Adverse Events

Morbidity associated with bone marrow aspiration and trephine biopsy - a review of UK data for 2004

Adverse events following bone marrow biopsy are rare but poorly documented. Annual UK surveys are building up a data-base on the frequency and nature of such complications, which will provide the evidence on which recommendations can be based. The latest annual survey documented 15 adverse events, mainly hemorrhagic, among 20323 procedures.

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Complications associated with bone marrow aspiration and trephine biopsy are well recognized but believed to be rare. Until recently, the nature and incidence of such adverse events have been poorly documented. As the result of a death from trephine-biopsy-associated retroperitoneal hemorrhage in 2001, the British Society for Haematology (BSH), in 2002, instituted an annual confidential survey of biopsy-associated morbidity and mortality, Data from the first three surveys have been published.[1-3] A further year's data are presented here and summated with the data from earlier years to identify risk factors.

Members of the BSH collected data prospectively throughout 2004 and submitted them early in 2005, using a standard proforma.

Data were returned from 120 hospitals. The total number of procedures reported was 20323, both aspirate and trephine biopsy being performed in 67% and aspiration alone in 32%. The number of procedures per hospital per year varied from 10 to 706 (mean 242, median 200). The percentage of patients who had a trephine biopsy in addition to an aspirate varied widely, from 12 to 100% (mean 68%, median 75%).

Table 1. Risk factors for hemorrhage in patients who bled.

	2004	*Cumulative results from previous years*	*Total*
Diagnosis of myeloproliferative disorder	3*	18	21
Aspirin therapy	3*	10	13
Warfarin therapy	0	3	3
Heparin therapy	0	1	1
Disseminated intravascular coagulation	0	2	2
Renal impairment	0	2	2
von Willebrand's disease	0	1	1
Other coagulation defect	1	0	1
Other putative platelet dysfunction	2 (AML, RAEB)	7 (4 MDS, 3 AML)	9
Thrombocytopenia	0	10	10
Obesity	0	4	4

** One patient with essential thrombocythemia was taking aspirin; another patient with essential thrombocythemia and a patient with idiopathic myelofibrosis had no risk factors other than the myeloproliferative disease. AML: acute myeloid leukemia; MDS: myelodysplastic syndrome; RAEB: refractory anemia with excess blasts.*

A total of 15 adverse events were reported, representing 0.07% of all reported procedures. As in previous years, hemorrhage was both the most common and the most serious adverse event; it occurred in nine patients. Other patients suffered persistent pain (3 patients), collapse relating to previously undiagnosed severe aortic stenosis (1 patient), suspected anaphylactic reaction (1 patient) and fracture at the site of the biopsy (1 patient). The fracture was in a patient with osteoporosis and led to 2 weeks' hospitalisation. Seven episodes of hemorrhage followed a combined aspiration and trephine biopsy but two followed aspiration alone, one of the latter being a major hemorrhage. Episodes of bleeding are summarized and compared with those in previous years in Table 1.

The cumulative data indicate that a diagnosis of a myeloproliferative disorder is a risk factor for hemorrhage, even in the absence of aspirin therapy. A coagulation defect associated with multiple myeloma was a risk factor not observed in previous years; this patient was found, the day after the hemorrhage occurred, to have a prothrombin time of 16.4 s (normal range 11-13.3) and an activated partial thromboplastin time of 40.8 s (normal range 21-34). Factor assays were factor VIII 67%, factor IX 68%, factor XI 60% and factor XII 47%. Coagulation returned to normal after treatment of the myeloma. Six patients required transfusion of blood or blood products' platelets in one patient, red cells in four patients and platelets, red cells and fresh frozen plasma in one. The potential gravity of hemorrhagic complications is exemplified by the fact that the event was life-threatening in two patients. One of these patients suffered a laceration of a branch of the gluteal artery during aspiration and required transfusion of ten units of red cells, four units of fresh frozen plasma and two units of platelets together with embolization of the bleeding vessel. The second patient became hypotensive, suffered a 3 g/dL drop in hemoglobin concentration and required transfusion of three units of blood. She was found to have developed a 14×6 cm retroperitoneal hemorrhage from a damaged branch of the right internal iliac artery and required embolization.

There was no clear association between inexperience of the operator and the occurrence of hemorrhage. Three of the nine events were associated with procedures carried out by medical staff with less than one year's relevant experience. In the other six instances the procedures were carried out by staff with 1.5, 4, 5, 14, 20 and 24 years' experience. Recent alterations in practice were reflected by the fact that for the first time adverse events were reported after procedures performed by nurse practitioners (one with 4 years' and the other with 5 years' experience).

Adverse events following aspiration and trephine biopsies of the bone marrow are rare but because of their potential gravity are a cause for concern. Hemorrhage remains the single most common and most serious adverse event. The lack of any reports of hemorrhage in patients receiving warfarin or heparin in the year surveyed may indicate that UK hematologists are now more alert to the potential risks. The role of embolization of a bleeding vessel is highlighted by the fact that this procedure was required in two patients to arrest hemorrhage. Embolization may obviate the need for hazardous surgery.[4]

Documentation of adverse events resulting from medical procedures is an important step in reducing their incidence. Other national associations of hematologists might well give consideration to instituting similar surveys.

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