
Editorial

Childhood Cancer: Where Do We Stand?

Cancer is a frightening disease to sufferers of any age group and their families. Fortunately, this entity is not very common in children, as in adults, but next to infection and malnutrition, cancer accounts as the major cause of death in Indian children. Because of the industrialisation and efforts now being directed for controlling infection, diarrheal diseases and malnutrition, deaths due to cancer are becoming more noticeable and people are becoming more concerned about this problem. In India accurate nation-wide figures of incidence of cancer in children are not available because of the paucity of population based cancer registries. However, using the United States as a baseline, where 10-12 out of 100,000 children under 15 years of age develop cancer each year(1,2), {Table I} approximately 35,000-40,000 children develop cancer annually in India. Because of the major advances in diagnosis, multimodality therapy, development of rational use of combination chemotherapy and improved supportive care, the cure rate in childhood cancer has increased tremendously and over 60% of all childhood cancers are now curable(3). In some cancers like Hodgkin's disease and Wilms' tumor the cure rate is nearing 90% (Table II).

Types of Childhood Cancer

Leukemia is the most common form of childhood malignancy which accounts for approximately 30% of all childhood cancers (2). Next is brain tumor followed by lymphoma both Hodgkin's and Non-Hodgkin's, neuroblastoma, Wilms' tumor,

soft tissue sarcoma, bone tumors, eye tumors and some other rare tumors. Most of these tumors occur below the age of eight years. The majority of cases of acute lymphoblastic leukemia, neuroblastoma, Wilms' tumor, retinoblastoma and primary liver cancer occur below the age of 5 years. Other tumors like Hodgkin's disease, Non-Hodgkin's lymphoma (NHL) and bone tumors occur more frequently in the age group of over 10 years. In both children and adolescents, boys are affected more than girls.

Leukemia is the most common cancer in children. There are two main subtypes in leukemia: (i) Acute lymphoblastic leukemia (ALL), and (ii) Acute myeloid leukemia (AML). There is also a small percentage of cases of Chronic Myeloid Leukemia (CML). Acute lymphoblastic leukemia is the commonest single type of childhood malignancy and accounts for almost 80% of cases of leukemia. The clinical features of acute leukemia are those of bone marrow failure and of the accumulation of malignant cells. A blood count and blasts in the peripheral smear normally arouses suspicion of leukemia but is not always diagnostic. The diagnosis is confirmed by examination of the bone marrow which shows the characteristic morphology of the blast cells. Cytochemical staining must be done to distinguish between ALL and AML. Immunophenotyping and cytogenetic studies are performed to better characterize the disease. Treatment is with intensive combination chemotherapy (anticancer drugs). Most ALL treatment regimens divide therapy into different treatment phases, namely, induction, consolidation, CNS prophylaxis and maintenance therapy. The

TABLE I- Incidence of Cancer by Site Under 15 Years of Age (2).

| Rank | Site | Per cent of total | Rate per 1,00,000 children |
|------|----------------------------|-------------------|----------------------------|
| 1. | Leukemia | 30.1 | 3.78 |
| 2. | Brain tumors | 19.1 | 2.41 |
| 3. | Lymphoma | 12.3 | 1.55 |
| 4. | Sympathetic nervous system | 8.1 | 1.04 |
| 5. | Kidney | 6.5 | 0.82 |
| 6. | Soft tissue | 6.3 | 0.79 |
| 7- | Bone | 4.8 | 0.61 |
| 8. | Retinoblastoma | 2.3 | 0.34 |
| 9- | Liver | 1.1 | 0.14 |
| 10. | All others | 90 | 1.15 |
| | All sites | 100.0 | 12.63 |

Adapted from Reference 2.

aim of the induction therapy is to induce remission. Generally 3 or 4 drugs including vincristine, adriamycin, L-asparaginase and prednisolone are given for 4 weeks followed by consolidation and CNS prophylaxis which include cyclophosphamide, cytosine arabinoside, intrathecal methotrexate and cranial irradiation. Maintenance therapy with oral 6-mercaptopurine and methotrexate alongwith intermitant reinforcement therapy incorporating vincristine, daunomycin, L-asparaginase and prednisolone is continued for 2 to 2¹/₂ years. With timely adequate and intensified treatment over 70% children with ALL are now cured (4-6).

Treatment of a Child with Cancer

Thirty years ago there was little that could be done for most children with cancer. There has been a revolution in the treatment of childhood cancer in the past three decades. This tremendous improve-

TABLE II- Five Year Survival Rates for the Most Common Childhood Cancers in United States (3).

| Type of cancer | Five year survival rate (%) |
|------------------------------|-----------------------------|
| Acute lymphoblastic leukemia | 68.9 |
| Acute myeloid leukemia | 26.4 |
| Brain tumor | 56.5 |
| Hodgkin's disease | 87.0 |
| Non-Hodgkin's lymphoma | 68.5 |
| Wilms'tumor | 84.9 |
| Neuroblastoma | 49.0 |
| Retinoblastoma | 97.7 |
| Osteosarcoma | 53.1 |
| Ewing's sarcoma | 54.0 |
| Rhabdomyosarcoma | 68.2 |
| Gonadal germ cell tumors | 92.9 |

Adapted from Reference 3.

ment in the survival of childhood cancer is due to the effort of many great scholars and scientists in the various fields related to Pediatric Oncology. Today the aim of treatment is cure. At least 60% of the cancers in children are now curable if the diagnostic and therapeutic techniques are instituted promptly. There are four main modalities of treatment, namely, chemotherapy, surgery, radiotherapy and bone marrow transplantation.

Chemotherapy at present is an essential aspect of cancer management. In certain cancers, chemotherapy alone can cure the disease. In other cases it is complementary to surgery and/or radiotherapy. Medical management of cancer has been much more impressive in children than in adults, Acute lymphoblastic leukemia (ALL) in children, for instance, is curable in 70-75% cases with chemotherapy alone. Many other cancers which occur predominantly

in children such as Wilms' tumor, Hodgkin's disease, Non-Hodgkin's lymphoma, neuroblastoma, Ewing's sarcoma and rhabdo-myosarcoma can be cured in a large percentage with chemotherapy alone or with the combination of chemotherapy, surgery and/or radiotherapy. Some forms of cancer such as Hodgkin's disease and Wilms' tumor have very high cure rate of 80-90%. For other types, *i.e.*, neuroblastoma and AML the situation is better than it was, but we have still a long way to go.

The success of treatment of childhood cancer largely depends on early diagnosis and prompt treatment. Children suspected to have cancer should be referred to the nearest specialized center for diagnosis, evaluation and initiation of therapy. It must be recognized that the initial work up and formulation of the treatment plan are crucial for achieving success. These can best be provided by a team of experts who are accustomed to working together and have experience and expertise in treating children with cancer. It implies a multidisciplinary approach of a team of experts which include pediatric oncologist, pediatric surgeon, radiotherapist, pathologist, hematologist, radiologist, nursing and paramedical specialists. The Pediatric Oncologist in most instances will act as a coordinator in the treatment of children with cancer. Because of the potential complications encountered with treatment and the need for aggressive supportive care (red blood cell and platelet transfusion, management of infectious complications and emotional and developmental support), the intensive treatment protocols are best carried out by specialists in pediatric oncology and performed in cancer centers or hospitals with all the necessary pediatric supportive care facilities including Pediatric nursing care, good diagnostic and labo-

ratory support in hematology, pathology, radiology, microbiology, clinical chemistry and blood banking(7).

Several studies have shown that survival rates of children with cancer are significantly enhanced through access to state-of-the-art treatment given according to well-defined protocols in specialised centers, compared to pediatric cancer patients not enrolled on protocols and treated in other hospitals (8-12).

Once the diagnosis of cancer is suspected by the primary physician or pediatrician and a decision has been made to refer the patient to a specialised center, it should be left to that center to confirm the diagnosis and further manage the patient. Unfortunately, cancer in children is a hospital-oriented disease and the family physician has little role in the direct management of the child. However, the primary physician or a pediatrician has a very important role to play in suspecting the disease early and referring the patient as early as possible to a specialised center where proper facilities for diagnosis and management are available. Certain tumors can be treated in the clinic of a primary care pediatrician once the therapy is initiated in the specialised center. Another important role the primary care physician or local hospital or clinic can play is to provide a palliative care to patients with very advanced malignant disease which is a common feature in developing countries and where little can be done to cure the disease. This will also reduce the work load of overcrowded oncology centers. Compliance of treatment schedule is an urgent need of the hour. All efforts should be made to educate the parents regarding the disease, the importance of prolonged treatment, risk of stopping treatment and prevention of infection.

The success in Pediatric Oncology in the

western world is unprecedented. However, this is not so in the developing countries. There are many reasons for the failure to achieve the potential cure rate in our country. Among the recognized factors are late detection, wrong diagnosis and inappropriate treatment. Early detection, accurate diagnosis and appropriate treatment depend upon a multidisciplinary approach to the child with malignancy.

It is of importance to determine the causes for poor results and to plan the optimal strategies for improving the cure rate in developing countries. One of the important causes is that people and even the medical community are not aware of the fact that cancer, particularly in children, is a curable disease. Poverty, malnutrition, unhygienic living conditions, poor communication and transportation systems, poor supportive care, deficiencies in infrastructure, financial support, training of health professionals, cultural, educational and socio-economic problems of the developing countries are other well known contributory factors.

Health education is the single most important factor in creating awareness among masses. For this, both print and electronic media can play a vital role. Radio and television should be used extensively to spread the message.

As mentioned earlier, chemotherapy is the single most effective treatment of the majority of childhood cancers. However, anti-cancer drugs are highly expensive and are beyond the reach of a majority of the patients (13). The cost may further increase if the child develops severe complications like infections and bleeding. Besides, at times, the drugs are not available in the market, which adds to the misery and hardship of the parents and physicians.

In our country, the specialized centers

for treatment of cancer are few and far apart. Urgent steps should be taken to develop at least one well-equipped cancer center in each state.

Financial support should be provided to needy children both by the government and philanthropic organizations. There is a strong logic for supporting the children suffering from cancer since a majority can be fully cured and live a purposeful life. A National Trust can be founded to help the needy children suffering from cancer. There is also a great need for technology transfer between developed and developing countries both at clinical and research level(7,14). The task is difficult but is possible and we may march with hope and a day will come when almost all children with cancer will be cured.

Survival of Children with Cancer in India

There are very few published reports on the long term survival of childhood cancer patients from India. There is an ongoing Indo-US multicentric trial for characterization and treatment of ALL and NHL at Cancer Institute Madras, Tata Memorial Hospital Bombay, All India Institute of Medical Sciences, New Delhi and Kidwai Memorial Institute of Oncology, Bangalore. The 5 year survival of patients of ALL and NHL from Tata Memorial Hospital is reported to be 50-55% and 55-60%, respectively. The provisional estimate of survival from our center is also around 55-60% in ALL and NHL. The data on survival rates of other childhood cancers is almost non-existent. Various reasons have been attributed to the decreased survival of cancer in children in our country in comparison to the west. One of the most important reasons is the financial burden of treatment resulting in poor compliance and large number of dropouts. The high incidence of infections among the immunocompro-

mised cancer patients, lack of availability of good supportive care and poor tolerance to chemotherapy by malnourished patients also contribute to increased mortality. There is considerable evidence of adverse biological and genetic factors in play. It has been noted that T cell leukemia and cytogenetic abnormalities that predict poor outcome are more common in Indian children with leukemia. Over the years there has been a significant improvement in the outcome of cancer patients in our country and the future appears encouraging.

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