PROCEDURE

Arterial stick

An arterial stick removes blood from an artery to measure oxygen, carbon dioxide, and acidity.

PURPOSE
Measure blood oxygen, carbon dioxide, and acid-base balance

PROCEDURE TYPE
Diagnostic - bedside needle puncture

WHERE IT IS DONE
At the bedside or in an outpatient clinic

ANAESTHESIA
None; local anaesthetic sometimes used

HOW LONG IT TAKES
About 5-10 minutes

PREPARATION
Usually none; disclose oxygen use and blood thinners

RECOVERY
Same day; driving is usually allowed

MAIN RISKS
Pain, bruising, bleeding, reduced circulation, infection

RESULTS
Often available within minutes

Overview

An arterial stick, also called an arterial puncture, removes a small blood sample from an artery. Arteries carry oxygen-rich blood away from the heart. The sample is most often used for an arterial blood gas, or ABG, test.

An ABG directly measures oxygen, carbon dioxide, and acidity, known as pH. It can show how well your lungs move oxygen into your blood and remove carbon dioxide. It also helps assess how your lungs, kidneys, and metabolism are maintaining the blood's acid-base balance.

The radial artery at the wrist is the usual sampling site. An artery near the elbow or in the groin may be used when the wrist is unsuitable. Unlike a routine blood draw from a vein, an arterial stick may cause a brief, sharper pain because arteries lie deeper and have more nearby nerves.

The procedure collects information. It does not treat the underlying problem.

Why the procedure is performed

Your healthcare team may recommend an arterial stick when they need more information than a finger oxygen monitor or routine venous blood test can provide.

Common reasons include:

An ABG may be performed in an emergency department, intensive care unit, operating area, respiratory clinic, or hospital ward. It can also be planned as part of lung-function assessment.

- Checking oxygen and carbon dioxide during breathing difficulty
- Assessing serious lung or heart conditions
- Monitoring oxygen treatment or mechanical ventilation
- Investigating an abnormal acid level in the blood
- Checking for certain abnormal forms of haemoglobin, when combined with co-oximetry
- Measuring other substances, such as lactate, when clinically needed

Who should and should not have it

An arterial stick may be appropriate if your care team needs a direct measurement of arterial oxygen, carbon dioxide, or pH. It is especially useful when precise oxygen information could affect immediate treatment.

It is not necessary for every breathing problem. A pulse oximeter or venous blood sample may provide enough information in some situations.

The procedure may be avoided at a particular site if there is:

Bleeding disorders and medicines that reduce clotting can increase bleeding or bruising. These do not always rule out an arterial stick, but the team may choose another site, apply pressure longer, or use an alternative test.

Before a wrist puncture, the clinician may assess circulation to your hand. No single bedside circulation test predicts every blood-flow problem, so your medical history and examination also matter. In an emergency, the need for rapid information may outweigh reasons to delay testing.

- An infection, burn, wound, or significant swelling over the area

- Poor blood flow to that hand or limb
- An artery used for a dialysis fistula, graft, or previous vascular surgery
- Known blockage or severe disease in the artery
- A previous complication at that site

How to prepare

An arterial stick usually requires no fasting or bowel preparation. You can generally take your usual medicines unless you have been told otherwise.

Tell the healthcare team if you:

Do not stop a blood thinner or change your oxygen setting on your own. The team needs to know how much oxygen you are receiving because this affects how the result is interpreted.

For a planned test, you may be asked to rest and keep your oxygen setting unchanged before the sample. Follow the treating facility's own instructions, which take priority over general information here.

- Take anticoagulants or antiplatelet medicines that reduce clotting
- Have a bleeding disorder
- Have had surgery, a dialysis access, or circulation problems in that limb
- Are receiving oxygen or breathing support
- Previously had difficulty with an arterial blood sample

What happens during the procedure

You will usually sit or lie down with the selected arm supported. If the radial artery is used, your wrist may be placed over a small rolled towel to make the artery easier to reach.

The clinician feels for your pulse and may check blood flow to the hand. They clean the skin with antiseptic. Local anaesthetic may be offered, although many arterial sticks are performed without it. The anaesthetic injection can briefly sting but may reduce pain from the arterial needle.

A thin needle attached to a special syringe is inserted into the artery. Arterial pressure usually pushes blood into the syringe. You may feel a sharp sting or pressure. Try to keep your arm still and breathe normally.

After enough blood is collected, the needle is removed. Firm pressure is applied to prevent bleeding and bruising. Pressure may be needed for longer if you take blood-thinning medicine or have difficulty forming clots.

The sample is sealed, labelled, and analysed promptly. The team records whether you were breathing room air or receiving oxygen.

Recovery and what to expect afterward

Pain: Mild tenderness or throbbing at the puncture site can last for a short time. A small bruise may develop. Pain should improve rather than steadily worsen.

Eating: You can usually eat and drink normally immediately afterward unless another test or your medical condition requires restrictions.

Activity: Keep the dressing in place for the time your facility recommends. Avoid heavy lifting or forceful wrist activity for the rest of the day if the area remains sore or bruised. Do not repeatedly press or rub the puncture site.

Driving: Sedation is not normally used, so the arterial stick itself usually does not prevent driving. Do not drive if you are unwell, light-headed, or unable to use the hand comfortably and safely.

Work: Most people can return to desk work and normal light activities the same day. You may need a brief adjustment if your work involves heavy lifting or repeated use of the punctured wrist.

Risks and possible complications

Temporary pain and bruising are the most common concerns. Bleeding may take longer to stop than after a venous blood draw because pressure inside an artery is higher.

Other possible complications include:

Serious circulation problems are uncommon, but they require prompt assessment. Careful site selection, skin cleaning, and firm pressure afterward help reduce risk.

- A collection of blood under the skin, called a haematoma
- Temporary tightening of the artery, called arterial spasm
- Injury to a nearby nerve
- Infection at the puncture site

- Reduced blood flow beyond the puncture
- Ongoing bleeding, especially with impaired clotting
- A damaged area of artery that forms a pulsating lump

Results and follow up

ABG results are often available within minutes, especially when a nearby blood gas analyser is used. Processing may take longer if the sample must be sent to a central laboratory.

The main results usually include:

Some analysers also report lactate, electrolytes, or abnormal forms of haemoglobin. The included tests are determined by why the sample was ordered.

Your healthcare team will interpret the values together rather than relying on one number. Your oxygen treatment, breathing rate, temperature, medical condition, and previous results all provide context.

Routine follow-up may involve discussing the result, adjusting oxygen or breathing support, ordering other tests, or repeating the ABG to check your response to treatment.

- pH: How acidic or alkaline your blood is
- PaO_2 : The pressure of oxygen dissolved in arterial blood
- $PaCO_2$: The pressure of carbon dioxide in arterial blood
- Bicarbonate: Part of the body's acid-base buffering system
- Oxygen saturation: The percentage of haemoglobin carrying oxygen

Alternatives

The best alternative depends on what information is needed. Each option gives up some of the detail provided by arterial blood.

If precise arterial oxygen or acid-base information is essential, these alternatives may not answer the same question.

- Pulse oximetry: Painless and continuous, but it does not measure carbon dioxide or pH. Readings can also be affected by poor circulation and other factors.
- Venous blood gas: Easier and usually less painful. It can help assess pH and carbon dioxide, but venous oxygen cannot replace an arterial oxygen measurement.

- Capillary blood gas: Uses blood from a heel, finger, or earlobe. It is less invasive, but oxygen results are generally less dependable than arterial results.
- End-tidal carbon dioxide monitoring: Estimates carbon dioxide in exhaled breath without a needle. It is useful for monitoring trends but may not match arterial carbon dioxide in some illnesses.
- Arterial catheter: Allows repeated samples without repeated needle sticks. Inserting and maintaining the catheter is more invasive and brings catheter-related bleeding, infection, and circulation risks.

When to call your healthcare team

For routine concerns, contact your healthcare team if pain, bruising, or swelling is not improving, or if the puncture area becomes increasingly red, warm, or tender.

Seek urgent medical advice if:

Call emergency services if there is heavy uncontrolled bleeding, severe difficulty breathing, fainting, or a sudden major change in your condition.

- Bleeding continues despite firm, uninterrupted pressure
- Swelling around the puncture is rapidly increasing
- A new pulsating lump develops
- Your hand becomes unusually painful, weak, numb, pale, or cool

Common questions

Will I be asleep?

No. An arterial stick is usually performed while you are awake without sedation. Local anaesthetic may be used to numb the skin.

Can I drive home?

Usually, yes. The procedure does not normally require sedation. Do not drive if your illness, dizziness, or hand discomfort makes driving unsafe.

How painful is an arterial stick?

Many people describe a brief sharp sting followed by pressure or throbbing. It may hurt more than a routine blood draw, but the needle is usually in place only briefly. Local anaesthetic can reduce puncture pain.

When will I know the results?

Results are often ready within minutes. Your team may discuss them immediately if they affect urgent care, or later with your other test results.

Why can't the blood come from a vein?

Venous blood can help assess acidity and carbon dioxide, but it does not provide the same direct measurement of oxygen in blood leaving the lungs.

Can blood be taken from an existing arterial line?

Yes. If you already have an arterial catheter, the sample can often be collected from it instead of performing another needle puncture.

Sources

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