



# Patent foramen ovale (PFO) closure in patients who have had a cryptogenic ischaemic stroke

## What is a cryptogenic ischaemic stroke?

An ischaemic stroke is caused by a blood clot blocking an artery in the brain. If the source of the blood clot cannot be found, the ischaemic stroke is described as cryptogenic ('of unknown origin'). People who have a cryptogenic ischaemic stroke are generally younger – 60 or younger – and otherwise healthier than people who have a stroke with a known cause.

## What is patent foramen ovale (PFO) closure?

A foramen ovale is a hole between two chambers of the heart. All babies have a foramen ovale which normally closes shortly after birth. In 25% of adults the foramen ovale remains open (patent).

Patent foramen ovale (PFO) closure is a minimally invasive procedure where a device is inserted through a large blood vessel in the groin and passed up into the heart. The PFO closure device has two discs, one that sits each side of the PFO once implanted. Over time the body's tissues grow around and through the device, closing the hole permanently.

## Why is this important?

In 2018 over 8,000 people in Scotland were admitted to hospital with an ischaemic stroke. Up to one-third of these patients had a cryptogenic stroke. People who have a cryptogenic stroke are more likely than the general population to have a PFO. It is therefore thought that a blood clot passing through a PFO may be the cause of some cryptogenic ischaemic strokes. Results from three studies published in 2017 and 2018 could help to establish if PFO closure reduces the risk of further ischaemic strokes in patients who have a cryptogenic ischaemic stroke and a PFO.

## What we did

We assessed whether PFO closure is safe and effective compared with blood thinning medication for preventing further ischaemic strokes in patients who have had a cryptogenic ischaemic stroke. We also looked at whether PFO closure is good value for money.

## What we found

There are two main types of blood thinning medication: antiplatelet and anticoagulant. Antiplatelet medications are drugs such as aspirin. The most well-known anticoagulant medication is warfarin.

Compared with antiplatelet medication PFO closure reduced the risk that patients would have another stroke. Compared with anticoagulant medication there was no noticeable reduction in the risk of a future stroke with PFO closure.

Patients treated with anticoagulant medication had a higher risk of major bleeding compared with patients who had their PFO closed.

Patients who had a PFO closure procedure were more likely to develop persistent atrial fibrillation (an irregular heart beat) compared with either type of blood thinning medication. An estimated 18 patients would develop persistent atrial fibrillation for every 1,000 patients treated with PFO closure.

Other complications associated with PFO closure occurred in 1.5% to 5.9% of patients.

### Impact on patients

Four published studies found that quality of life was better in patients who had a PFO closure compared to people who did not. Patients in NHS England reported a small improvement in quality of life after PFO closure, with the greatest benefit relating to a reduction in anxiety and depression.

### Value for money

In NHS England PFO closure cost approximately £5,300 more than blood thinning medication. Two published studies concluded that PFO closure was likely to be good value for money in patients who had a cryptogenic stroke, even though it cost more than blood thinning medication. However, due to uncertainties about the methods used in these studies, it is likely that in reality PFO closure is not good value for money in the short-term but becomes good value for money over the lifetime of the patient.

## What SHTG considered when developing advice for NHSScotland

- In the last 5 years there have been 148 PFO closure procedures in NHSScotland. Most of these procedures (91.2%) were done at a single hospital. Based on available data we calculated that roughly 200 to 315 PFO closure procedures per year may be needed in future. This is likely an overestimate due to limitations in available data.
- Clinical experts explained to the Committee that historically cryptogenic ischaemic stroke has been treated with antiplatelet medication. Recently there has been a move towards increased use of anticoagulant medication for these patients.
- The Committee discussed the importance of choosing patients for PFO closure based on their clinical characteristics, thorough diagnostic testing and the views of a team of clinicians with different specialties. The Committee highlighted the need for a clear referral route for

patients to get PFO closure and the need for PFO closure to be provided at a limited number of expert centres in order to optimise results.

- Having a clear understanding and agreement on the diagnostic tests needed to determine that an ischaemic stroke is cryptogenic was acknowledged as important.
- The Committee discussed the consequences of some patients developing persistent atrial fibrillation (irregular heart beat) after PFO closure. Atrial fibrillation is known to increase the risk of patients having another ischaemic stroke. It was also noted that patients may need to take antiplatelet or anticoagulant medication for a long time after PFO closure due to the younger age of patients who have a cryptogenic stroke.

### What is our advice to NHSScotland?

PFO closure plus antiplatelet medication should be considered for selected patients with a diagnosis of cryptogenic ischaemic stroke. Patients referred for PFO closure should:

- Be aged 60 or younger,
- Have a diagnosis of cryptogenic ischaemic stroke supported by imaging tests, and
- Have a confirmed PFO.

Before being offered a PFO closure procedure patients must have had a full set of diagnostic tests to rule out other explanations for ischaemic stroke. Based on these tests, a clinical team with different specialties should agree that a blood clot passing through the PFO is the most likely explanation for the cryptogenic ischaemic stroke.

The potential benefits and risks of the PFO closure procedure should be highlighted to patients. These include the risk of developing persistent atrial fibrillation (an irregular heart beat).

PFO closure plus antiplatelet medication is not good value for money in the short-term. However, PFO closure becomes good value for money over the lifetime of the patient.

PFO closure should be offered at a small number of hospitals that have the appropriate facilities and expertise. There should also be a clear referral pathway to ensure equity of access for patients.

### Future work

More research is needed to compare PFO closure with anticoagulant medications. PFO closure could also be compared with blood thinning medications in patients aged over 60.

This plain language summary has been produced based on SHTG Advice 02-20