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Skin biopsies in mammals

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The skin biopsy is an invaluable diagnostic tool in veterinary dermatology. This column reviews the indications and techniques for performing skin biopsies.

Many skin conditions can only be diagnosed by histopathological examination of skin samples. Although there are no definitive rules on when a biopsy should be performed, there are general guidelines to assist in the decision. Biopsy should be performed in cases of the following:

- Obvious or suspected neoplastic lesions;
- Persistent ulcerations;
- Major disease that is most readily diagnosed by biopsy (for example, follicular dysplasia, zinc-responsive dermatosis, sebaceous adenitis, dermatomyositis, and immune-mediated skin disease);
- Dermatoses that are not responding to apparently rational therapy;
- Unusual or seemingly serious dermatoses;
- Vesicular dermatitis; and
- Suspicious conditions for which the therapy is expensive, dangerous, or sufficiently time-consuming to necessitate a definitive diagnosis before beginning treatment[1].

Ideally, skin biopsies should be performed on those dermatoses that have been non-responsive to medical therapy over a three-week period. This will not only help prevent changes associated with chronicity of the condition, but also limit the administration of medications and help thwart self-excoriation and secondary infections. Biopsies allow for the rapid introduction of appropriate therapy and therefore decrease the likelihood of permanent disease sequellae, reduce patient suffering, and avoid costs of unnecessary treatment. Use of anti-inflammatory medications, such as non-steriodal anti-inflammatory drugs and corticosteroids, should be discontinued 2–3 weeks before biopsy, as these medications can alter the histologic appearance of the tissue. It is also important to eliminate secondary bacterial pyoderma with systemic antibiotic therapy so as to prevent the destruction of histopathologic features of concurrent dermatoses[1].

SITE SELECTION

Before selection of a biopsy site, thoroughly examine the whole animal for the most representative samples. Identify any primary and secondary lesions and create a list of differentials[2]. Primary cutaneous lesions, such as pustules, vesicles, petechia, erythematous macules, and papules, provide the most valuable information. Secondary lesions—crusts, alopecia, scales, ulcers, and erosions—may be useful but tend to have less diagnostic impact. The best approach is to sample several sites to get a range of lesion types.

PREPARATION OF SITE

Do not surgically prepare the skin surface before obtaining skin biopsies; cleaning or scrubbing can remove valuable diagnostic material such as parasites, microorganisms, or the stratum corneum[3]. Rather, gentle clipping of the hair from the site is acceptable under most circumstances. Aseptic preparation of the skin surface is only indicated when entire lumps are being removed or when sections of tissue are to be submitted for fungal culture.

Most skin biopsies can be performed under local anesthesia with appropriate physical restraint. Mark the margins of the biopsy sites with a waterproof black marker pen and then inject ~0.5–1.0 ml (depending on the size of the lesion) of 1–2% lidocaine subcutaneously through a 25-gauge needle under each site (**Fig. 1**). A small amount of sodium bicarbonate can be mixed with the lidocaine to ameliorate the sting of the injection. The author combines 0.5 ml of sodium bicarbonate with 2.5 ml of

EQUIPMENT FOR SKIN BIOPSIES

Sterile gloves
2% lidocaine
Sodium bicarbonate
25-gauge needles and syringes
Disposable punch biopsies in a variety of sizes (2–8 mm)
Thumb forceps
Iris or small curved scissors
Needle holder
Suture material
Gauze sponges
Formalin containers
Other materials may include scalpel handles, blades, and sterile drapes

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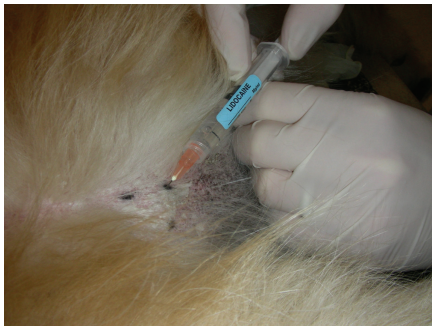

FIGURE 1 | Injection of local anesthetic (lidocaine) subcutaneously underneath the marked biopsy site of the skin of a dog. The black dots from a permanent marker outline the biopsy site.

2% lidocaine in a 3-ml syringe. Wait 5–10 minutes after administration of lidocaine before taking the sample. The total amount of lidocaine should be monitored because it can cause myocardial depression, muscle twitching, neurotoxicity, and even death. General anesthesia may be necessary when removing larger masses, handling animals that cannot be controlled with physical restraint (such as small rodents and rabbits), or taking samples of sensitive areas such as the face and feet.

BIOPSY TECHNIQUE

Two types of biopsy techniques are commonly used in veterinary medicine: the punch biopsy and the excisional (wedge) biopsy.

Punch biopsy

The punch biopsy technique is the most frequently used cutaneous biopsy procedure. This procedure is usually employed with suspected infectious, inflammatory, or endocrine dermatoses[2]. A 6–8 mm punch will provide good sampling material with minimal trauma. Smaller punches (2–4 mm) can be used for more delicate areas such as the face and feet.

Place the punch vertically over the selected lesion and apply gentle but firm continuous pressure as the punch is rotated in one direction (**Fig. 2**). Less resistance will be felt once the punch moves through the skin surface and into the subcutis. Next, remove the punch, leaving the biopsy sitting in its circular incision. Carefully grasp the biopsy at the base (which should be the panniculus) and sever all the subcutaneous attachments with scissors (**Fig. 3**). Never grasp the dermis and/or epidermis with forceps as this can lead to a crush artifact and misinterpretation by the pathologist. The biopsy should be gently blotted with gauze to remove artifactual blood before placing it in a 10% formalin container. Place thin samples with the dermis side down onto a piece of cardboard or a piece of a tongue depressor. This will prevent the tissue from curling when it is placed in the formalin. For appropriate fixation, use a volume of formalin at least ten times the volume of the sample. One to two simple interrupted sutures or a single cruciate suture will effectively close the biopsy site after adequate hemostasis is achieved. Under normal circumstances, use nonabsorbable sutures. When taking out the sutures (10–14 days after the biopsy), evaluate the incision for evidence of healing.

Wedge biopsy

The excisional or wedge biopsy is a complete surgical excision of a lesion. A classic elliptical shaped incision is used in this method. This technique enables removal of whole nodules, masses, or bullae, or sampling of a wedge of tissue at a junction of normal/abnormal skin[4]. Excisional biopsies are also helpful for obtaining samples that can be used to diagnose suspected diseases of the subcutaneous fat, such as panniculitis. The advantage of wedge biopsy is that it allows diagnosis and treatment with a single procedure.

WHAT NEXT?

Send the biopsy to someone who can provide the most information, such as a veterinary pathologist specializing in dermatopathology, a veterinary dermatologist with a special interest and expertise in dermatohistopathology, a general veterinary pathologist, or a physician dermatolopathologist with a special interest in comparative dermatopathology[1]. Cutaneous biopsies submitted to the pathologist should be accompanied by the following information:

- Age, sex, and breed;
- History and description of gross lesion(s);
- Duration of lesions;
- Clinical diagnostic test data;
- Treatment; and
- A list of differential diagnoses[5].

When the scientist and pathologist work hand-in-hand, skin biopsies correctly reflect the dermatologic diagnosis in the majority of cases.

FIGURE 2 | A punch biopsy tool placed vertically over the skin lesion of a dog. The punch should only be rotated in one direction. To preserve the integrity of the lesion, the area of interest has been shaded but not aseptically prepared.

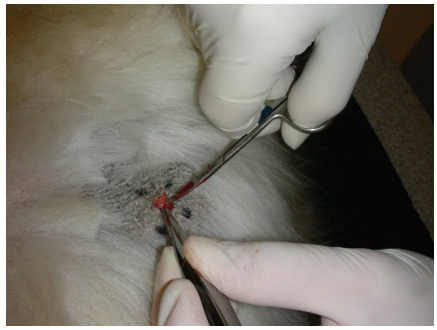

FIGURE 3 | Removal of the punch skin biopsy sample. Gently grasp the base of the sample with a pair of tissue forceps and cut it with a small pair of scissors. Then blot the tissue onto gauze to remove fresh blood, which can alter the interpretation of the sample.

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