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Radiotherapy of childhood malignancies in Nigeria

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Summary

Malignant tumours in children rank fourth after carcinoma of the cervix, breast, and head and neck tumours among the malignancies managed by radiotherapy in Nigeria. The management of these tumours constitute a myriad of problems which are probably responsible for the overall poor survival results observed. This paper analyzed and discussed the epidemiology, presentation and radiotherapeutic management of 122 paediatric malignancies seen and managed between 1981-84 at the radiotherapy unit of the Lagos University Teaching Hospital, Nigeria. This unit was up till 1986 the only radiotherapy service available in Nigeria and the rest of the Anglophone West African states.

The potential beneficial role of a multidisciplinary approach in the management of these tumours is stressed. Several other factors which may improve the quality of care and survival among this group of patients are discussed.

The recent upgrading of radiotherapy services in Nigeria through the Technical cooperation assistance programme of the International Atomic Energy Agency in Vienna has further improved the scope of radiotherapy facilities in the country. This is expected to result in improved standards of patient care, and survival.

Résumé

Parmi les tumeurs traitées par radiothérapie au Nigeria, les tumeurs malignes chez les enfants viennent en quatrième position après les cancers de l'utérus, du sein et de la tête et du cou. Le traitement de ces tumeurs pose une multitude de problèmes qui sont probablement à l'origine du faible taux de survie constaté d'une manière générale. Le mémoire analyse l'épidémiologie, la présentation et le radiotraitement de 122 cas de tumeurs malignes chez des enfants, traités entre 1981 et 1984 à l'unité de radiothérapie du Centre hospitalier universitaire de Lagos (Nigeria). Jusqu'en 1986, cette unité était le seul service de radiothérapie qui existait au Nigeria et dans les autres pays anglophones d'Afrique occidentale.

Le mémoire fait ressortir les avantages que pourrait offrir une approche multidisciplinaire du traitement de ces tumeurs. Il étudie également plusieurs autres facteurs susceptibles d'améliorer la qualité des soins et les chances de survie chez ce groupe de patients.

La modernisation récente des services de radiothérapie au Nigeria grâce au programme d'assistance et de coopération techniques de l'Agence internationale de l'énergie atomique de Vienne a pris d'améliorer encore les moyens radiothérapeutiques du pays. Ceci devrait se traduire par un relèvement du niveau des soins et un accroissement des chances de survie des patients.

Introduction

Malignant tumours in childhood account for 11 percent of all neoplastic disorders seen and managed at the Radiotherapy department of the Lagos University Teaching Hospital. They form the fourth largest group following carcinoma of the cervix (26.3%), breast cancer (24.2%), and head and neck cancers (16%) respectively[1].

The behaviour and natural history of these tumours are different from those seen in the adults. Their management entail many problems such as the late presentation, delay before treatment which often includes surgery, radiotherapy and/or chemotherapy. The various complications associated with these forms of treatment and difficulties with securing the cooperation of the patient during radiation therapy also constitute special problems for which local solutions were found.

This paper analyses and discussed the epidemiology, clinical presentation, general management problems and the survival pattern of those cases that were

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managed between 1981 and 1984 at the only radiotherapy service available to Nigeria and the whole of the West African subregion where patients were referred for treatment.

Materials and methods

The hospital records of all patients aged 14 years and below who were referred to the radiotherapy unit of the Lagos University Teaching Hospital from January 1981 to December 1984 were analysed. The patients were referred mainly from Nigeria and other neighbouring countries where radiotherapy facilities were not available. All the patients had histopathological confirmation of their malignancies brought along with their referral letters. As much as possible the slides were reviewed and the diagnosis reconfirmed by our pathologists. The features covered by the analysis include age, sex, diagnosis, stage, treatment offered, details of radiotherapy, complications and other management problems. The various factors which affect radiotherapy planning such as tumour site, size, dose fractionation pattern, critical organs and tissue tolerance were examined. The response and the patient's survival data were also analysed. In view of the large variety of tumours seen, and the non-uniformity of staging systems used, they were reclassified for the purposes of this analysis into early and late stages. Those tumours which fall into stages 1 and 2 of the more conventional staging classification such as the TNM classification were reclassified as early while those in stages 3 and 4 were reclassified as late.

Only those patients who actually had radiotherapy were included in this review. Radiotherapy was given on the cobalt-60 teletherapy machine. Since most of the patients presented with advanced disease, treatment policy was palliative in 78% of all sites. Radiation dose ranged between 25Gy and 50Gy in 3-5 weeks and depended on factors such as the site, histopathology and the volume of disease being treated.

Adjuvant chemotherapy was given along with radiotherapy where necessary in cases such as induction of remission in leukaemia, advanced nephroblastoma, and in some soft tissue sarcomas. The drugs commonly used include vincristine, methotrexate, endoxan, actinomycin-D, adriamycin and bleomycin. These were given either as single agents or in combination when indicated. All patients on therapy had regular haematological and other biochemical tests carried out especially while on chemotherapy and appropriate adjustments are made to their treatment plans as necessary.

Results

One-hundred and twenty-two children with malignant paediatric tumours were analyzed. There were 70 females and 52 males. The mean age was 5.58 years (range 6 weeks - 14 years).

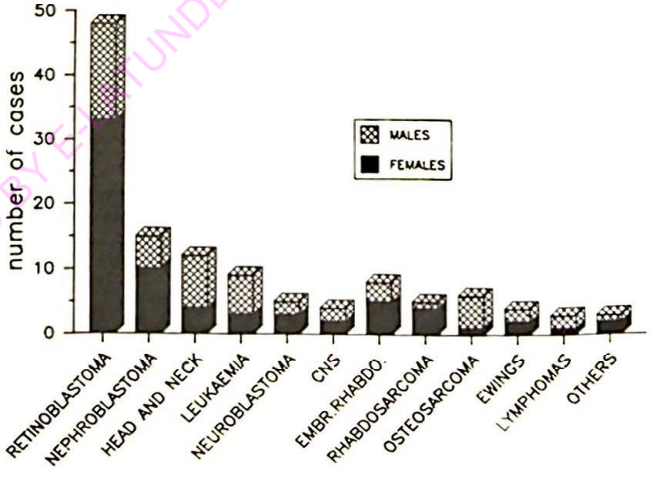

Fig 1: Frequency distribution by type and sex

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Figure 1 shows the frequency distribution by type and sex of tumours reviewed. 85% from the reclassified staging presented with late disease. A radical curative policy was possible in the treatment of 22% of the patients. Retinoblastoma formed the largest group seen in 39.3%. Most were advanced with bilateral eye involvement and widespread nodular metastasis all over the scalp. Bone and soft tissue sarcomas were found in 19.0%. Among this group, embryonal rhabdomyosarcoma was commonest (6.6%) followed by osteosarcoma (5.0%), rhabdosarcoma (4.1%), and ewing's sarcoma (3.3%) respectively. Other groups included Wilm's tumour (12.3%) and lymphoma (2.4%). No cases of Burkitt's lymphoma were treated. Other rare tumours managed included one case each of melanoma in a six week old child, hepatoblastoma and a parotid tumour.

Complications following radiotheraphy were few considering that 78% of the cases received palliative radiotherapy designed to control and relieve any distressing symptoms such as pain, bleeding or obstruction. These complications which were usually acute may also be associated with the chemotheraphy. They include nausea and vomiting (58.1%), anaemia (36.7%), and mild to moderate skin reaction (19.6%). Others recorded were alopecia (14.8%) and conjuctivitis (9.8%).

The survival pattern based on the staging reclassification is shown in Figure 2. The high default rate with follow up, late presentation of cases, and the limited radiotherapy facilities in Nigeria during the period under review, are some of the probable factors responsible for the very poor survivors in the series. The efforts made to improve the situation are discussed.

Table 1 shows the frequency distribution by site and mean age of presentation of tumours seen.

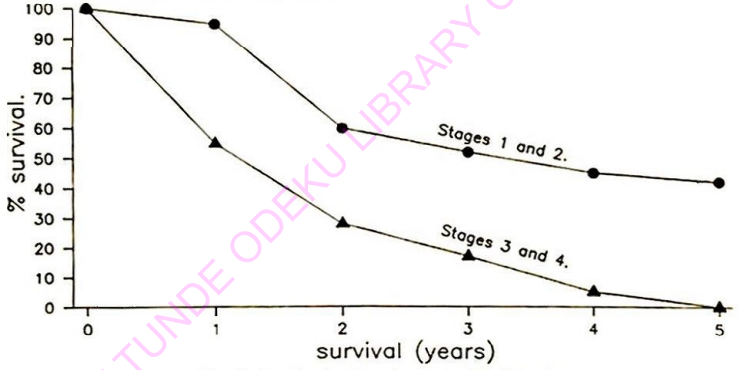

Fig. 2: Survival pattern by reclassified staging

Table 1: Frequency distribution by site and mean age at presentation

Tumour type	Total	%	Mean age
Retinoblastoma	48	39.3	4.5
Nephroblastoma	15	12.3	4
Head and neck	12	9.8	8
Leukaemia	9	7.4	5
Neuroblastoma	5	4.1	4
CNS	4	3.3	9
Embry. Rhabdo	8	6.6	4.5
Rhabdosarcoma	5	4.1	4
Osteosarcoma	6	5.0	11
Ewings	4	3.3	4.5
Lymphomas	3	2.4	7
Others	3	2.4	1.5
Total	122	100	5.58

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Discussion

Unlike the adults, carcinoma is rare in children. The soft tissue and bone sarcomas are more common. In this report retinoblastoma was the commonest tumour representing 39.3% of all the paediatric tumours managed. The cases were mostly advanced, sometimes involving both eyes with widespread nodular metastasis on the scalp. The soft tissue and bone sarcomas rank second and account for 19.0% of all cases. A further breakdown of the sarcoma group showed that embryonal sarcomas (sarcoma botyroides) were the most common type forming 6.6%. They were found at sites such as the vagina, and nasopharynx and showed good response to radiotherapy. The frequency distribution of the other tumour types are shown in Figure 1. The incidence of childhood malignancy recorded over several decades in the Manchester children's tumour registry in England shows the following spectrum: leukaemia (30%), CNS tumours (15%), bone and soft tissue tumours (14%), lymphomas (10%), neuroblastoma (7%) and nephroblastoma (6%) [13].

Since some parts of Nigeria fall within the so called Burkitt's tumour zone, where an association has been reported between the incidence of Burkitt's lymphoma, infection with malaria parasites and Epstein-Barr virus in malnourished children, the absence of this tumour among the cases treated by radiotheraphy may be due to the fact that the patients were treated primarily with chemotherapy. Only superfractionation radiotherapy regime with its multiple radiotherapy sessions daily seem to have a place in the management of these tumours[14,15].

The limited facilities and the large patient number awaiting treatment did not allow for the possible use of this regime in Nigeria during the period under review. The incidence of childhood leukaemia (7.4%), and CNS tumours (3.3%) were low compared with the average 30% and 15% respectively often quoted in literature[13].

Various late complications have been reported among children treated by radiation. Such complications include growth failure[2], cardiac sequelae[3], failure of breast development in girls[4], Butler *et al.* [5] also described various skeletal abnormalities in such children later in life. These include asymmetry of the chest and ribs, scoliosis, kyphosis and pain. The skeletal problems are due to the early fusion of the epiphysis especially in the long bones resulting in shortness and scoliosis. Such scoliosis can be prevented by including the whole vertebral bodies within the treatment volume. Other radiosensitive organs like the eyes, testes, ovaries, lungs, spinal cord, and the breasts in prepubertal girls, are best kept out of the radiation field, or shielded provided such shielding would not protect known tumour bearing tissues. Less common complications such as brain and spinal cord haemorrhage have been reported in the literature[6].

There are various other reports about the relative risks of developing second malignancies and genetic complications among long time survivors[7,8,9,10]. A four fold increase in the incidence of thyroid carcinoma in children following a dose of 9cGy to the scalp for the treatment of tinea capitis was recorded by Ron *et al.* [11].

Retinoblastoma is known to carry increased risk of the development of osteosarcoma as a result of a second mutation of the same chromosome 13 gene deletion in an osteoblast[12]. This association was not manifested in our cases. Apart from the early complications previously outlined, very few symptoms could be ascribed to late complications. This may be due to the fact that the majority did not survive long enough to manifest these complications, or because of the precautionary measures deliberately adopted to prevent them during treatment planning and actual treatment.

The management of paediatric malignancies can be very tasking not only for the young patient, but also the parents and the family especially when they become aware of the likely extent and the possible complications from the various forms of treatment planned. The fear of being disabled with the loss of some functions and body parts as for example following an amputation of a limb, or the enucleation of an eye can be very traumatic to the patient and his family. Such trauma can be minimised by carefully explaining the potential benefits to the patient and offering rehabilitation through provision of suitable prosthesis. Complications following radiotherapy and chemotherapy should also be carefully explained before hand. Such an approach relieves the anxiety of the patient and his parents and also increases their confidence in the doctors when the reactions occur and are effectively managed. There is also a paramount need for instituting a multidisciplinary approach to the management of these patients if the current poor survival pattern is to improve.

The poor results are directly related to the late presentation of the patients for specialist management, and the inadequate radiotherapy

facilities available in Nigeria. It should be noted however that the situation has greatly improved following the support received from the International Atomic Energy Agency in Vienna, Austria whereby the radiotherapy facilities in Nigeria were upgraded. Modern equipment were provided including a new Cobalt-60 teletherapy machine, remote after-loading brachytherapy machines, computerized radiation treatment planning systems, a radiation physics laboratory and other equipment for radiation dosimetry and protection. Indigenous staff were also trained as radiotherapists, medical physicists, radiation technologists and radiotherapy nurses thus assuring a safe and more effective standard of radiotherapy practice in Nigeria.

With the improved facilities and personnel, it should be possible to have cancer treatment teams consisting of various specialists such as radiotherapists, oncologists, surgeons, paediatricians, pathologists and nurses. This multidisciplinary team would design the most effective and rational policy tailor made to the individual needs of these patients. This would also ensure that hospital stay is kept to the minimum.

Following increased awareness of the potential curability of some malignant tumour, and the gradual acceptance by the medical profession in Nigeria of the effectiveness of radiotherapy in cancer management, it is expected that many more cases of childhood malignancies would be referred early for treatment. This would result in many more long time survivors who are likely to manifest the late complications discussed earlier. They can be avoided only if enough care is taken during treatment planning for curative radiotherapy.

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