Procedures in Practice

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BONE-MARROW ASPIRATION AND TREPHINE BIOPSY (1)

Indications

Bone-marrow examination is essential in the investigation of many haematological disorders. It may provide a diagnosis suspected from the clinical features and peripheral blood examination or occasionally gives a previously unsuspected diagnosis. It is also useful in certain diseases for assessing the extent or response to treatment. Bone-marrow fragments may be aspirated and spread on slides, as for a blood film, or a core of bone and marrow may be obtained intact and histologically sectioned (trephine biopsy). The table shows the main indications for one or both of these tests. In general, aspiration is used to show the morphology of individual haemopoietic cells and to obtain material for ancillary tests, whereas a trephine gives a more representative view of the cellularity of the marrow and allows infiltrations to be recognised.

The investigations are limited by the small size of the samples and consequent sampling errors. Infiltrations may be missed, and the cellularity may vary from site to site. Nevertheless, the tests provide a considerable amount of information and should always be considered before a large battery of investigations is requested, particularly if these investigations are time consuming and costly and may prove to have been irrelevant once the marrow appearances are known.

Indications for bone-marrow aspiration and trephine biopsy

Indications	Ancillary tests
<i>Bone-marrow aspiration*</i>	
Unexplained anaemia (particularly when reticulocyte count low)	
Macrocytic anaemia (to distinguish megaloblastic from normoblastic erythropoiesis)	Deoxyuridine suppression test
Granulocytopenia or thrombocytopenia, or both (to distinguish failure of production from peripheral consumption)	
Suspected acute leukaemia (and to monitor treatment) and myelodysplastic syndromes	Cytochemistry, cytogenetics, electron microscopy, cell surface markers, enzyme assays, semi-solid agar culture
Suspected myeloma	Immunofluorescence
Suspected lipidoses	
Diagnosis of certain infections—for example, tuberculosis, kala-azar	Appropriate microbiological culture
<i>Bone-marrow aspiration and trephine†</i>	
Pancytopenia—for example, aplastic anaemia, hypersplenism	
Chronic leukaemia	Cytogenetics (in chronic granulocytic leukaemia)
Myeloproliferative diseases—for example, polycythaemia, thrombocythaemia, myelofibrosis	Cytogenetics
Suspected infiltration by, for example, lymphoma, carcinoma, granuloma	Immunofluorescence or immunoperoxidase studies in non-Hodgkin's lymphoma
If repeated "dry taps" on attempted aspiration, perform trephinement	

*Routine stains are Romanowsky (for example, May-Grünwald Giemsa) and iron; results available in one to two hours.

†Routine stains for the trephine biopsy are haematoxylin and eosin, and reticulin; results available in seven days (unless rapid decalcification used).

Needles

Aspiration needles (the Salah or Klima) are short and stout and should have a sharpened bevel, a well-fitting and easily removable stylet, and an adjustable guard for use in sternal aspirations. For a trephine biopsy the Jamshidi-Swain needle is favoured. This has a radially tapered distal cutting tip, which prevents the specimen from being crushed or plugged in the needle.

Sites

Aspiration may be done at the following sites.

Sternum—At the level of the second or third interspace, just to one side of the midline, with the patient in a semi-recumbent or supine position. This site should be used only for patients over 12 years old. It is the easiest site from which to obtain the most cellular marrow but causes the greatest patient apprehension.

Posterior iliac crest—May be used for any patient over 1 year old. The patient is placed in the right or left lateral position with the back comfortably flexed, and the uppermost crest is used. This site can be a difficult landmark to find in an obese patient, but several attempts to obtain marrow can be made in the same area.

Anterior iliac crest—May be used in adults with the patient supine. A site is chosen 2.5–5 cm posterior to the anterior superior iliac spine and beneath the palpable lip.

Tibia—For use in children less than 1 year old. The flat triangular area at the proximal end of the medial surface of the tibia, just below the tibial tubercle, is chosen.

Trephine biopsy should be undertaken only at the posterior iliac crest, and, since both an aspirate and a trephine biopsy specimen are often necessary, this site is commonly used. Biopsy specimens may, however, be taken from other sites—for example, where an x-ray film or bone scan suggests a definite lesion.

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