

Gamma knife stereotactic radiosurgery for an arteriovenous malformation

This leaflet is for people who are considering gamma knife surgery for an arteriovenous malformation (AVM). It explains the procedure, its advantages and risks, and aims to answer the main questions you're likely to have. There is a separate general guide to gamma knife radiosurgery which explains the procedure in more detail. For a copy of this, or if you have any additional questions, please speak to your doctor or another member of the gamma knife team.

What is an arteriovenous malformation?

An arteriovenous malformation (AVM) is formed when blood vessels don't connect together properly and the arteries and veins join together in a complex tangle. This puts the blood in the blood vessels under intense pressure and can eventually lead to a blood vessel bursting. An AVM is usually congenital (present since birth). While some people have haemorrhaging (bleeding), headaches and seizures, many people don't get any symptoms at all.

What is gamma knife radiosurgery?

Gamma knife radiosurgery uses a beam of radiation to treat conditions affecting the brain, head and neck. It does not use a knife but is a non-invasive treatment that does not need any skin incision.

The benefits of gamma knife radiosurgery

The accuracy of the gamma knife radiosurgery system enables a high dose of radiation to be focused on a very precise area. This means one treatment is generally all that is needed.

One of the major benefits of gamma knife radiosurgery is that it is non-invasive. Other benefits include the following:

- There is no incision. This means you won't need to shave your head and you'll have no scars to heal. It also avoids the risks that can be associated with open surgery, such as bleeding and infection.
- You're unlikely to have hair loss or nausea.
- The procedure is relatively painless and in most cases a general anaesthetic isn't needed.
- We find that most people get back to their normal activities in a day or two (compared to two to six weeks of recovery time with conventional brain surgery).

Gamma knife radiosurgery usually has minimum complications. Indirect comparisons suggest it produces fewer complications than other treatment techniques.

What are the alternatives to gamma knife surgery?

Depending on your general health and the size and position of your AVM, the main alternatives are observation (waiting to see what happens), conventional surgery or interventional procedures such as embolisation. Your doctor will discuss the relative benefits of these with you.

About the gamma knife procedure

There are several steps to the procedure but these will all be done in one day. Generally you will be admitted to the hospital the night before or on the morning of your gamma knife radiosurgery. You will be asked not to eat or drink anything for four hours before your procedure (unless you have diabetes). You will also be asked to wash your hair. You may be given medicine to help you to relax.

Before the surgery can take place, you'll have a lightweight head frame fitted. This is used to pinpoint the area to be treated by the gamma knife. A local anaesthetic will be injected in four places into your scalp where the frame will be fixed with screws. These injections may be painful but will only last for a few seconds. The frame will stay attached to your head for the whole procedure.

To find the exact position of the area that needs to be treated, you will need to have a magnetic resonance imaging (MRI) scan. Then, to get a clear image of specific arteries in your brain, you will have a cerebral angiogram (an X-ray image of the blood vessels in your head and neck). A neuro-radiologist (a doctor who specialises in using imaging methods in the brain), physicist and your doctor will plan the optimal dose of radiation and the most precise way of targeting it to the relevant area.

You will return to the gamma knife unit where you'll be carefully positioned on the couch so that your head remains completely still. The gamma knife procedure may involve one or several exposures to the radiation. The length of time of the procedure will vary according to the size and location of your AVM. You will be able to talk to our staff through a microphone in the gamma knife machine throughout the procedure.

Recovering from gamma knife radiosurgery

Once the procedure is finished, you will have the head frame removed and you can go back to rest in your room. When the frame is taken off you may have slight bleeding from the points where it was held in place. You may also feel sick or have a headache but this shouldn't last for more than a few hours. Most people stay overnight in the hospital after gamma knife radiosurgery. Depending on your general health, you should be able to get back to your normal activities the day after treatment.

Follow-up

The aim of gamma knife radiosurgery is to close the AVM in order to prevent further bleeding.

It takes approximately two to three years before it's possible to know if the gamma knife surgery has been successful. At this stage you will have an angiogram to assess whether the AVM is gone. If small remnants of it still exist after three years then your doctor may consider further gamma knife treatment.

Your doctor will give you details but it is usual to have a follow-up appointment, with an MRI scan at one, two and three years after gamma knife radiosurgery. A follow-up angiogram will also be carried out as required.

What are the risks?

As with every procedure, there are some risks associated with gamma knife surgery. In order to make an informed decision and give your consent, you need to be aware of the possible side effects of this procedure.

Side effects after gamma knife radiosurgery for AVMs are rare. However, in the process of reducing the risk of future bleeding, the gamma knife radiosurgery may cause some swelling around the AVM. Very occasionally this can result in temporary neurological side effects. The nature of these side effects will depend on the location of the AVM in your brain.

Any exposure to radiation (as in gamma knife surgery) carries the risk of a malignant tumour developing in the future. However the risk is considerably lower than for a serious complication occurring following conventional surgery.

Your doctor will talk to you about the potential risks and side effects of gamma knife surgery for your individual circumstances. If your doctor recommends that your AVM is treated with gamma knife surgery, this will be based on the judgement that it carries lower risks than conventional surgery and has a higher chance of success than an interventional procedure such as embolisation.

You should be aware that you will not be protected from a brain haemorrhage until the AVM has been completely closed by the treatment.

Contact

If you have any questions or need further information, please contact your doctor, or the gamma knife centre Monday to Friday, between 9.00am and 5.30pm.

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w: bupacromwellhospital.com/services-and-specialties/gamma-knife-centre

Further information

The AVM Support Group provides information and support for patients diagnosed with arteriovenous malformations.

w: avmsupport.co.uk

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