Acute Lymphoblastic Leukaemia (A.L.L) Following Radiation During Pregnancy

Pages with reference to book, From 179 To 180

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Introduction

Acute leukaemia may occur at any age. In children the incidence is highest in the first six years of life. Acute leukaemia in children, especially young children is usually lymphoblastic in type. The etiology of acute leukaemia is not known but many predisposing factors are recognized, including radiation, chemical or therapuetic agents and constitutional disorders. A case of acute lymphoblastic leukaemia, where diagnostic irradiation may have been the precipitating factor is presented here.

Case Report

History

An eight years old male child was well until April of 1980 when he first developed cough. During a holiday in the hills in June 1980 his cough returned. He complained of breathlessness on exertion and pain in left knee. By the end of June he became pale and looked ill.

The patient is the first child of well educated and intelligent parents. He was born in a hospital, in Karachi by caesarean section. His birth weight was 7 lbs 12 ozs and he has been fully immunized. His mother had radiological pelvimetry in the third trimester. This procedure was repeated because the results of the first exposure were not satisfactory.

Soon after birth the child developed some gastrointestinal problems. At the age of eight months he underwent radiological examination which included a barium meal follow through.

Clinical Examination

On examination the child was anaemic. There was no lymphadenopathy. Pulse 100/ minute, BP 100/75, there was a soft apical systolic murmur, heart sounds were normal. Respiratory rate 30/min. breath sounds were vesicular and there were no adventitutious sounds. Liver and spleen were not palpable. There were depigmented spots on the right thigh. No fundal haemorrhages were seen on ophthalmoscopic examination.

Investigations

The following were the results of preliminary investigations :-

Haemoglobin 6.7g/dl
White Blood Count 2.1 x109/L
Neutrophils 0.42 x109/L.
Monocytes 0.12 x10»/L
Lymphocytes 1.554x109/L
Platelets 125x19»/L

Coagulation screening showed moderate prolongation of the prothrombin, partial thromboplastin and thrombin time. Plasma electrolytes and renal function tests were within normal limits.

Bone Marrow: examination showed cellular particles with marked increase in blast cells. Haemopoiesis was markedly reduced.

Diagnosis of acute lymphoblastic leukaemia (A.L.L.) was made.

Treatment was begun in Karachi with vincristine and prednisolone and was continued in London, according to the United Kingdom Acute Lymphoblastic leukaemia trial V schedule (UKALL V). This is a "non T, non-B A.L.L. treatment protocol.

In the U.K. A.L.L. V protocol, drugs used in the induction phase are Daunarubicin, Vincristine, Prednisolone and asparaginase C.N.S. prophylaxis is given with cranial irradiation and intrathecal methotrexate. On completion of C.N.S. prophylaxis a bone marrow was performed which showed continued remission. Maintenance therapy was started with oral methotrexate once a week, and 6 mercaptopurine for 2 weeks, together with vincristine and predisolone once every six weeks.
Todate, after 26 weeks of diagnosis he is still in complete remission. His low count at diagnosis, lack of organomegaly and favourable histology, all favour a good prognosis.

Comments

Acute lymphoblastic leukaemia, although observed in all age groups is primarily a disease of childhood, where it accounts for 75% to 85% of all cases of acute leukaemia. The most common presenting complaints include fever, pallor, haemorrhage, anorexia, fatigue and bone or joint pains.
Immunological studies of lymphocyte membrane or surface markers have divided A.L.L. into:
1. Null A.L.L. (Accounting for 75% of all cases)
2. T-A.L.L. (Accounting for 20-24% of all cases)
3. B-A.L.L. (1-5%)

These surface characteristics remain constant throughout the course of the disease. These classifications have both therapetic and prognostic significance.
There are many factors predisposing to leukaemia in man, including radiation, chemical or therapeutic agents and constitutional disorders.
Ionizing radiation have long been recognized as oncogenic (Kamada, 1969), the types of neop-plasm varying according to the species, the condition of exposure, the duration and dosage, in some instances genetic and hormonal factors greatly affect succeptibility and in others the oncogenic effect depends on the activation of a virus. In man the incidence of acute myeloid leukaemia and chronic granulocytic leuckaemia was found to be greatly increased in patients suffering from ankylosing spondylitis who had been treated by X-irradiation of the spine and in the Japanese population of Hisoshima and Nagasaki who were exposed to radiation from the atomic bombs in 1945. The incidence in both cases began to rise in the second year after exposure, rose to a maximum after 5 years and was high and after 10 years. The available evidence suggests a linear relationship with dosage, with no indications of a threshold below wich exposure can be acepted as "safe". (Brill et al., 1962).
The potential leukaemogenic effects of prenatal exposure to diagnostic radiation is still open to question. There are reports that intra uterine radiation increases the risk of both childhood leukaemias and other cancers (Stewart et al., 1958; Mac Mahon, 1962). According to de-Gruchy (1978) the increased incidence amongst these children appears to be of the order of 40%. It has also been suggested that the radiological examination during pregnancy may have been made because of an illness during pregnancy and perhaps the oncogneic influence was unrelated to the radiation (Kneal and Stewart, 1976).
The leukaemogenic effect of radiation may be related to chromosomal damage. Individuals with the chromosome instability syndromes such as Bloom's syndrome, ataxia telangiectasia, xeroderma pigmentosa and Fanconi's syndrome have an increased risk of leukaemia. These diseases are autosomal, recessive and exhibit spontaneous chromosomal aberrations.
The individual with the highest risk of developing leukaemia is the one whose identical twin has leukaemia, the risk being 20-25%. Pearson et al (1963) reported the cytogenetic findings in a pair of identical twins who developed A.L.L. within five months of each other. There was no family history of haematological disease, cancer, or consanguinity but the mother had received a single X-ray to the abdomen six weeks before term.
As has often been seen, what is powerful for good, can be potent for evil. Diagnostic radiology, balance, is a useful tool, but it should be used with responsibility and caution.

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