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PRACTICAL DERMATOLOGY

Basic Concepts in Skin Biopsy. Part II☆

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Abstract In this article, we review some of the artifacts commonly observed in biopsies and the methods used to prevent their appearance. We describe the basic techniques for taking biopsies of melanocytic lesions, bullous diseases, and from special areas such as the scalp and nail region. We also provide a brief summary of the role of skin biopsy in the diagnosis of neurological diseases and prenatal diagnosis. The aim of this guide is to improve the diagnostic yield of biopsies and to highlight the importance of a correct clinical–histological correlation; we therefore provide clues to the interpretation of the dermatopathology report.

PALABRAS CLAVE
Biopsia cutánea;
Anatomía patológica;
Dermatopatología;
Preparación histocitológica;
Técnica;
Complicación quirúrgica

La biopsia cutánea: bases fundamentales. Parte II

Resumen En este artículo de dermatología práctica se revisarán algunos de los artefactos encontrados frecuentemente en las biopsias, así como métodos para evitarlos. También se darán nociones básicas acerca de la realización de biopsias de lesiones melanocíticas, enfermedades ampollosas o de la biopsia de lesiones en localizaciones especiales, como el cuero cabelludo y la región ungueal. Por último se comentarán algunas de las aplicaciones de la biopsia cutánea al diagnóstico de enfermedades neurológicas y al diagnóstico prenatal de una manera breve. Con esta guía básica pretendemos mejorar la rentabilidad de la biopsia y resaltar la importancia de realizar una correcta correlación clínico-histológica, por lo que se comentarán también algunas nociones respecto a la interpretación del informe dermatopatológico.

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As discussed in the first part of this series, optimizing the diagnostic yield of skin biopsy requires us to carefully select the biopsy site, assess the depth of the lesion, and choose the most appropriate sampling technique. In this second article we will review the following aspects:

1. Artifacts in the sample
2. Indications for biopsy: diagnosis of melanocytic lesions, vesicular–bullous diseases, scalp lesions, nail lesions, neurologic diseases, and prenatal conditions
3. Conclusions: the dermatopathologist's report

Artifacts in the Biopsied Tissue: A Source of Histopathological Error

If too much pressure is applied when skin is being disinfected, cells of the stratum corneum can be rubbed away and information will be lost. It may then be impossible to identify the fungal hyphae and spores of a dermatomycosis, the parakeratosis of plaque psoriasis, or the neutrophilic infiltrates or bacterial colonies in impetigo or pitted keratolysis (Fig. 1).

Too rapid an injection of local anesthetic or the use of a Dermo-Jet injector can lead to the appearance of oval artifacts in the dermis or even in the epidermis.[1] Topical application of a eutectic mixture of local anesthetic (EMLA cream) has been associated with the formation of vacuoles in the spinous and granular layers; changes that simulate epidermolysis bullosa simplex have also been reported.[2]

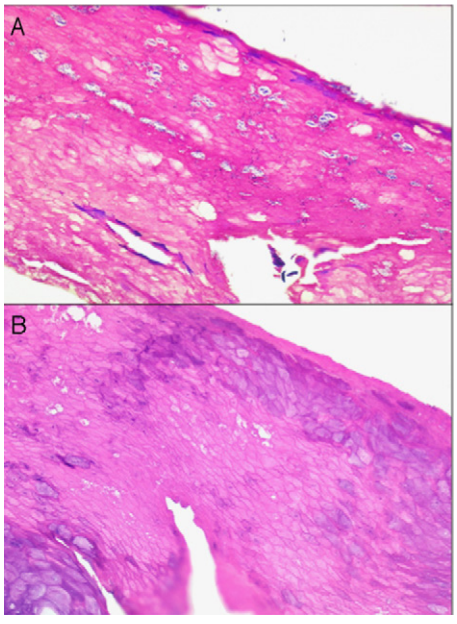

Figure 1 A, Hematoxylin–eosin, original magnification ×40. Fragment of the stratum corneum from the sole of the foot. (B) Gram staining revealed bacteria. Diagnosis: pitted keratolysis.

Crush artifacts caused by compressing the sample with forceps or the edge of a receptacle can sometimes imitate localized scleroderma or a pedunculate fibroid tumor.[1] If forceps put pressure on basal cell epitheliomas, especially the nodular type, the tumor may be artifactually extruded, leaving empty spaces. Similar spaces are sometimes seen in samples from a patient who has had superficial basal cell epitheliomas removed by prior curettage; artifacts like these must be differentiated from such lesions as lymphangiomas. Subepidermal blister formation because of excessive pressure is also possible: in fact, blisters are fairly often seen in punch biopsies of panniculitis lesions[1] or after cryotherapy.[2]

Areas of fat necrosis or other artifacts can be caused by laser treatments or the use of electrical currents to preserve hemostasis. Electrocautery can lead to increased eosinophilic cytoplasm and keratinocytes with elongated nuclei in biopsy borders (Fig. 2)[3] and even in the excised tumor (a phenomenon Ackerman called cell polarization), with changes that can be mistaken for basal cell epitheliomas.[4] Dehydration after the application of electrical currents can also lead to cytoplasmic vacuolization.

In addition, freeze artifacts can appear in samples that have been fixed in 10% formaldehyde at temperatures approaching 0 °C (Figs. 2 and 3); ice crystals that form in the tissue expand to cause changes that range from slight vacuole formation to cell death. To avoid such freeze artifacts, the operator needs only to fix the sample for 8 to 12 hours longer at ambient temperature. If the biopsy is urgent and a longer fixing time is impossible, freeze artifacts can be prevented by adding ethanol (75%–95%) at a 1:10 volume ratio.[1,5,6] This problem rarely arises in Switzerland because of the short distances samples need to be transported, but it happens more often in Germany and may also occur in certain parts of Spain. If a formaldehyde-containing recipient opens, the sample will not be properly fixed or will have a peculiar appearance. To these problems we must add that of transporting samples in flimsy plastic containers that break easily: once a sample was even transported in a contact lens case. Such handling problems are rare, but we have often seen biopsies from several lesions transported in a single container. Diagnosing a melanoma from a sample that contains several melanocytic lesions would make therapeutic decisions unnecessarily difficult and follow-up would also be problematic.

Clearly, significant artifacts will be seen in biopsies of lesions with abrasions or overlying infections (Fig. 4) with vesicles more than 24 hours old, or samples obtained from necrotic or ulcerated areas without an epidermal layer: few such biopsy samples will be useful for diagnostic purposes.

Finally, we remind the reader briefly that various exogenous materials can cause characteristic skin reactions, although a discussion of this problem lies outside the scope of this article. Examples of materials that cause reactive changes are aluminum chloride (used to treat hyperhidrosis), ferric subsulfate solution (used for hemostasis), paraffin, mercury, various filling materials, and sutures (Fig. 5); it would be incorrect to label such changes as artifacts, however.[7]