Craniospinal irradiation in an older patient

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Abstract
We describe central nervous system blast crisis on a background of chronic myeloid leukaemia in remission in a 70-year-old man. After successful elimination of blasts in the cerebrospinal fluid, this patient received craniospinal irradiation (CSI). He remains well 30 months after CSI and has no significant long-term toxicity. CSI is usually reserved for patients under the age of 50 years and we wish to document its safe and successful use in this older patient.

Keywords
Craniospinal irradiation; chronic myeloid leukaemia; blast crisis; acute lymphoblastic leukaemia; adult.

Introduction
The use of craniospinal irradiation (CSI) is usually reserved for younger patients due to concerns about toxicities, particularly neurocognitive impairment. We report a case of an older patient being treated with CSI with little acute and late toxicity.

Case report
This 70-year-old man was diagnosed with chronic myeloid leukaemia (CML) and achieved complete cytogenetic response with imatinib. He had received this continuously for 22 months when, on return from a skiing holiday, he developed headaches, confusion, hearing loss and impaired coordination. Despite normal computed tomography (CT) and magnetic resonance imaging (MRI) of brain and spine, and full blood count, his condition deteriorated to the extent that he could no longer stand unaided. Cerebrospinal fluid (CSF) analysis following a lumbar puncture revealed a raised white cell count and immunophenotyping demonstrated acute lymphoblastic leukaemia (ALL). A repeat bone marrow was normal and he remains in complete haematological and cytogenetic remission from CML. Blasts visualised in the CSF cleared following treatment with intrathecal methotrexate. Imatinib was changed to dasatinib. On completion of 6 cycles of intrathecal therapy, having made a significant clinical recovery he was referred to clinical oncology for consideration of CSI to consolidate his central nervous system (CNS) remission.

There were reservations regarding the role of CSI in this case. First, the clinical scenario of CNS relapsed ALL in the setting of controlled marrow disease is highly unusual. Although whole
brain radiotherapy is included in the UKALL XI protocol for patients not eligible for transplant, CSI is more commonly used in treating patients with intrinsic CNS tumours. This patient’s age also caused significant concern; most patients receiving CSI are less than 50 years old. These issues were discussed with the patient and his family who were keen to proceed with treatment to obtain the most durable remission possible in the CNS.

The patient attended for fitting of an orfit for immobilisation and underwent a planning CT in the prone position. His radiotherapy was CT planned using the eclipse varian planning system. The treatment was delivered via 2 lateral fields to the head and 2 direct posterior fields to upper and lower spine. Tissue compensators were used because of the curvature of the spinal cord. The junctions between the 3 fields moved caudally every 3 fractions to avoid consistent over- or under-dosage at the field junctions. 24 Gy in 1.2-Gy fractions were delivered over 4 weeks to the craniospinal axis. This dose was chosen with reference to the MRC UKALL XI protocol for whole brain radiotherapy in ALL. We decided to hyperfractionate the radiotherapy to reduce risks of longer-term toxicity. Dasatinib was withheld for the duration of radiotherapy as there is limited data about potential interactions and therefore the possibility of increased toxicity.

Radiotherapy was well tolerated with the main toxicity experienced being alopecia and grade 1 oesophagitis. He did not experience any haematological or other toxicity. Thirty months after completing radiotherapy he remains in complete remission on dasatinib. He feels slightly forgetful but leads a full and active life.

**Discussion**

CSI is usually reserved for intrinsic CNS tumours and tends to be used in younger patients because of concerns about acute and late toxicities in older patients. Most data about CSI in leukaemia comes from protocols used in the treatment of children with ALL. A previous case series from MD Anderson describes the use of CSI in adults with a CNS recurrence of leukaemia, with one patient having CML and blast crisis as described here. The median age of patients treated was 34 years with range 16–58 years, a significantly younger age group than our patient.

**Teaching point**

CSI has previously been demonstrated to be effective in eliminating leukaemia in the craniospinal axis. Our case suggests that its use need not be limited to the younger patient and can be considered in the more elderly population.

**References**