

UNDER THE MICROSCOPE

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THE BONE MARROW EXAM

Of the few procedures that brings the pathologist face to face with the patient, the most feared, by far, is the bone marrow exam. The most ancient surgical procedure still practiced in modern medicine, the bone marrow biopsy (trephining) dates back to the Neolithic Period, which ended in 4500 to 2000 BC. It is still in use today because bone marrow exam can be the most definitive approach to diagnosing hematologic disorders.

Bone marrow exam is, fortunately, an uncommon procedure. It is most commonly indicated for the investigation of hematologic abnormalities identified in the peripheral blood, such as cytopenia, leukocytosis or thrombocytosis. It is critical for the diagnosis of leukemias, as well as staging of non-Hodgkins and Hodgkins lymphoma. It is even useful for the monitoring of hematologic disease, as well as the response to chemotherapy.

The bone marrow exam actually consists of two parts: aspiration and biopsy. Aspiration involves the removal of marrow by suction. Aspirate material provides superior cytologic detail when smeared on a slide and stained; furthermore, aspirate material can be submitted for valuable ancillary studies, such as flow cytometry, fluorescent in situ hybridization and cytogenetics. Biopsy involves the removal of an actual segment of bone. This portion of bone is not large—about the size of half of a toothpick. The biopsy preserves the architecture of the bone and allows for a more precise understanding of the overall cellularity and distribution of the marrow cells and disease processes.

The vast majority of bone marrow exams are performed in an office setting, with local anesthesia. As a rule, very little preparation on the part of the patient is necessary, other than the possible withholding of a dose of anticoagulant therapy, e.g. Plavix or coumadin (a decision best made by the patient's primary care physician). Because general anesthesia is not used, there is no need to fast before the procedure. As the local anesthetic does not alter consciousness in any way, the patient may safely drive home after the bone marrow exam.

The bone marrow exam should take approximately 20 to 30 minutes to perform. After a brief discussion of the rationale and possible complications of the procedure, the patient is positioned on the examining table, either on the belly or the side. The posterior iliac crest (the part of the hip bone that can be felt under the thumbs when one stands with one's hands on the hips) is identified and the local anesthetic, lidocaine, is injected. The pathologist needs to anesthetize the skin, the bone and the soft tissue in between, so this step may take some time. After anesthetization has been accomplished, the pathologist inserts a hollow needle into the bone and aspirates marrow with a syringe. After aspiration, the pathologist will then push the needle a bit deeper into the bone to obtain the biopsy.

Assuming the successful acquisition of aspirate and biopsy material, the pathologist applies firm pressure to the area until bleeding stops. When this is accomplished, a bandage is applied and the patient is sent home with instructions to avoid strenuous activity for the rest of the day, as well as showers or baths. Most importantly, the bandage must be checked every few hours or so for rebleeding, which is the primary concern post-procedurally.

Possible complications, which occur much less than 1% of the time, include uncontrolled bleeding, infection and damage to nearby structures. However, even thrombocytopenic patients usually do not report rebleeding at home, and serious infection is practically unheard of. The posterior iliac crest is also not close to any vital organs or large blood vessels or nerves.