CONDITION

Retinopathy of prematurity

Retinopathy of prematurity is abnormal retinal blood vessel growth that can affect babies born early.

WHAT IT IS
Abnormal retinal blood vessel growth in babies born early

BODY SYSTEM
Eyes and vision

MAIN SYMPTOMS
None early, poor visual response, crossed eyes, wandering eyes

WHAT CAUSES IT
Premature retinal development, influenced by oxygen and illness

HOW IT IS DIAGNOSED
Dilated retinal examination by a trained eye specialist

MAIN TREATMENT
Monitoring, laser or eye injections; surgery for detachment

CAN IT BE CURED?
Sometimes - treatment can stop progression

IS IT AN EMERGENCY?
Sometimes - sudden white pupil or lost visual response

LONG-TERM OUTLOOK
Many retain useful vision; severe disease can cause blindness

Overview

Retinopathy of prematurity, often called ROP, is a condition affecting the retina in some babies born prematurely. The retina is the light-sensitive layer at the back of the eye. It turns light into signals that travel to the brain and create vision.

The retina's blood vessels normally develop during the later part of pregnancy. When a baby is born early, this development must continue outside the womb. In some babies, the vessels grow abnormally. They may leak, bleed, form scar tissue, or pull the retina away from the back of the eye.

Most mild ROP improves without treatment. More advanced ROP can threaten sight, especially if the retina begins to detach. Because early ROP usually causes no visible symptoms, scheduled eye screening is essential. Screening allows treatment to be given

before serious vision loss develops.

ROP affects each eye separately. One eye may be more severely affected than the other.

Symptoms

Early ROP does not usually cause symptoms that a parent can see. A baby may appear to look around normally even while the condition is becoming more serious. This is why observation at home cannot replace retinal examinations.

Signs of previous or advanced ROP may become noticeable later. They can include:

These signs are not specific to ROP. They can have other causes and need an eye assessment.

Premature babies also have a higher risk of other vision problems, whether or not their ROP becomes severe. These include short-sightedness, long-sightedness, astigmatism, and a squint. Astigmatism means the eye focuses light unevenly, which can blur vision. A squint means the eyes do not consistently point in the same direction.

- Limited response to faces, lights, or moving objects
- Eyes that cross or point in different directions
- Repeated wandering or shaking eye movements
- A white or unusual-looking pupil
- Difficulty recognising objects or moving around safely

Causes and risk factors

ROP begins because the retina and its blood vessels are still developing when a baby is born. Birth changes the baby's oxygen levels, nutrition, circulation, and exposure to illness. These changes can interrupt normal blood vessel growth. Later, the oxygen-hungry retina may produce signals that cause fragile, abnormal vessels to grow.

The strongest risk factors are being born at an earlier stage of pregnancy and having a lower birth weight. The most premature and smallest babies generally have the greatest risk.

Other factors associated with ROP include serious breathing or circulation problems, infection, poor growth, and changes in blood oxygen levels. Supplemental oxygen can be lifesaving for a premature baby. The risk is linked to oxygen levels and fluctuations, not simply to whether oxygen was used. Neonatal teams carefully monitor oxygen to balance the needs of the lungs, brain, and eyes.

ROP is not caused by something a parent did or did not do. It is also not contagious.

Diagnosis

ROP is diagnosed through a retinal screening examination. Babies who meet local screening criteria are examined by an ophthalmologist or another appropriately trained eye specialist. Criteria are usually based on gestational age, birth weight, and the baby's clinical course.

Before the examination, eye drops widen, or dilate, the pupils. The specialist then examines the retina using a light and magnifying lens. A small device may gently hold the eyelids open. Some services also use wide-field retinal photographs, but these do not always replace an examination by a specialist.

The examination can be uncomfortable, and a baby may cry or become unsettled. The neonatal team monitors and supports the baby according to the unit's procedure.

ROP is described using several features:

Stages 1 and 2 are usually mild. Stage 3 involves abnormal blood vessel growth. Stage 4 means part of the retina has detached, while stage 5 means the retina is completely detached. The stage alone does not determine treatment; location and blood vessel changes also matter.

Examinations are repeated until the retinal vessels have developed far enough, the ROP has gone away, or treatment is needed. The timing is based on the baby's age and the previous examination. These appointments remain important after a baby leaves hospital.

- Zone: where the abnormality is located in the retina
- Stage: how far the retinal changes have progressed, from stage 1 to stage 5
- Plus disease: abnormal widening and twisting of retinal blood vessels
- Extent: how much of the retina is involved

Treatment and management

Mild ROP often settles as the eye continues to develop. In this situation, management means close monitoring rather than immediate treatment. Follow-up examinations check that the condition is improving and not becoming treatment-requiring ROP.

If the risk of retinal detachment becomes high, treatment may include laser therapy or an injection into the eye.

Laser treatment is applied to the undeveloped outer retina. It reduces the signals that drive

abnormal blood vessel growth. The procedure is usually performed with pain control or anaesthesia. Temporary swelling or redness may occur. Laser can preserve central vision, but it may reduce some peripheral vision and can contribute to short-sightedness.

Anti-VEGF medicines may be injected into the eye. VEGF is a natural protein that promotes blood vessel growth. Blocking it can cause abnormal vessels to settle, particularly when disease affects the back of the retina. Because ROP can return later after an injection, longer follow-up is usually needed. Researchers continue to study the possible effects of these medicines elsewhere in a developing baby's body.

Some babies receive both injection and laser treatment. The choice is based on the pattern of ROP, the baby's overall health, and the benefits and limitations of each approach.

Surgery may be needed if the retina has started to detach. Procedures can remove pulling scar tissue or support the retina while it heals. Surgery for advanced detachment is complex and cannot always restore useful vision.

Treatment does not end the need for eye care. Children treated for ROP need long-term checks for focusing problems, squint, lazy eye, glaucoma, and late retinal complications. Lazy eye, also called amblyopia, happens when the brain relies more on one eye and vision in the other eye does not develop normally.

Complications

The main serious complication is retinal detachment. Scar tissue can contract and pull the retina away from the back of the eye. A detached retina cannot work normally and may cause severe, permanent sight loss.

Other possible complications include:

Not every child with ROP develops these problems. Risk is generally higher after severe ROP, retinal detachment, or treatment. However, children with mild or resolved ROP can still need glasses or treatment for a squint.

- Short-sightedness, sometimes severe
- Astigmatism or long-sightedness
- Squint and amblyopia
- Glaucoma, caused by damage related to raised pressure inside the eye
- Cataract, which is clouding of the eye's natural lens
- Reduced peripheral or central vision

- Retinal tears or detachment later in life

Prevention

ROP cannot always be prevented. The main risk-very premature birth-is not always avoidable, and some babies develop ROP despite careful neonatal care.

When oxygen is needed, neonatal teams use monitoring and target ranges to avoid both dangerously low and unnecessarily high oxygen levels. Stable breathing, infection treatment, and support for growth are also important parts of premature infant care. These measures support overall health but cannot guarantee that ROP will not develop.

Screening does not prevent ROP from starting. It helps prevent avoidable sight loss by finding serious changes early enough for treatment. Keeping every scheduled examination is therefore one of the most important protective steps after discharge from hospital.

Living with it and what to expect

ROP develops over weeks and months while a premature baby's retina is maturing. Mild disease often stops progressing and disappears without treatment. More serious disease may change quickly, which is why examinations can be scheduled close together.

After ROP has settled, it does not usually remain actively progressing through childhood. Its effects can still influence how the eyes grow. A child may need glasses, patching for amblyopia, squint treatment, or low-vision support. New retinal problems can occasionally occur years later, particularly after severe ROP.

Many children with mild ROP develop useful vision and take part fully in school and daily activities. Children with reduced sight may benefit from early support with movement, communication, play, and learning. Vision services can help families adapt lighting, toys, reading materials, and classroom arrangements.

Regular eye appointments may continue through childhood and sometimes into adult life. The schedule is different from the frequent retinal examinations used during infancy. Routine follow-up looks for focusing problems, eye alignment changes, glaucoma, and late retinal complications.

Children and adults with a history of ROP should tell future eye-care professionals about it, even if their vision seems stable.

When to get medical help

Attend every scheduled ROP screening or follow-up appointment, even if your baby's eyes look normal. Contact the screening service promptly if an appointment is missed or your baby is discharged or transferred before screening is complete. The team can arrange the next examination at the correct time.

Seek urgent medical assessment if:

A white pupil has several possible causes, some unrelated to ROP, but it should be assessed urgently.

Use emergency services or the emergency department for sudden major loss of vision, a serious eye injury, or severe symptoms after recent eye treatment when the specialist team cannot be reached.

Changes such as a gradually developing squint, trouble focusing, sitting unusually close to screens, or difficulty seeing at school usually need a routine eye appointment rather than emergency care.

- A pupil looks white instead of black in person or repeatedly in photographs
- Your baby or child suddenly stops responding to faces, lights, or movement
- An eye becomes very red, swollen, cloudy, or appears painful
- There is increasing discharge, swelling, or distress after an eye injection or surgery
- A child with known retinal disease describes a curtain, shadow, flashes, or many new floating spots

Common questions

Does ROP make a baby blind?

Most babies with mild ROP do not become blind. Severe ROP can cause major sight loss if abnormal vessels and scar tissue lead to retinal detachment. Screening and timely treatment reduce this risk but cannot prevent every poor outcome.

Will ROP go away on its own?

Mild ROP often improves as the retinal blood vessels finish developing. More advanced patterns are less likely to settle safely without treatment. Only repeat retinal examinations can show whether the condition is improving or becoming more serious.

Is ROP caused by too much oxygen?

ROP is not caused by oxygen treatment alone. Premature retinal development, illness, oxygen levels, and changes in those levels all contribute. A premature baby may need oxygen to survive and protect the brain and other organs. Neonatal teams monitor it carefully.

Can ROP come back after treatment?

It can. Recurrence is possible after laser or an anti-VEGF injection, and it may occur later after anti-VEGF treatment. Follow-up continues until the specialist is confident that the retina is stable and sufficiently developed.

Will my child need glasses?

Many children born prematurely need glasses, including some whose ROP was mild or resolved. Short-sightedness and astigmatism are particularly common after severe or treated ROP. Regular eye tests help identify focusing problems while vision is developing.

Can adults have problems from childhood ROP?

Yes. Adults who had ROP may have short-sightedness, reduced vision, glaucoma, or an increased risk of retinal tears and detachment. The risk is not the same for everyone. A history of ROP should be mentioned during adult eye examinations.

Sources

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