CASE REPORT

Ring chromosome with deletion 7q in acute myeloid leukaemia

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SUMMARY

Cytogenetic abnormalities can be detected in approximately 50–60% of newly diagnosed adult patients with acute myeloid leukaemia (AML). Monosomy of the chromosome 7 (−7) and deletion of the long arm of the chromosome 7 (7q−) are considered as high cytogenetic-risk AML with a poor prognosis. These abnormalities can occur, as a single chromosomal aberration, in approximately 8% of newly diagnosed AML. We report an elderly patient with AML who had deletion 7q (7q−) along with ring chromosome, which was demonstrated in conventional cytogenetics and fluoresecent in-situ hybridisation techniques.

BACKGROUND

Cytogenetic abnormalities are known to occur in approximately 50–60% of newly diagnosed adult patients with acute myeloid leukaemia (AML).[1–3] Ring chromosomes are very rare chromosomal abnormalities in haematological malignancies. The association of ring chromosome with deletion 7q31 has not been reported.

CASE PRESENTATION

A 69-year-old Caucasian man presented with weakness of 4 weeks duration. He was healthy in the past without any comorbid medical illness. On examination there was a mild pallor and a few small bruises in the body.

INVESTIGATIONS

At presentation full blood count showed haemoglobin of 84 g/L, white cell count of 32×10^9/L with 85% blasts in differential count and platelet count of 38×10^9/L. The bone marrow biopsy demonstrated hypercellularity with 80% blasts and trilineage dysplastic changes. Majority of the blasts were large, with granular cytoplasm and Auer rods were not present (figure 1). The blasts expressed surface markers CD13, CD33, CD34, CD117, human leucocyte antigen-DR (HLA-DR) and myeloperoxidase (MPO). The picture was consistent with acute myeloid leukaemia (AML) with myelodysplasia-related features according to WHO classification. Bone marrow chromosome analysis revealed an abnormal male karyotype with a ring chromosome derived from chromosome 7 in the majority of cells examined—46, XY,r(7)(p13q21)(13)/46,XY(3) (figure 2, arrow mark). Fluoresecent in situ hybridisation (FISH) testing of the bone marrow was carried out using the Vysis LSI D7S486 (7q−) probe—7q31. Two hundred interphase cells were examined and 98% of them showed a deletion of 7q31 (figure 3).

TREATMENT

The patient underwent induction chemotherapy with 7+3 (cytarabine and daunorubicin) regimen. During the postchemotherapy period, patients had mucositis and neutropenic colitis which resolved completely after intensive supportive management.

OUTCOME AND FOLLOW-UP

Bone marrow biopsy performed after 4 weeks of chemotherapy demonstrated complete remission morphologically (<1% myeloblasts) and by immunophenotyping. Chromosomal analysis showed a normal karytotype (46XY) with the absence of ring chromosome abnormality detected at diagnosis. After 13 months of clinical remission the patient had relapse of AML and during that time, the same abnormality (ring chromosome with deletion 7q31) was found in the bone marrow cytogenetics assay.

DISCUSSION

Ring chromosome formation usually occurs when the two ends of a chromosome fuse to form a ring shape. Ring can occur when breaks in the chromosome arms occur with fusion of the proximal broken ends and in such cases, there will be a loss of distal chromosomal material. The cause of these DNA breaks and fusion of the ends is unknown. Ring chromosomes can also occur due to a mechanism called telomere dysfunction when the terminal ends of a chromosome fuse without breaks in the chromosome arms.[4] Acquired-ring chromosomes have been reported in many cancers and the majority of them are solid malignancies. High

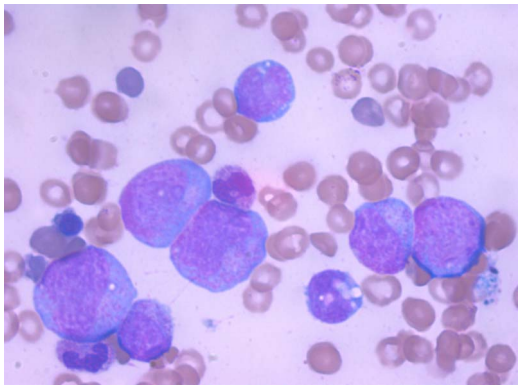

Figure 1 Bone marrow aspirate showing large myeloblasts.

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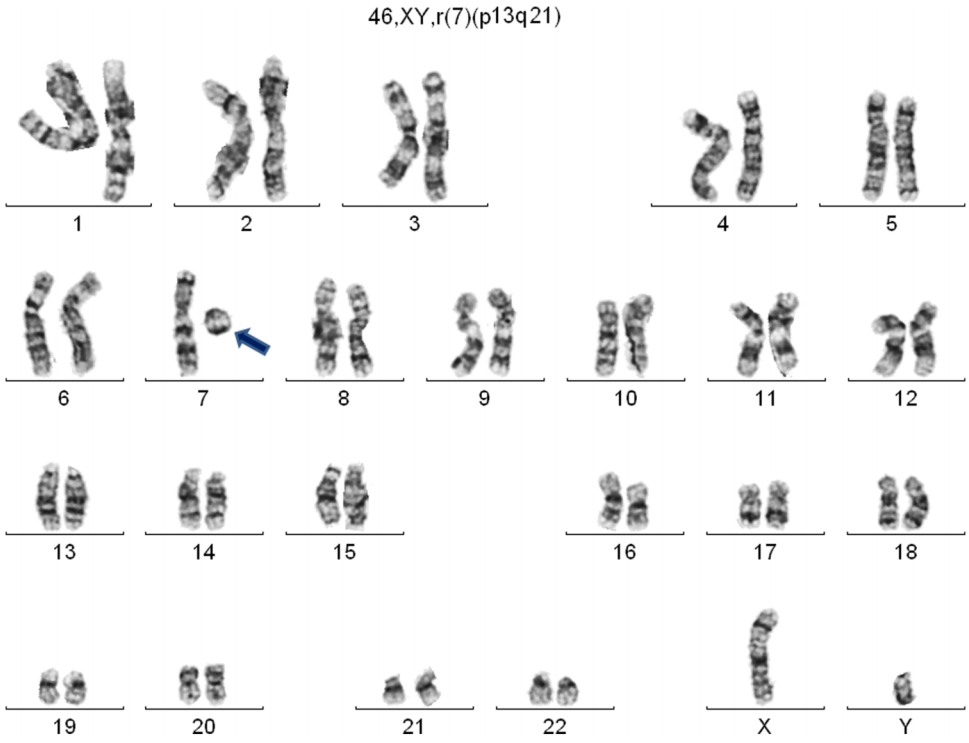

Figure 2 Bone marrow cytogenetics showing ring chromosome at chromosome 7 (arrow).

incidences of ring chromosomes are seen in dermatofibrosarcoma protuberans (70%), liposarcoma (21%) and gall bladder cancers (21%).[5] These are very rare in haematological malignancies and can be seen in approximately 2% of AML.[2] Ring chromosomes involving chromosomes 1, 5, 8 and 18 have been reported in AML patients.[6–9] Deletions at long arm of chromosome 7 (7q–) are typically associated with a poor prognosis in myelodysplastic syndromes and AML. Deletion of chromosome 7q31 in conjunction with ring formation has not been reported; however, ring chromosome 7 without confirmation of 7q31 deletion has been reported in childhood acute megakaryoblastic leukaemia.[10]

Learning points

- Ring chromosomes are very rare in haematological malignancies.
- Deletions of chromosome 7 (−7) and long arm of 7 (−7q) are associated with poor prognosis in acute myeloid leukaemia.
- Ring chromosome with deletion 7q31 has not been reported so far.

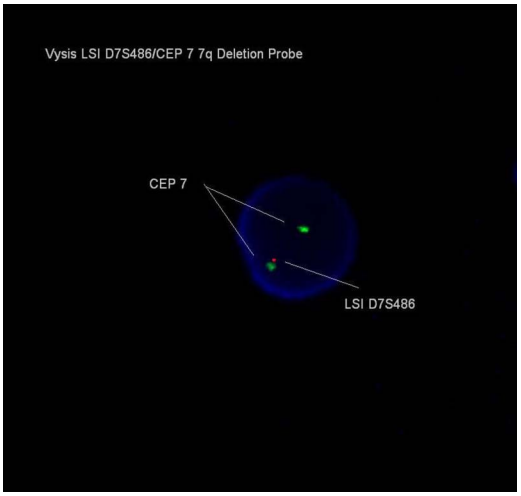

Figure 3 Fluoresecent in situ hybridisation using 7q– probe showed showed a deletion of 7q31.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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