

Case Reports

Primary Ki-1-Positive Anaplastic Large Cell Lymphoma of the Bone Presented with Spinal Cord Compression

KC CHOW, GCF CHAN, PL KHONG, TWH SHEK, SY HA, YL LAU

Abstract Ki-1-positive anaplastic large cell lymphoma is a common form of aggressive non-Hodgkin's lymphoma in children with a wide spectrum of clinical presentations. Uncommonly, it presents as a paraspinal tumour with spinal cord compression. Only a limited number of cases with similar presentation have so far been reported in the English literature. We reported a boy with paraspinal Ki-1-positive anaplastic large cell lymphoma initially presented with paraplegia. The patient achieved complete remission with chemotherapy plus local irradiation and regained full function with no residual neurological deficit.

Key words Anaplastic lymphoma; Bone; Children

Case Report

A 10-year-old boy presented with unsteady gait, pain and lower limb weakness for two months. He sought help from traditional chiropractor until his condition deteriorated

and became wheelchair bound with constipation and urinary retention. Upon admission, he had paraplegia with absent knee and ankle jerks with no focal sensory deficit. There was neither lymphadenopathy nor hepatosplenomegaly. Complete blood picture showed anaemia (HB 8.3 g/dl), mild thrombocytopenia (platelet $116 \times 10^9/L$) with normal leucocyte count. Erythrocyte sedimentation rate was elevated (55 mm/hr). His lactate dehydrogenase was low (321 U/L) but serum ferritin was elevated (1530 pmol/L). Nerve conduction velocity showed decreased amplitude in both tibial and peroneal nerves with axonal neuropathy. Spine X-ray showed a wedge compression fracture at the sixth thoracic vertebral body. Magnetic resonance imaging (MRI) of the spine revealed an aggressive tumour involving the sixth thoracic and fifth lumbar vertebrae with paraspinal and intraspinal extension (Figures 1 & 2).

A trucut biopsy of the tumour was performed and histology showed diffuse cohesive sheets of large malignant tumour cells with indistinct cell borders. Occasional cells with horseshoe, embryo-like nucleus with a prominent perinuclear Golgi zone are also seen. Immunohistochemical studies show that these tumour cells are strongly positive for leucocyte common antigen (LCA), CD30, EMA, and UCHL-1. They are negative for cytokeratins (CAM5.2 & AE1/3), neural markers (synaptophysin, chromogranin and NSE), muscle markers (myosin and desmin), placental-like alkaline phosphatase, Leu-M1, B-cell markers (CD20) and

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Figure 1 Mid-sagittal FSE T2-weighted image of the lumbosacral spine shows replacement of L5 vertebral body marrow by mildly hyperintense signal. The vertebral body height and adjacent L4-5 and L5-S1 disc space are preserved. There is associated soft tissue component of similar signal in the pre-vertebral space and spinal canal. The cauda equina is compressed.

CD3. Incidentally tumour cells are also positive for O13. The overall histologic and immunophenotypic profile are compatible with Ki-1-positive anaplastic large cell lymphoma of T-cell type (UCL-1+ve).

Bilateral bone marrow aspiration and trephine biopsy were negative for tumour cells. Computed tomography (CT scan) of the neck was unremarkable. CT scan of the chest showed bilateral pleural effusion with no pulmonary nodules. Lumbar puncture was not performed in view of the large tumour situated in the L5 region. Bone scan revealed multiple osseous metastases. The patient was started on chemotherapy with Hong Kong Paediatric Haematology Oncology Study Group--NHL protocol

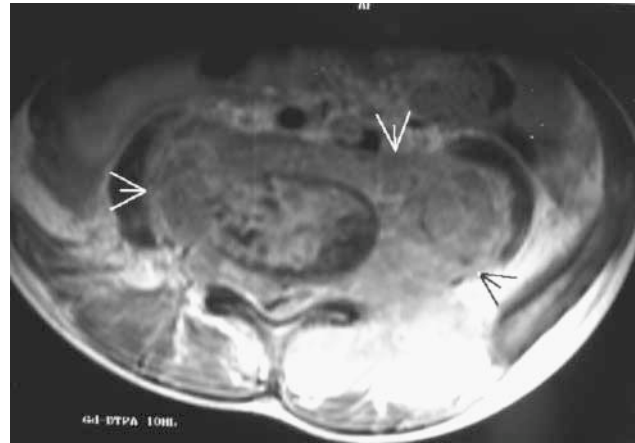


Figure 2 Axial SE T1-weighted image of L5 shows an aggressive tumour with anterior extension to pre-vertebral space, paraspinal extension into the psoas muscles and posterior extension into the spinal canal. The intraspinal extradural component obliterates the thecal sac and markedly compresses the cauda equina.

(modified from the United Kingdom Children's Cancer Study Group--NHL-91)¹ and a total of 7 courses of treatment was given. Intensive physical and occupational therapy was instituted at the time of the initial phase of treatment and he regained most of his motor function (except for bilateral foot drop) and could walk with support after the fourth course of chemotherapy. But his bowel and urinary retention problems persisted. Repeated MRI spine after the 7th course of chemotherapy showed residual disease at L5 area and a local involved field (T5~T7, L4~S2) irradiation with 4,000 cGy was given over 4 weeks. He regained his foot and bladder control later and neurological examination was normalised at 2 months after completion of therapy. Repeated MRI and bone scan showed no residual disease. Due to the optimal response and questionable additional benefit, megatherapy with autologous bone marrow transplant was withheld. He is now 18 months post-therapy and remains disease free with no residual neurological deficit.

Discussion

Ki-1-positive anaplastic large cell lymphoma (Ki-1 ALCL) usually involves predominantly the lymph nodes and skin, and extranodal involvement such as the thorax, gastrointestinal tract and bone had also been mentioned.^{2,3}

Bone involvement has been found only in 9% of Ki-1 ALCL.⁴ For primary lymphoma of the bone, which by itself is a rarity, only 10% of them are related to Ki-1 ALCL⁵ and primary Ki-1 ALCL of the bone presented as spinal cord compression is even rarer. When we searched the PubMed, only 30 plus cases of primary bone Ki-1 ALCL with clinical information have been reported in the English literature.^{2,6-19} In one large paediatric series that involved 256 children with non-Hodgkin's lymphoma (NHL), only 5 had spinal cord compression and none of them had Ki-1 ALCL.²⁰

We reviewed those cases of Ki-1 ALCL with primary bone involvement published in the English literature, only those with adequate clinical details were included and summarised (Table 1). Axial skeleton including spinal or paraspinal areas were the most frequent sites of involvement which accounts for 70-80% of cases in 2 reported series.^{13,14} It is interesting to note that primary bone involvement is more commonly found in Asian (23 of 32 cases, all East Asian except 1 Jewish). For the 9 non-Asian cases, 8 were American and their ethnic origins were not disclosed so there might be Asian included in the cohort. Furthermore, Asian's experience is often under-represented in the English literature. Therefore the actual incidence might even be higher. Typical Ki-1 ALCL has a bimodal age distribution, with peaks in the second and seventh decades. Cases with initial bone involvement showed a distinct age distribution difference among Caucasian and Asian, most reported Asian cases were adolescents or young adults whereas most European cases were 60 years old or above.

There have been conflicting results on the prognosis of patients with Ki-1 ALCL. A large paediatric series suggested that its outcome in children is favourable even in advanced stage.³ For patients with primary bone involvement, it also has been claimed to have good outcome in 3 reports with young patients.^{6,7,21} Due to the good response to chemotherapy and radiation therapy, surgery decompression is seldom required. The majority of reported patients were treated with chemotherapy with or without radiotherapy, only one patient underwent surgical decompression (Table 1). Our patient has a very good outcome with chemotherapy and local irradiation alone and he recovered from his spinal cord injury without neurological deficit. He is currently considered as cure from his lymphoma with a complete remission period of more than 8 years.

In summary, Ki-1 ALCL with primary bone involvement is a rare phenomenon but seems to be more common among young orientals. Whether this is due to the bias of reporting or represents a genuine phenotypic variation in different

ethnic groups await further study to validate. In general, young patients with bony involvement seem to have good outcome when treated with current chemotherapy with or without radiation therapy. Even with spinal cord compression, surgical decompression may not be necessary.

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Table 1 Primary Ki-1 lymphoma of bone

Authors/Ref	Number	Race	Sex/Age(yr)	Initial sites	Immunophenotype	Therapy	Outcome
Koike ⁶	1	Japanese	F/4	skull, scapula	T	NA	DOD (3 mos)
Chott et al ²	1	Austrian	M/70	bone	T	Chemo	AWD (3 mos)
Fujimoto ⁶	2	Japanese	F/10, M/14	pelvis, femur	NA	NA	DOD (8 mos) CR (8 mos)
Chan et al ⁷	3	Chinese	M/22, F/8, M/22	T5-T6; C7, skull; pelvis, femur	T; uncertain; B	Chemo +/- RT	CR (42 mos) CR (30 mos) CR (34 mos)
Penny et al ⁸	4	American	M/21, F/70, M/34, M/72	ribs, L2; thoracic cord; paraspinal mass (vertebral involvement); shoulder	T; T; B; B	Chemo +/- RT	DOD (6 mos) DOD (4 mos) On therapy AWD (11 mos)
Agematsu & Komiyama ⁹	1	Japanese	M/12	lumber spine, parietal bone	T	NA	NA
Ishizawa et al ⁶	2	Japanese	M/20, F/14	T7, L4; temporal bone, pelvic, sternum	T	NA	DOD (14 mos) DOD (7 mos)
Wang et al ¹⁰	1	American	M/60	tibia, iliac	B	Chemo + RT	AWD (20 mos)
Suzukawa et al ¹¹	1	Japanese	M/21	thoracic, lumber spine,	null-cell skull	OP+ Chemo + RT	DOD (8 mos)
Postovsky et al ¹²	1	Jewish	M/10	leg	NA	NA	NA
Hsieh et al ¹³	5	Chinese	M:F=6:1 Median 42	Axial skeleton (71%)	T	Chemo +/- RT	1 yr OS 45%
Nagasaka et al ¹⁴	6	Japanese	M:F=2:1, Median 33 (range 4-63)	Axial bone (83%)	2T, 4 null-cell	Chemo +/- RT	DOD (3/6<2 yrs) AWD (2/6<2 yrs) NA (1/6)
Bakshi et al ¹⁵	3	American	M/<15	femur; sacrum; rib	NA	Chemo	CR (11 yrs) CR (15 mos) DOD (12 mos)
Lones et al ¹⁶	1	American	M/70	rib	T	NA	NA
Index patient	1	Chinese	M/10	T6, L5	T	Chemo + RT	CR (97 mos)

*The English information of the studies of Koike & Fujimoto were described in Ishizawa's article.

[Abbreviation] yr: Years; mos: Months; M: Male; F: Female; AWD: Alive with disease; CR: Complete remission; DOD: Died of disease; NA: Not Available; RT: Radiotherapy; Chemo: Chemotherapy; C/T/L: Cervical / Thoracic / Lumber Spine

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