Metastasis of solid tumours in bone marrow: a study from Kashmir, India

Between 1935 and 2001, many studies have appeared in the literature from different parts of the world on bone marrow invasion by solid tumours. After lymphoma, the primary tumours that most frequently involve the bone marrow are malignancies of the prostate, breast, lungs, thyroid, kidney, and stomach. 1 Metastatic deposits of malignant melanoma have also been described. 2 In many instances, primary tumours remain clinically undetected and are identified only at necropsy. 3

The value of bone marrow aspiration in the diagnosis of malignant neoplasms was confirmed when four of eight cases of malignant melanoma were found to harbour tumour deposits. In a series of 57 patients with known carcinoma of the prostate, breast, lungs, thyroid, kidney, and stomach, 2 metastatic deposits of malignant melanoma have also been described. 2 In many instances, primary tumours remain clinically undetected and are identified only at necropsy. 3

In our present study, lymphoma (non-Hodgkin lymphoma) made up a quarter (two cases) of all the secondary tumours of the bone marrow, along with neuroblastoma (two cases)—a childhood tumour. Neuroblastoma, non-Hodgkin lymphoma, and acute lymphoblastic leukaemia pose a considerable amount of difficulty in diagnosis because all three are round cell tumours with a very similar morphological appearance. In acute lymphoblastic leukaemia, the peripheral blood film examination is of paramount importance because it shows the presence of lymphoblasts. In neuroblastoma cells in bone marrow smears tend to form rosettes and may show neural or neurofibroblast differentiation. Non-Hodgkin lymphoma is thought of as a malignancy of old age, although it can be seen at any age; however, childhood lymphomas are mostly of high grade.

In most studies, the incidence of tumour deposits in bone marrow varies from gastrointestinal tumours was low, but they made up a quarter of the cases presented here (two cases). This could be explained by the low number of cases in our study, together with the high incidence of gastrointestinal cancers, especially of the oesophagus and stomach, seen in Kashmir. 4 Deposits from prostate and breast tumours (one case each) are known to have a predilection for skeletal metastases.

Finally, several features worthy of comment are that the metastatic tumour cells are easily identified in the bone marrow smears because they look foreign within the native bone marrow cell population. These cells are usually identified in groups, even at low power examination, because they are larger than most of the bone marrow cells. Single cells are more difficult to recognise, although they never resemble the normal bone marrow cells. The primary site of the malignant deposits may be extremely difficult to determine on a morphological basis only, but their origin can sometimes be inferred from their morphological appearance, especially in mucous producing carcinoma, squamous carcinoma, some adenocarcinomas, and in many cases of metastatic neuroblastoma or melanoma.
extracellular osmolality. Symptoms can be
apparent when the serum sodium falls
below 120 mmol/litre, but are usually associ-
ated with concentrations below 110 mmol/
litre. Severe symptoms occur with very low
sodium concentrations of 90–105 mmol/litre.
As the sodium concentration falls, the symp-
toms progress from confusion to drowsiness
and eventually coma. However, the rate at
which the sodium concentration falls is also
an important factor, and the acute intake of
large volumes of water over a short period of
time, as occurred in this case, would have pro-
duced a rapid drop in serum sodium, which
was fatal.

Postmortem serum samples are unsuitable
for sodium measurement because concentra-
tions decrease after death and there is consid-
erable individual variation. However, vitreous
sodium concentrations are stable in the early
postmortem period, and the concentration in
vitreous humour is similar to that found in
normal serum. Studies have shown that
abnormal vitreous humour sodium concen-
trations had corresponding antemortem
hyponatraemia or hypernatraemia. Self
induced water intoxication is known to
psychologists, but there is a paucity of
information and little awareness of this life
threatening problem in the professional
literature. The initial symptoms associated
with this condition are very similar to psycho-
lights, delusions, hallucinations, confusion, and disorientation. If untreated, the symptoms may progress
from mild confusion to acute delirium, sei-
uores, coma, and death, as occurred in this
case.

Fatal water intoxication has been described
in several different clinical situations. The
most common of these is psychogenic poly-
dipsia (compulsive water drinking), which is
times associated with either mental
illness or mental handicap. The condition
has also been described in young army
recruits of good health who developed hypo-
naemia or hyponatraemia after apparent overhydration fol-
lowing heat related injuries. The most com-
mon symptoms suffered by this group were
changes in mental status, emesis, nausea, and
seizures. Accidental water intoxication has
been described as a result of excessive water
intake after an episode of gastroenteritis, and
an iatrogenic case has occurred after gastric
lavage. Forced water intoxication is a recog-
nised form of child abuse, which commonly
leads to brain damage and is sometimes fatal.

In conclusion, we wish to highlight an
unusual cause of death that may go unnoticed
without an appropriate clinical history and
relevant postmortem biochemical investiga-
tions. Both clinicians and pathologists need to
be aware of this condition, which may
manifest itself as a psychotic illness and so go
recognised, resulting in its early stages. Early de-
tection is crucial to prevent fatal complications.

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CORRECTION
Salivary gland-like tumours of the breast:
surgical and molecular pathology. Pia-
Pathol 2003;56:497–506. The name of the first
author should have been Foschini MP not
Pia-Foschini M.

Calendar of Events
6–8 April 2004, Pragati Maidan, New Delhi,
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