Skin biopsy

Skin biopsy is an important tool in the diagnosis of cutaneous malignancy and it can also be a useful diagnostic aid, in conjunction with clinico-pathological correlation, when dealing with infective and inflammatory disease. Many dermatological conditions can be confidently diagnosed by a dermatologist clinically, but histology can be useful in cases of diagnostic uncertainty. Skin biopsy is the removal of a sample of skin for analysis. Important steps must be taken into account such as consent, wound closure, anatomical site and type of investigation. The authors encourage clinicians to ask their dermatologist colleagues for supervision to gain confidence in this valuable diagnostic tool.

Consent

It is a legal and ethical principle that valid consent must be obtained before starting treatment for a patient. You should be confident in how the procedure is performed and the complications before obtaining consent from patients. The British Association of Dermatologists (2014) guidance states that although written consent is not mandated, in most cases it is good practice to do so. In practice, most departments in the UK obtain written consent before skin biopsy.

Dr David Veitch, Dermatology Registrar, Department of Dermatology, Leicester Royal Infirmary, Leicester LE1 5WW

Dr James Miller, Dermatology Registrar, Department of Dermatology, Leicester Royal Infirmary, Leicester

Dr Shyamal Raichura, Dermatology Registrar, Department of Dermatology, Leicester Royal Infirmary, Leicester

Dr John McKenna, Consultant Dermatological Surgeon, Department of Dermatology, Leicester Royal Infirmary, Leicester

Correspondence to: Dr D Veitch (davveitch@hotmail.com)

For skin biopsy the patient should be consented for scar, pain or discomfort, bleeding or bruising, wound infection and dehiscence. Anticoagulants often do not need to be stopped but bleeding risk needs to be discussed and if patients are immunosuppressed the increased risk of infection needs to be mentioned. It is also important to consent for site-specific complications such as damage to the temporal branch of the facial nerve in the temple region, damage to the spinal accessory nerve located at Erb's point, or damage to the marginal mandibular branch of the facial nerve at the insertion point of the masseter muscle at the jawline. As with all surgery it is essential that you ensure that you are operating on the correct patient and site and that the specimen pot and matching request form are fully and accurately completed. Most departments have a surgical safety checklist which should be followed.

What to biopsy

In England and Wales suspected skin cancer such as squamous cell carcinoma or malignant melanoma should be referred to dermatology via the 2-week wait cancer waiting time pathway. Core medical trainees are more likely to come across acute inflammatory or infective conditions, for which a skin biopsy can be performed in a ward or outpatient environment if this is indicated to guide patient management.

Clinico-pathological correlation is essential when it comes to interpreting skin biopsies and so as much information as possible (for example duration, symptoms, dermatological description and suspected diagnosis) should be included on the histopathology form to help guide the histopathologists. Attending a multidisciplinary meeting to discuss findings and present the case is invaluable. Arranging for medical illustration at the time of biopsy is very helpful as the images can be used to present the case at the multidisciplinary meeting in order to help interpret the histology, and if a different clinician follows the patient up in clinic he/she can see how the rash looked at the time of biopsy, should it resolve or evolve.

As a rough guide, with widespread rashes the best area is often the newest area to appear rather than the most obvious. If the rash is widespread it is often better to take the sample from areas where the scar will be less visible, particularly avoiding the face and hands unless absolutely necessary. Certain biopsy areas such as the upper trunk are more prone to keloid scarring. If the rash is blistering then intact and fresh blisters yield the best results. If there is suspicion of an infectious aetiology then samples can be sent for culture and if there is suspicion of an immunobullous disorder then immunofluorescence can be requested. Pathology can sometimes be subtle on analysis and therefore larger samples may yield a better diagnostic outcome.

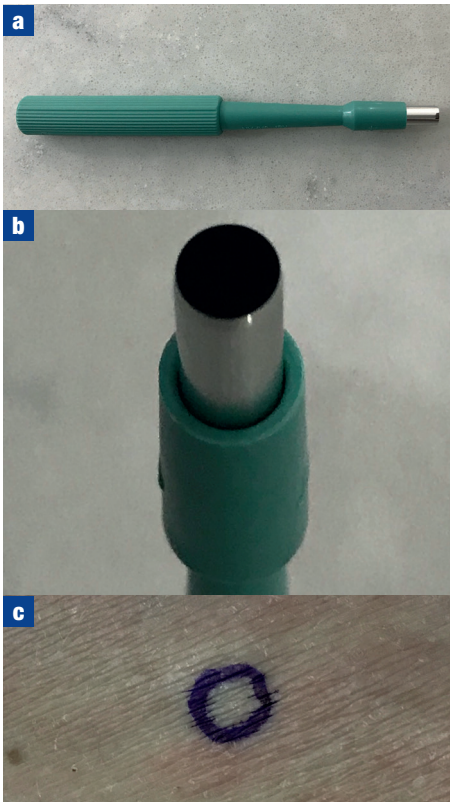
Biopsy technique

Excision biopsies are mainly used in dermatology and plastic surgery for removal of skin cancer and will not be discussed further here.

Equally shave and curettage biopsies are mainly reserved for benign skin lesions such as skin tags or premalignant conditions such as Bowen's disease.

Punch biopsies (*Figure 1a–c*) are the most commonly used biopsy. The advantage of these is that they are quick, easy, leave a small circular defect, and achieve an appropriate depth of sample including epidermis, dermis and subcutaneous fat. Following valid consent the area to be sampled should be marked out. Skin should be cleansed with antiseptic and then appropriate local anaesthetic administered. Different sizes of punch biopsies are available from 3 mm to 8 mm. The punch biopsy is designed with a circular blade able to core out the tissue required and the depth is user dependent according to the site. Best practice is to remove skin with a layer of subcutaneous fat beneath.

Figure 1. Punch biopsy. **a.** Photo of a typical 4 mm punch biopsy Steifel. **b.** End on view of the punch biopsy showing the circular blade. **c.** Skin is marked as shown with a skin marker to guide which site is to be sampled.



Tension should be applied to the surrounding skin to help with haemostasis and to detect when an adequate depth of incision has been achieved. As the blade is very sharp a gentle twisting motion between the thumb and forefinger will usually suffice. Once the required depth is reached the tissue will usually need to be cut from the base with scissors. Haemostasis may be required with cautery but usually a closing suture will suffice.

Guidance from the British Society for Dermatological Surgery and the British Heart Rhythm Society (Bray et al, 2017) suggests that implantable defibrillators need to be temporarily switched off if electrocautery is to be used, and patients with pacemakers should not have unipolar electrocautery.

Ellipse incisional biopsy differs slightly from the punch biopsy as an ellipse needs to be drawn over the area requiring a biopsy (*Figure 2*). The advantage is that it produces a larger sample which can be beneficial. For example, in vasculitis one is able to gain a deeper sample capable of identifying

Figure 2. Ellipse incision biopsy marking.

medium-sized vessels. Using a scalpel blade perpendicular to the skin the ellipse is cut to the depth of the subcutaneous fat. The base is then dissected using dissecting scissors, creating an elliptical defect. Haemostasis may be required using cautery. The defect is closed using simple interrupted sutures. Ellipse incisional biopsies are more technically difficult and would normally involve subcutaneous sutures as well as surface interrupted sutures.

Anaesthetic

Lidocaine is the most commonly used local anaesthetic and is usually mixed with adrenaline to cause vasoconstriction and reduce the amount of bleeding. There is a rapid onset of action and anaesthesia can last up to 6 hours.

Adrenaline is useful for vasoconstriction and prolongs the duration of anaesthesia. However, adrenaline also adds to the pain of infiltration. There are important steps to take when infiltrating local anaesthetic to reduce pain:

1. Perform an initial sub-dermal injection
2. Infiltrate the local anaesthetic slowly
3. Make sure the local anaesthetic is at room temperature
4. Use a narrow bore needle such as a 30 gauge needle found in dental or insulin syringes
5. Distract the patient
6. Some departments buffer the solution with bicarbonate to reduce pain.

Dosing quantities of anaesthetic should be judged after consultation with the local prescribing formulary or British National Formulary. As a general rule for most small skin biopsies less than 5 ml of local anaesthetic will be necessary, which is well within the maximum dosing volumes (Peck et al, 2008; Smith et al, 2011). Care should be taken to avoid injecting a large volume of anaesthetic into the lumen of a vessel as severe toxicity may occur (Joint Formulary Committee, 2017).

Closure

The simple interrupted suture is the most commonly used suture to close a wound and one that is important to be able to perform. The suture should be held within a needle holder two thirds of the way down the needle to avoid damage to the needle. The needle should penetrate the skin at a 90° angle approximately 2 mm from the wound edge. As the needle passes through the wound the depth of the needle should be equal on both sides and the needle should exit perpendicular to the skin surface on the opposite side of the wound in a mirror image to the entry point. The suture material is then pulled through leaving a short end at the entry point.

Knot tying becomes quicker and more efficient with practice. The long end of the suture material is rotated twice around the tip of the needle holder and this is then used to grasp the short end. This is pulled through the loops while crossing the hands, thus creating a knot. A further two knots are performed with a single loop each time and tied in the opposite direction to the previous knot. It is important to ensure that the knot lies at one side of the wound as healing can be impaired if the knot lies directly over the wound. Dissolving or non-dissolving sutures can be used to close the wound.

When a wound is larger a subcutaneous suture may be required to support and bring the wound edges together before using interrupted sutures. The process is similar to that of the interrupted suture but the knot is started within the dermis below the skin surface and the knot is buried deep to the wound. It is important that a dissolving suture is used as once the wound is closed it will not be possible to remove the suture.

Specimen analysis

Most samples are sent to histology in formalin and stained with haematoxylin and eosin. When there is a suspicion of infection, the specimen can be sent for culture to microbiology in normal saline. In cases of suspected autoimmune blistering conditions it is essential that a fresh sample, again not fixed in formalin, be sent for immunofluorescence to assess for the presence of antibodies.

KEY POINTS

- Clinico-pathological correlation is essential when interpreting biopsy results.
- Regular practice is required to master the biopsy technique.
- Liaise with your local dermatology team to learn this technique.
- Consent is a recommended process when performing skin biopsy.
- A safety checklist is a helpful tool.

Hospital laboratories may have specific requirements for processing skin biopsies, for example, fresh specimens for immunofluorescence may need to be transported in Michel's transport medium. If in doubt, it is best practice to contact your local laboratory to confirm you have the necessary materials before performing the biopsy.

Post procedure

It is important to ensure that the wound has been closed adequately and that haemostasis has been achieved before a dressing is applied. The choice of dressing will depend on a patient's sensitivities and allergies. Ideally a waterproof dressing is recommended as most wounds will need to be kept dry for 48 hours.

It is highly recommended that written post-procedural advice is given to patients before leaving the biopsy suite. This should ensure patients know how to look after their wound and provide them with advice in the event of bleeding or signs of infection.

Finally, it is important that the procedure performed has been documented clearly in the patient's notes. Those notes should include the written consent, the date of the procedure, patient allergies, concomitant antiplatelet or anticoagulant medication, adequate patient details as set out by clinical standards, the name of the operator, the site from which the sample has been taken, the amount and type of local anaesthetic used, the skin cleansing agent used, the type of procedure performed, the number and type of sutures used and the recommended number of days that the stitches should remain in situ, if applicable.

Complications

In the event of bleeding, it is recommended that pressure is applied continuously to a wound for 10–15 minutes before seeking medical attention if necessary.

Patients should be advised about the signs of infection and to seek medical advice from their GP if these occur. Signs of infection include erythema that is spreading, increasing pain and tenderness around the wound, calor (heat around the skin) and discharge.

In the case of wound dehiscence the patient should seek medical advice. Most wounds would then be left to heal by secondary intention.

Conclusions

Skin biopsy can be a highly effective diagnostic aid but requires appropriate experience to select when to biopsy and how best to perform it. **BJHM**

Conflict of interest: none.

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