

Jamshidi needle

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The Jamshidi needle is the standard instrument used for bone marrow biopsy. Bone marrow examination is commonly performed for the diagnosis and management of blood diseases. It usually involves both a marrow blood aspiration and a marrow trephine biopsy. Interpretation of a bone marrow specimen is in the context of a good clinical history, physical examination, and the results of at least a complete blood count and peripheral blood smear examination. Depending on the diagnosis, in addition to conventional morphological examination under light microscopy, the marrow specimen may be sent for immunophenotyping, cytogenetic analysis, or molecular genetic studies. For selected cases, microbiological tests, especially viral studies using immunological or molecular genetic techniques, may help establish a diagnosis.¹

A dry tap may occasionally be encountered during marrow aspiration. The operator is unable to aspirate marrow blood from the biopsy site. This may be due to myelofibrosis or heavy malignant marrow infiltration. Under such circumstances, a biopsy imprint may be prepared from the trephine specimen on a clean glass slide. This allows optimal cytological examination of marrow cells by the haematopathologist.

Indications for bone marrow examination include undiagnosed anaemia, leukopaenia, thrombocytopaenia or pancytopaenia, and to

investigate the cause of elevated blood counts including polycythaemia, leukocytosis, and thrombocytosis. A bone marrow evaluation is essential for the diagnosis of leukaemia and plasma cell myeloma, and for staging of lymphoma. For the latter, bilateral marrow aspiration and trephine biopsy are often recommended although studies show that unilateral biopsy is usually adequate if the length of the trephine biopsy specimen exceeds 20 mm. Bone marrow examination may also be performed in cases of unexplained splenomegaly.

The posterior superior iliac crest and spine are the chosen sites for marrow aspiration and trephine biopsy. The procedure is usually performed under local anaesthesia. Other premedications or sedation including anxiolytics or opiates are not usually necessary for adults.

The patient is advised to lie supine for at least 15 minutes following the procedure and inspected for bleeding before discharge. Paracetamol may be given to control pain. The patient should be advised that there may be slight tenderness or numbness around the puncture wound for a few days and to contact the clinic if there is increasing tenderness, swelling, or bleeding.² The wound should be kept dry and heavy exercise should be avoided. Complications including bleeding and infection are rare.

Trepanning of bone has a very long history.³ There is evidence that the procedure was once



FIG. Jamshidi needle with stylet in situ (above) and the guidewire (below) used for detaching the marrow specimen from its lumen

Specimen was donated to the Hong Kong Museum of Medical Sciences in 2016 by the Department of Medicine, The University of Hong Kong

performed on the bones of the skull to treat headache and mental illness. Obtaining a bone marrow specimen for diagnostic purposes was first performed by Pianese in 1903 in Italy, by puncturing the epiphysis of a femur. Over the years, different needles have been designed for similar purposes. The ultimate instrument, the Jamshidi needle, was designed and patented in 1971. It was named after the inventor Dr Khosrow Jamshidi, an Iranian physician.³

The original Jamshidi needle was made of stainless steel, including the handle, and was reusable (Fig). It can be used for both marrow blood aspiration and trephine biopsy.³ It is a long hollow needle with a tapering sharp cutting end and a handle at the other end, with a solid stylet inside the needle. A 20-mL syringe with no luer lock is usually used for marrow aspiration. The unique feature of this needle is that the interior diameter of its distal end tapers radially towards the cutting tip. This allows the trephine

specimen to enter freely into the lumen and hence avoids crushing of the marrow tissue. As the needle has a tapering end, it is important to use the provided guidewire to push out the trephine specimen away from the sharp end, to avoid compressing marrow cells.

A Jamshidi needle is now the standard instrument used by haematologists worldwide for marrow aspiration and trephine biopsy. It must be sterilised before use and sharpened periodically. The original reusable Jamshidi needle, however, has now almost completely been replaced by disposable needles although its basic design is unchanged. This ensures sharpness and sterility, and a higher yield with less pain to patients.

Modification of the marrow biopsy technique is advocated only in the most difficult cases and includes use of an electric drill and guidance by computed tomography.

References

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