MOHS' MICROGRAPHIC SURGERY

What are the aims of this leaflet?

This leaflet has been written to help people understand more about Mohs' micrographic surgery (often just referred to as Mohs'). It aims to explain what Mohs' is, what is involved and the potential benefits and risks.

What is Mohs' micrographic surgery?

Mohs' micrographic surgery was first developed by Dr Frederic Mohs in the 1930s. It is a specialised surgical method for removing certain types of skin cancer – usually basal cell cancers (BCC) and squamous cell cancers (SCC).

During the Mohs' micrographic surgery procedure, the 'roots' of the skin cancer are located and removed. This is done in stages by removing the tumour together with a thin (1-2mm) layer of surrounding normal tissue. After each stage the tissue is frozen and cut into thin slices that are then stained with a dye. The edges are then examined very carefully under the microscope. If the tumour is found at the edge of the slice, then a further slice of tissue is removed, but only in the area where the tumour remains. Therefore, close to 100% of the cancer is located and removed.

Sometimes, if the tissue cannot be processed by same-day frozen sections, it is necessary to perform these stages several days apart – this may be recommended in other, more unusual, conditions such as lentigo maligna (slow Mohs').

There are two main advantages of removing the skin layer by Mohs' surgery. Firstly, the minimum of healthy skin is removed around the skin cancer, which keeps the wound as small as possible ('tissue sparing'). Secondly, your dermatological surgeon can be almost certain that the skin cancer is fully removed on the day of the procedure. The disadvantages of Mohs' are that waiting times for Mohs' are often longer than for standard excision, as it is a

longer procedure (often involving several stages in one day) and not all skin cancers are suitable for removal by Mohs'.

Non-Mohs' minor operations (called standard excision) also surgically remove skin cancers together with an area of healthy unaffected surrounding skin and some subcutaneous tissue below it. However, the area is usually around 4mm (slightly larger than for Mohs'). Once removed, the skin is sent to the laboratory for examination by a pathologist (a doctor who specialises in looking at the tissue cells with a microscope) to confirm whether the operation has been successful or not. It usually takes about 2 weeks for a pathology report to be available. The report will state whether the skin cancer appears to have been fully removed or not. If it has not been completely removed, a further procedure may be necessary. However, with a standard excision the pathologist is only able to look at a small proportion of the cut area (usually, less than 2% of the area). This means that the pathologist's report is an *estimation* of the completeness of removal. We know that (depending on the type of skin cancer) standard excision is sufficient to prevent the tumour coming back around 80-95% of the time.

Therefore, standard excision is a good option for many patients. However, for patients who have skin cancers on the face, or have certain types of tumours, your doctor may recommend Mohs' Surgery.

Mohs' procedure is performed by dermatologists or dermatological surgeons who are specially trained in Mohs' micrographic surgery. This training is an additional 1-2 years over that required to become a consultant dermatologist. The British Association of Dermatologists, in conjunction with the British Society for Dermatological Surgery, have published standards on Mohs' micrographic surgery and a link to these standards can be found below.

In the NHS, dermatologists and Mohs' surgeons who are undergoing specialized training may be involved in your care, under the supervision of a consultant Mohs' surgeon. Occasionally, support may be given by other specialists, eg a plastic surgeon to help remove the tumour or reconstruct the wound, an oculoplastic surgeon for the eye area, or a head and neck surgeon to treat the deepest part of the cancer.

What does the procedure involve?

The visible skin cancer is outlined with a marker pen and the skin is numbed with a local anaesthetic injection; the patient is usually fully awake during the procedure. The tumour is then removed with a small area of healthy skin around and underneath it. A map of the surgical site and the sections of

removed tissue is drawn by the surgeon. This allows the surgeon to know exactly how the removed skin tissue corresponds to the wound so that the correct place for any further surgery can be identified. A dressing is put on to cover the wound and the patient is asked to wait. The removed skin tissue is then examined under the microscope to determine whether any of the tumour remains. It can take approximately 2 hours for the laboratory to process a small skin tissue sample; larger samples may take longer. If the tumour is seen at the edge of the surgical area examined under the microscope, a further layer (another stage) will be removed from the corresponding area on the wound. The surgeon will know exactly where to remove any remaining tumour from the map drawn of the location of tumour. It may be necessary to inject more local anaesthetic before further surgery.

This process is repeated as many times as is necessary until there is no tumour remaining. Sometimes the tumour can be much larger than is visible on the surface of the skin.

What happens when the entire tumour has been removed?

There are three main options to close the wound (called reconstruction):

1. Wounds on some areas of the face can be left to heal naturally, this is called healing by secondary intention leaving a good cosmetic appearance. If this is done you will be shown how to look after the wound and will be provided with aftercare advice on how to apply or arrange further dressings.
2. The surgeon may close the wound directly edge to edge as a line with stitches (called primary closure) or may move tissue around from looser skin nearby on the face (called a flap) or use a piece of skin from another area (called a skin graft) to cover the wound.
3. The wound may need to be repaired by another surgeon, eg a plastic surgeon or an oculoplastic surgeon (a doctor who specialises in surgery of the eye and face). This is usually planned before you attend your surgery and may be performed on the same day or within a few days. If the repair surgery is to be performed at a later date, dressings will be applied and wound care advice given. You will be allowed to go home and return for surgery at a later date.

Which conditions can be treated with Mohs' micrographic surgery?

Mohs' micrographic surgery is most often used for the removal of a type of common skin cancer known as a basal cell carcinoma (BCC). Your dermatologist may also recommend this technique for the removal of other

types of skin cancer, for example squamous cell carcinoma (SCC). These skin cancers most frequently arise on the head and neck region where minimising surgical wounds is particularly important in order to ensure a good cosmetic outcome. Mohs' surgery is sometimes used for other skin cancers, such as a condition called lentigo maligna.

Who is suitable for Mohs' micrographic surgery?

Mohs' micrographic surgery is particularly useful in the following circumstances:

- Recurrent or previously incompletely removed basal cell carcinomas.
- Certain subtypes of basal cell cancers that are at a higher risk of recurrence.
- Basal cell carcinomas in areas where it is cosmetically better to remove as little healthy skin as possible eg eyelids, nose, ears and lips.
- Basal cell carcinoma at the site of previous surgery or radiotherapy.
- Very large tumours where removing as little healthy skin as possible can help minimise the size of the wound.
- Patients who have genetic conditions (such as Gorlin's syndrome) or medical conditions (such as kidney transplant recipients) that makes them more susceptible to develop skin cancers.

How effective is this treatment?

The cure rate for Mohs' micrographic surgery is high for both primary (new) basal cell cancers (up to 99%) and recurrent tumours (up to 95%). This compares to a cure rate of approximately 80-95% for a tumour removed by traditional surgical methods.

What are the complications of this treatment?

All surgical procedures carry some risk. For Mohs' micrographic surgery the main risks are:

- *Pain/swelling.* Most people find that there is some swelling and discomfort afterwards. How much will depend on the type of procedure and reconstruction. Most people find that taking a simple painkiller such as paracetamol is enough to control the pain.
- *Bleeding/bruising.* Bleeding will be stopped during the surgery using cauterization (burning or freezing the wound), but can restart afterwards. It is normal to have bruising that may persist for a while. You may develop more bleeding or bruising if you take a blood thinning

medication, such as warfarin, rivaroxaban, clopidogrel or aspirin, or if you have a medical condition that causes you to bleed more easily. This should be discussed with your dermatologist before the surgery, as additional care during the surgery may be required. It is not always necessary to discontinue your medication, but you may be asked to have a blood test before the day of your surgery.

- *Wound infection.* There is a very small risk of developing an infection in your wound. You may be prescribed antibiotics at the time of surgery if your doctor thinks there is a high risk of infection.
- *Nerve damage.* Small nerves may be cut during the surgery to remove the skin cancer. This can result in numbness which improves over weeks or months as the new nerves grow. Every effort is made to avoid this when removing the tumour; however, in some circumstances it may be unavoidable. Rarely, a nerve that supplies movement to a muscle can be affected resulting in a weakness or paralysis of that muscle.
- *Scar.* The removal of the skin cancer will involve a wound in the skin and one of the options (1-3 as above) will be suggested to close the wound. The skin will heal, leaving a scar. The type of scar will be very different depending on the area, the type of wound, how it is closed (stitches or natural healing) and how your body heals. The type of scar that you are likely to have afterwards can be discussed with your surgeon.

How will the surgery be planned?

You will usually meet the Mohs' surgeon or a doctor working with the Mohs' surgeon before the procedure is arranged. The purpose of this meeting is to ask about your other medical problems, medications and to discuss the treatment options, the benefits and the risks of Mohs' surgery. The Mohs' surgeon or the plastic, oculoplastic or head and neck surgeon will discuss the reconstructive options in your particular case once the cancer is removed.

How long will I need to stay in hospital?

You will usually be discharged on the day of your procedure. The amount of time that you spend in the hospital on the day will depend on how many layers (stages) have been taken to completely remove the skin cancer. Another point to consider is how big the tumour is, as very large tumours will take longer to be examined. As a general rule, you can expect to spend a half or full day in the hospital.

What should I bring with me on the day?

- Breakfast - usually, you will be able to eat breakfast the morning of the procedure, although some patients seeing the plastic or oculoplastic surgical teams for reconstruction under general anaesthetic may be asked to fast on the day of the procedure.
- Something to occupy your time whilst you await your result, such as a book or electronic device.
- Refreshments and sandwiches – you should bring these in with you for snacks; sometimes lunch is provided - you should check with the hospital team in advance whether you need to bring a packed lunch.

You should inform your doctor of any medical conditions, current medications you are taking, if you have a pacemaker or another type of implant, as well as any allergies you may have.

How should the treated area be cared for when I get home?

You will be provided with verbal and written instructions on how to care for your wound.

Are there alternative treatments?

Yes. Before arranging Mohs' micrographic surgery, your doctor will explain the alternative treatment options that could be recommended for the particular type of skin cancer you have. These may include:

- Traditional surgical skin cancer removal (standard excision)
- Radiotherapy

Where can I get more information about Mohs' micrographic surgery?

Your Mohs' surgeon and the skin cancer clinical nurse specialist should be able to direct you to any local resources for such information and details of self-help groups, or to ask about obtaining formal social, psychological, cultural or spiritual support. Your Mohs' surgeon may also be able to connect you with other patients who have had Mohs' surgery for support or with local skin cancer support groups.

Some useful links

Minimum Standards for Mohs' Micrographic Surgery Services (British Association of Dermatologists and British Society for Dermatological Surgery) 2020:
https://www.bad.org.uk/shared/get-file.ashx?itemtype=document&id=6346

http://www.dermnetnz.org/procedures/mohs.html

https://www.mohssurgery.org/patient-resources/patient-video/

https://www.mohssurgery.org/wp-content/uploads/2017/08/mohs-Brochure-without-bleedlines.pdf

https://www.bsds.org.uk/patient-information/patient-support-groups

The below link is a useful video on Mohs' surgery that was made by a UK hospital with a patient donation:
https://www.youtube.com/watch?v=lM2FgGltzMw

For details of source materials used please contact the Clinical Standards Unit (clinicalstandards@bad.org.uk).

This leaflet aims to provide accurate information about the subject and is a consensus of the views held by representatives of the British Association of Dermatologists: individual patient circumstances may differ, which might alter both the advice and course of therapy given to you by your doctor.

This leaflet has been assessed for readability by the British Association of Dermatologists' Patient Information Lay Review Panel

BRITISH ASSOCIATION OF DERMATOLOGISTS
PATIENT INFORMATION LEAFLET
PRODUCED MARCH 2013
UPDATED JANAURY 2021, APRIL 2021
REVIEWED APRIL 2024