctor who specializes in eye care and surgery. An optometrist provides eye examinations, vision correction, and management of many eye conditions.

The examination may include a visual acuity test using an eye chart. Each eye is tested

separately, usually with and without current glasses or contact lenses.

Refraction testing determines the lens power that provides the clearest vision. The clinician may ask which of several lens choices looks clearer. In children or people who cannot provide reliable answers, retinoscopy can estimate the prescription by measuring how light reflects from the eye.

An astigmatism prescription commonly includes a cylinder value and an axis. The cylinder describes the amount of astigmatism correction. The axis identifies the direction of that correction. These numbers describe the lens needed; they are not, by themselves, a diagnosis of eye disease.

A keratometer may be used to measure the curve of the cornea. Corneal topography or tomography creates a detailed map of the corneal shape. These tests are especially useful when irregular astigmatism or keratoconus is suspected, when contact lenses are being fitted, or when refractive surgery is being considered.

The clinician may also examine the front and back of the eyes. Dilating drops may be used to widen the pupils so the lens, retina, and optic nerve can be assessed. This helps identify other causes of reduced or changing vision.

A vision screening can detect possible problems, but it is not the same as a comprehensive eye examination. A full evaluation may be appropriate when symptoms persist, a screening result is abnormal, or there is concern about a child's visual development.

Treatment and management

Treatment depends on how much astigmatism affects vision, whether it is regular or irregular, and whether another eye condition is present. A small amount may not require correction if vision is comfortable and daily activities are not affected.

Glasses

Prescription glasses are the simplest correction for many people. The lenses redirect light so it focuses more clearly on the retina. Glasses can correct astigmatism together with nearsightedness, farsightedness, or age-related difficulty focusing up close.

A new prescription may feel unusual at first, especially after a major change in the amount or axis of astigmatism. If discomfort or distortion continues, the glasses and prescription should be checked rather than abandoned without advice.

Contact lenses

Soft toric contact lenses are designed to correct regular astigmatism. They include features

that help keep the lens in the correct position. Because the lens can rotate slightly with blinking, vision may sometimes fluctuate.

Rigid gas-permeable lenses create a smooth optical surface over the cornea. They may provide sharper vision for some people with higher or irregular astigmatism. Scleral lenses are larger rigid lenses that rest on the white part of the eye and arch over the cornea. They may be considered for keratoconus, corneal scarring, or other complex corneal shapes.

Contact lenses require professional fitting and careful hygiene. Wearers should follow the recommended replacement schedule, wash and dry their hands before handling lenses, and use approved contact lens solution. Water should not be used to rinse or store lenses. Sleeping, showering, or swimming in lenses can increase infection risk unless specific use has been discussed with the eye care professional.

Refractive surgery

Procedures such as LASIK or PRK can reshape the cornea to reduce certain refractive errors, including astigmatism. Surgery does not guarantee perfect vision or eliminate the possibility of needing glasses later.

Suitability depends on factors such as age, prescription stability, corneal thickness and shape, dry-eye symptoms, and overall eye health. Possible effects include dry eye, glare, halos, undercorrection, overcorrection, or reduced visual quality. A detailed evaluation and discussion of expected benefits, limitations, alternatives, and risks are important before choosing surgery.

Cataract surgery and corneal treatment

When cataract surgery is needed, astigmatism may sometimes be reduced with a toric intraocular lens or other surgical techniques. These options depend on corneal measurements, eye health, and visual goals.

Irregular astigmatism caused by keratoconus or another corneal disorder may require treatment of that condition as well as vision correction. For example, corneal cross-linking may be used in selected people to slow progression of keratoconus. It is intended to stabilize the cornea, not necessarily to remove the need for glasses or contact lenses.

Complications

Astigmatism itself does not usually damage the eye. Its main effect is reduced visual clarity. If it is not corrected, it may contribute to eye strain, headaches, and difficulty with visually demanding tasks.

In infants and young children, significant astigmatism can interfere with normal visual

development. The brain may begin to favor one eye or may not learn to process a clear image. This can lead to amblyopia, often called "lazy eye." Early assessment matters because treatment is generally more effective while the visual system is still developing.

Contact lens wear can lead to corneal irritation, scratches, inflammation, or infection. Prompt assessment is important for pain, marked redness, light sensitivity, discharge, or reduced vision, especially in a contact lens wearer.

Some complications relate to the cause of irregular astigmatism rather than the refractive error itself. Keratoconus, for example, may progress and make glasses less effective. Monitoring can help identify meaningful changes.

Follow up

Routine follow-up depends on age, symptoms, eye health, contact lens use, and how stable the prescription is. An eye care professional can recommend an appropriate schedule. Return sooner if vision is no longer clear with current correction, headaches or eye strain continue, or contact lenses become uncomfortable.

Children with significant astigmatism may need closer follow-up to confirm that glasses are worn as advised and that vision is developing evenly in both eyes. People with keratoconus or another corneal condition may need repeat corneal mapping to look for progression.

Arrange prompt eye care for a sudden change in vision, new double vision, eye pain, pronounced redness, or strong light sensitivity. Contact lens wearers with these symptoms should remove the lenses and seek advice promptly.

Flashes of light, many new floaters, or a dark curtain or shadow across the vision require urgent assessment because they can be signs of a retinal problem. Sudden severe eye pain with reduced vision, or vision loss after an injury or chemical exposure, requires emergency care. These are not typical symptoms of uncomplicated astigmatism.

Sources

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