

RESEARCH COMMUNICATION

Cancer Treatment by Radiotherapy in Western Nepal: A Hospital-based Study

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Abstract

Objective: The aim of this study was to describe utilization of radiotherapy and treatment compliance in the context of Nepal. **Methods:** A retrospective study was carried out on data collected from the radiotherapy treatment records of patients treated at Manipal Teaching Hospital (MTH), Pokhara, between 28 September 2000 and 30 May 2008. **Results:** In the 944 patients, the gender distribution showed a slight female preponderance (53.7 vs. 46.3%). Curative treatment was given to 62.8% (n=593) and palliative to the remaining 37.2% (n=351). Patients older than 50 years were more likely to receive palliative radiotherapy (p=0.001). The commonest cancers treated were head & neck at 23.7% (n=224), followed by lung at 21.3% (n=201) and cervix at 16.1% (n=152). The majority of patients were between 50-70 years of age (n=564). Nineteen percent (n=179) did not complete the prescribed dose of radiation. Unplanned treatment interruptions were found in 35.6% (n=336) and this was not affected by age (p=0.1) or gender (p=0.1). The most frequent treatment interruption compromising optimal effectiveness of cancer treatment was observed for head and neck cancers, constituting 43% (n=96) of patients in the group. **Conclusion:** Head and neck in both sexes and cervix in females were the most common cancers treated with a curative intent. Lung cancer, the second most common in both genders, was treated with palliative intent in a large number of cases. This indicates the need for early diagnosis for a possible curative treatment.

Key Words: Radiotherapy - curative treatment - palliative treatment - cancer types

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Introduction

The burden of cancer in developing countries is being increasingly recognized, and cancer is feared to become one of the principal causes of morbidity, mortality, and economic cost in the next 20 years (Ngoma, 2006). Among the 12 million new cancer cases estimated worldwide in the year 2007, 6.7 million cases were in developing countries alone. Similarly, 4.7 million out of the 7.6 million deaths globally attributed to cancer in the year 2007 occurred in developing countries (Garcia et al., 2007). Moreover, by 2020, an increase of 70% new cancer cases is predicted to occur in the developing countries (Jones, 1999). Such an increase in the incidence of cancer is expected primarily to be due to the possible decrease in the number of deaths from infectious diseases, and an increasing population as well as increasing life expectancy of people (Magrath, 2004).

Nepal is one of the poorest countries in the world with a Gross National Income per capita US\$ 290 and 31% of its population lying under the national poverty line (Collins, 2006; The World Bank Country Report, 2007). Its estimated population is 26.4 million for the year 2007

(Government of Nepal, 2008). Cancer prevalence rate in Nepal is unknown due to the lack of a population based national cancer registry. However, every year at least 17,000 new cancer cases are estimated and the figure is expected to go up considerably in the future (Ferlay, 2004). Radiotherapy is an integral part of the multidisciplinary approach for treating cancer, in addition to surgery and chemotherapy. The current evidence indicates that 50% of all patients diagnosed with cancer need radiotherapy at some stage of their disease (Porter et al., 1999). Though approximately 85% of world's population lives in the developing countries, they barely have one third of the world's radiotherapy facilities (Pal et al., 2004). Establishing a radiotherapy facility is a big challenge to the developing countries (Datta et al., 2004).

Nepal has five centers with radiotherapy facilities for the entire population. Four are located the central region (three of them in Kathmandu valley) and one in Manipal Teaching Hospital (MTH), Pokhara, located in the western region. Radiotherapy service started at MTH with Cobalt -60 in September 2000, and a high energy linear accelerator combined with a simulator and treatment planning system came into operation from 2002. In the

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Nepalese context, only limited information is reported about radiotherapy services (Duke, 1998; BPKMCH annual report, 2004; Prasiko et al., 2004; Mod et al., 2005). Therefore, the aim of this study is to describe use of radiotherapy and compliance to treatment at Manipal Teaching Hospital, Pokhara.

Materials and Methods

This hospital based retrospective study was performed at the Department of Radiotherapy and Oncology, MTH. All cancer cases treated by external radiotherapy between 28 September 2000 and 30 May 2008 were identified and relevant data were collected from radiotherapy treatment archives. Of 947 patients identified, 944 cases were included in the study as three cases were excluded due to lack of relevant data. The variables collected were age, gender, type of cancers, aim of treatment (curative vs. palliative), equipment used (Cobalt-60 or Linear accelerator) and information regarding unplanned interruptions and compliance to the treatment.

In this study, any unscheduled interruption of four consecutive days or more was defined as treatment interruption. Information on patients who were re-irradiated was also collected. Cancers of brain, oral cavity, tongue, oropharynx, larynx, buccal mucosa, maxilla, paranasal sinuses and parotid glands were classified as head and neck malignancy. Nasopharyngeal carcinomas, even though considered a different entity in view of their unique natural history, were categorised in the same group because of their commonalities with other head and neck malignancies for radiotherapy; similar radiation portals, doses and local toxicity. We divided gynaecological malignancies into two groups; ovarian, endometrial and vulvar/vaginal malignancies in one group and cervix cancers in a separate category due to their high incidence. The relationship of treatment interruption with gender and age was evaluated, as was the relationship between patient age and the aim of treatment.

The chi-square test was used to examine the association between different variables. P-value was taken as significant when ≤ 0.05 (two sided). Approval for the study was obtained from the institutional research ethical committee. Data were analysed using Excel 2003, SPSS 11 and EPI Info (TM) 3.4.1 windows version.

Results

A total of 944 patients treated by radiotherapy in the aforementioned period were analyzed. Of these, 58.1% (n=548) of cases were treated with Linear accelerator and 41.9% (n=396) cases with Cobalt-60. The gender distribution showed a slight female preponderance (53.7 vs. 46.3%). The patients' age ranged from 1.5 to 94 years, the mean age being 58.1 years. Patients in their 6th and 7th decades of life were the commonest age group treated, collectively constituting 59.7% (n=564) of the total patients. Only 20 patients under 15 years of age were treated, representing 2.1% of the total. Among these, four were treated for retinoblastoma, three for medulloblastoma, three for lymphoma, and two patients

Table 1. Tumour Location Distribution of Radiotherapy Patients

Site distribution	Frequency	%	(95% CI)
Brain	17	1.8	1.0 - 2.6
Breast	62	6.6	5.0 - 8.1
Cervix	152	16.1	13.8 - 18.4
Gastrointestinal	81	8.6	6.8 - 10.4
Other gynecological	17	1.8	1.0 - 2.6
Head & neck	224	23.7	21.0 - 26.4
Hepatobiliary	4	.4	0.0 - 0.8
Lung	201	21.3	18.7 - 23.9
Urogenital	53	5.6	4.1 - 7.1
Others	133	14.1	11.9 - 16.3
Total	944	100	

received prophylactic cranial radiotherapy for leukemia. Individual pediatric cases of osteosarcoma, squamous cell carcinoma-face, germ cell tumor etc were also treated. The gender-wise distribution of cancers is illustrated in Figure 1.

The sitewise distribution is given in Table 1. Amongst the females, cervix cancer was the highest with 30.0% (n=152) followed by lung cancer 19.7% (n=100) and amongst the males, head and neck cancers were the commonest with 36.4% (n=159) followed by lung cancer 23.1% (n=101).

Nearly 63% (n=593) were treated with a curative intent, and the remaining 37.2% (n=351) with a palliative intent. Treatment with a curative intent was given to 74.2% (n=187) of patients 50 years and below, and to 58.7% (n=406) of patients over 50 years old. Likewise, 25.8% (n=65) of patients 50 years and below, and 41.3% (n=286) of patients over 50 years received palliative radiotherapy. This relation was found to be statistically significant (p=0.001). Among those treated with a palliative intent, lung cancer was the most common malignancy (37%), while head and neck cancer was so with curative intent (33.9%). The intent of treatment among different types of cancers treated is given in Table 2. In the group of patients treated with Cobalt-60, 65.2% were treated with a radical intent, and 34.8% with a palliative intent. Similarly, with the linear accelerator, 61.1% were treated with a curative and 38.9% with a palliative intent.

Treatment was interrupted for four consecutive days or more in 35.6% (n=336) of the patients. Age did not

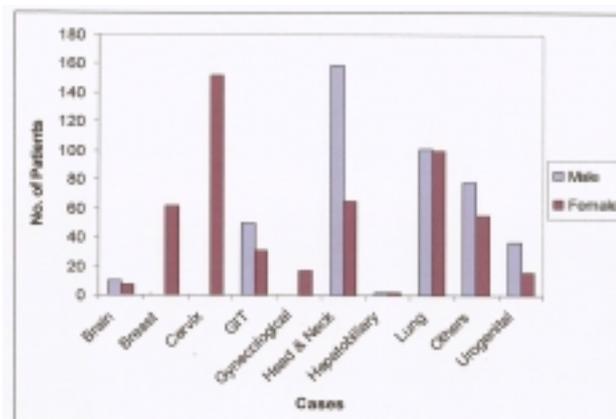


Figure 1. Site Distribution of Cancers by Gender

Table 2. Site and Intention Distribution of Radiotherapy Treatment

Site	Purpose of radiotherapy, percentage (95% CI)	
	Curative	Palliative
Brain	88.2 (63.6-98.5)	11.8 (1.5-36.4)
Breast	79.0 (68.9-89.2)	21.0 (10.8-31.1)
Cervix	88.2 (83.0-93.3)	11.8 (6.7-17.0)
Gastrointestinal	43.2 (32.4-54.0)	56.8 (46.0-67.6)
Gynecological	70.6 (48.9-92.2)	29.4 (7.8-51.1)
Head & Neck	89.7 (85.8-93.7)	10.3 (6.3-14.2)
Hepatobiliary	25.0 (0.6-80.6)	75.0 (19.4-99.4)
Lung	35.3 (28.7-41.9)	64.7 (58.1-71.3)
Urogenital	39.6 (26.5-52.8)	60.4 (47.2-73.5)
Others	40.6 (32.3-48.9)	59.4 (51.1-67.7)
Total	62.8 (59.7-65.9)	37.2 (34.1-40.3)

seem to have an impact on treatment interruption; 36.1% of patients under 50 years and 35.4% of patients 50 years or older had an interruption in their treatment ($p=0.1$). Likewise, gender did not seem to affect the treatment interruption, with 35.7% of females and 35.5% of males having interrupted treatment ($p=0.1$). Forty three percent of all head & neck cases had treatment interruption, making them the most frequent group of cancer cases to have so.

Nineteen percent ($n=179$) of the patients failed to complete the prescribed dose of radiation. Twenty four patients (2.5%) died during the course of treatment, accounting for 13.4% of those who did not complete the treatment. Of all cases, 69 (7.3%) patients were given second time radiotherapy following the completion of first-time treatment. No patient was irradiated for a new primary cancer.

Discussion

This study is conducted in a single radiotherapy facility and, to our best knowledge, this is the first ever study describing utilization of radiotherapy and treatment compliance among Nepalese cancer patients. Fifty-eight percent ($n=548$) of the cases were treated with the Linear accelerator and 42% ($n=396$) with Cobalt-60. Much of the radiotherapy service at MTH was delivered with the Linear accelerator after its operation since September 2002. Cobalt-60 machines continue to provide a major part of radiotherapy services in developing countries where they constitute 70% of the units (Datta et al., 2004). In terms of the radiotherapy equipment available until August 2008, there are four Cobalt-60, three Linear accelerators, two high dose brachytherapy units and two treatment planning systems for the entire country.

A wide range of age group (1.5-94 years) was treated with radiotherapy at MTH, and than half of the patients treated were in their 6th or 7th decades of life. This distribution fairly describes the increasing incidence of cancer with age. More than 50% of the patients diagnosed of malignancy coming to this hospital were older than 60 years (Binu et al., 2007). This is in agreement with the studies from the developed countries; people aged 65 years and more accounted for more than half of all new cancers in the US (Yancik et al, 2000) and similarly, people older

than 75 years had more than one third of cancers diagnosed in the UK (Turner, 1999).

According to this study, the three most common malignancies treated constituted head & neck (23.7%), lung (21.3%) and cervix (16.1%). A previous study at MTH had suggested that lung, larynx, and stomach cancers were the most common cancers among the males, as were lung, cervix and breast among the female patients attending the hospital out patient clinics (Binu et al., 2007). Lung and bronchus amongst males and breast amongst females are the most frequent sites of new cancer cases and deaths worldwide (Garcia et al., 2007). Nepal lacks a national cancer registry; nevertheless, B.P.Koirala Memorial Cancer Hospital, the national cancer hospital of Nepal, established a hospital-based cancer registry in collaboration with the WHO, and a National Cancer Registry is on the pipeline (Sharma, 2003). MTH has been registering cancer data for the national hospital based cancer registry system.

Nearly 63% ($n=593$) of the cases were treated with curative intent and 37% ($n=351$) with a palliative intent. This study shows that older age group were less likely to receive curative treatment; treatment with a curative intent was given to 74.2% ($n=187$) of patients 50 years and below, and to 58.7% ($n=406$) of patients over 50 years old. In the literature, elderly patients have been observed to be more likely to receive palliative rather than curative radiotherapy; however, the decisions regarding treatment practice are not influenced by age when patients are reported to radiation oncologists (Olmi et al, 1997).

Radiotherapy interruptions are known to adversely affect treatment outcomes. In a conventional radiotherapy fractionation of head and neck cancers, intervals of approximately one week are associated with a 10–12% reduction in the local control of the disease (Bese et al., 2007). The study showed that unplanned treatment interruptions occurred in 35.6% ($n=336$) of the patients. Obviously, the patients treated for head and neck malignancies were the commonest group to have the treatment interruptions; nearly 43% of patients. It might be due to the high incidence of head and neck malignancies, coupled by the frequent severe acute toxicity inherent to radiotherapy, especially when combined with chemotherapy. A significant number of patients receiving concurrent chemotherapy and radiotherapy are known to have Radiation Therapy Oncology Group grade 3–4 acute mucositis and generally require an interruption in the radiotherapy (Nguyen et al., 2000).

According to this study, age did not seem to affect treatment interruptions. A study from Brazil identified treatment interruption in 62.5% of the patients, mostly due to preventive device maintenance (Diegues et al., 2008). Current evidence suggests that radiotherapy interruptions of more than two days are detrimental; despite this, interruptions occur in more than 30% of treatments (Guidelines for the Management of the Unscheduled Interruption or Prolongation of a Radical Course of Radiotherapy, 2002). The causes of treatment interruptions are considered as follows:

i) The foreseeable reasons; those scheduled -

preventive equipment maintenance, public holidays, and non-overlapping treatment in cases of combined teletherapy/brachytherapy. ii) The unforeseeable reasons; occurring due to the treatment toxicity, equipment breakdown, and patients' individual reasons.

Additional factors causing treatment interruption in our center, as per our experience, are frequent strikes and transport blockades due to the political turmoil in the past years. The Nepalese health care service was adversely affected during the Maoist insurgency time (Singh, 2004; Ghimire et al., 2006). Unforeseeable causes of treatment interruption can probably be reduced by informing and educating the patients about the potential harms of interruption with adequate management of acute toxicity of radiotherapy. In addition, ensuring smooth functioning of equipment is mandatory to minimize the interruptions, which, in turn, becomes a prerequisite for better cancer care.

In this study, 19% (n=179) of the patients failed to complete the prescribed dose of radiation. Twenty four patients (2.5%) died during treatment, while additional 16.5% discontinued the treatment for other reasons. Long duration and significant acute toxicity are important causes for discontinuation. Financial problems, fatalistic attitude towards cancer, family reasons, etc. could also contribute factors. Patient counseling and adequate and timely treatment of the adverse effects could help significantly reduce the discontinuation rates.

Local recurrence, with or without distant metastasis after radiotherapy, is observed on many occasions (Okamoto et al., 2002). Especially in head and neck malignancies, up to 30% of patients on follow up for more than 10 years develop second malignancies due to 'field cancerization' (Forastiere et al., 2001).

In conclusion, radiotherapy facilities in Nepal are only a few and unevenly distributed. A good number of patients had treatment interruption compromising service efficiency. Effort is necessary to minimize the interruptions for better radiotherapy service and cancer care. Lung cancer, the second most common in both genders, is treated with a palliative intent in large number, pointing out the need for early diagnosis and possible curative treatment.

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