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Cerebral hypoxia

Cerebral hypoxia occurs when there is not enough oxygen getting to the brain. The brain needs a constant supply of oxygen and nutrients to function.

Cerebral hypoxia refers to the largest parts of the brain, called the cerebral hemispheres. However, the term is often used to refer to a lack of oxygen supply to any part of or all of the brain.

Causes

In cerebral hypoxia, sometimes only the oxygen supply is interrupted. This can be caused by:

- Breathing in smoke (smoke inhalation), such as during a fire
- Carbon monoxide poisoning
- Choking
- Diseases that prevent movement (paralysis) of the breathing muscles, such as amyotrophic lateral sclerosis (ALS)
- High altitude exposure
- Pressure on (compression) the windpipe (trachea)
- Strangulation

In other cases, both oxygen and nutrient supply are stopped, caused by:

- Cardiac arrest (when the heart stops pumping)
- Cardiac arrhythmia (heart rhythm problems)
- Complications of general anesthesia
- Drowning
- Illegal drug or medicine overdose
- Injuries to a newborn that occurred before, during, or soon after birth, such as cerebral palsy
- Prolonged seizure (status epilepticus)
- Stroke
- Very low blood pressure

Brain cells are very sensitive to a lack of oxygen. Some brain cells start dying less than 5 minutes after their oxygen supply disappears. As a result, brain hypoxia can rapidly cause severe brain damage or death.

Symptoms

Symptoms of mild cerebral hypoxia include:

- Change in attention (inattentiveness)
- Poor judgment
- Speech disorder
- Uncoordinated movement

Symptoms of severe cerebral hypoxia include:

- Complete unawareness and unresponsiveness (coma)
- No breathing
- No response of the pupils of the eye to light

Exams and Tests

Cerebral hypoxia can usually be diagnosed based on the person's medical history and a physical exam. Tests are done to determine the cause of the hypoxia, and may include:

- Angiogram of the brain
- Blood tests, including arterial blood gases and blood chemical levels
- CT scan of the head
- Echocardiogram, which uses ultrasound to view the heart
- Electrocardiogram (ECG), a measurement of the heart's electrical activity
- Electroencephalogram (EEG), a test of brain waves that can identify seizures and show how well brain cells work
- Evoked potentials, a test that determines whether certain sensations, such as vision and touch, reach the brain
- Magnetic resonance imaging (MRI) of the head

If only blood pressure and heart function remain, the brain may be completely dead.

Treatment

Cerebral hypoxia is an emergency condition that needs to be treated right away. The sooner the oxygen supply is restored to the brain, the lower the risk for severe brain damage and death.

Treatment depends on the cause of the hypoxia. Basic life support is most important. Treatment involves:

- Breathing assistance (mechanical ventilation) and oxygen
- Regulating the heart rate and rhythm
- Fluids, blood products, or medicines to raise blood pressure if it is low

- Medicines or general anesthetics to calm seizures

Sometimes a person with cerebral hypoxia is cooled to slow down the activity of the brain cells and decrease their need for oxygen. However, the benefit of this treatment has not been firmly established.

Outlook (Prognosis)

The outlook depends on the extent of the brain injury. This is determined by how long the brain lacked oxygen, and whether nutrition to the brain was also affected.

If the brain lacked oxygen for only a brief period, a coma may be reversible and the person may have a full or partial return of function. Some people recover many functions, but have abnormal movements, such as twitching or jerking, called myoclonus. Seizures may sometimes occur, and may be continuous (status epilepticus).

Most people who make a full recovery were only briefly unconscious. The longer a person is unconscious, the higher the risk for death or brain death, and the lower the chances of recovery.

Possible Complications

Complications of cerebral hypoxia include a prolonged vegetative state. This means the person may have basic life functions, such as breathing, blood pressure, sleep-wake cycle, and eye opening, but the person is not alert and does not respond to their surroundings. Such people usually die within a year, although some may survive longer.

The length of survival depends partly on how much care is taken to prevent other problems. Major complications may include:

- Bed sores
- Clots in the veins (deep vein thrombosis)
- Lung infections (pneumonia)
- Malnutrition

When to Contact a Medical Professional

Cerebral hypoxia is a medical emergency. Call 911 or the local emergency number immediately if someone is losing consciousness or has other symptoms of cerebral hypoxia.

Prevention

Prevention depends on the specific cause of hypoxia. Unfortunately, hypoxia is usually unexpected. This makes the condition somewhat difficult to prevent.

Cardiopulmonary resuscitation (CPR) can be lifesaving, especially when it is started right away.

Alternative Names

Hypoxic encephalopathy; Anoxic encephalopathy

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