

## EXPERIENCE OF BRACHYTHERAPY IN CARCINOMA OF UTERINE CERVIX AT B.P. KOIRALA MEMORIAL CANCER HOSPITAL, BHARATPUR, CHITWAN, NEPAL

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### ABSTRACT

Brachytherapy is primarily a treatment of a malignant disease with the use of radioactive isotope placed near or inside the target tissue. This technique plays an important role in the treatment of cancer of uterine cervix. This is a very new technique in Nepal and the department of radiation oncology of BPKMCH is the only place practicing brachytherapy procedure. The aim of the study was to analyze the cases that have undergone brachytherapy in the first year of initiation of this service. Total 232 patients, out of whom two hundred patients completed treatment. Total 657 applications were held during this period. Peak age group was in fifth decade followed by sixth decade. Good number of procedures was performed compared to other institutes abroad.

*Key Words: Radiotherapy, Brachytherapy, Cervix.*

### INTRODUCTION

Brachytherapy is the treatment of malignant lesion using radioactive material at a short distance.<sup>1</sup> It has advantage of delivering high dose in the source vicinity without delivering too much radiation to surrounding tissue. The history of Brachytherapy began in Paris in the year 1897, when Henri Becquerel discovered natural radioactivity. The use of radium for brachytherapy was developed through clinical experience. It was used in the year 1901 for the first time to treat skin lesion. Since then the technology is gradually progressing. The after-loading methods were developed during 1959 and 1960, which offered protection from the radiation hazard to physicians and other members performing brachytherapy, and there was greater flexibility of source geometry as well as improved reproducibility of treatment and comparatively shorter treatment time.<sup>2</sup> There are three types of brachytherapy in terms of dose rate: High dose rate (HDR): more than 12 Gray/h, Medium dose rate (MDR): 2 to 12 Gray/h, Low dose rate (LDR): 0.4 to 2 Gray/h.<sup>3</sup> <sup>137</sup>Cs (Cesium) is commonly used radioisotope in LDR, whereas <sup>192</sup>Ir (Iridium) and <sup>60</sup>Co (Cobalt) are used in HDR. Brachytherapy is the useful tool in treatment of carcinoma of uterine cervix, prostate, head and

neck cancers, esophagus, bronchus and skin cancer. The clinical implementation of HDR depends strongly on proper and careful understanding of dose optimization. The use of HDR brachytherapy for cervical carcinoma is the result of technologic development in the manufacture of high intensity radioactive sources, sophisticated computerized remote afterloading devices and treatment planning software.<sup>4</sup> There are various types of optimization used for dose distribution at desired points such as dose point, dwell time, geometry based dose, volume time and equal time etc.<sup>5</sup>

In the treatment of carcinoma of cervix, usually external radiotherapy is followed by intracavitary brachytherapy. In very early stage of the disease only brachytherapy treatment may be sufficient. External beam is used to treat whole pelvis and the parametrium including lymph nodes where as the central disease (cervix, vagina, and medial parametrium) is treated mainly with intracavitary source. The aim of the study was to analyze retrospectively, the records of the patients with cervical cancer having undergone brachytherapy procedures from September 17, 2002 to September 16, 2003 in the department of Radiation Oncology, BPKMCH according to age group, stage wise and completion of treatment as advised.

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## MATERIALS AND METHODS

On September 16, 2002, for the first time in Nepal, after testing and commissioning of the machine in the department of Radiation Oncology, B. P. Koirala Memorial Cancer Hospital, Bharatpur, brachytherapy service was started for the treatment of carcinoma of uterine cervix.

This machine is Varisource; manufactured by Varian Company, U.S.A. It is a remote after-loading, HDR brachytherapy unit with a single radioactive isotope  $^{192}\text{Ir}$  as the source of radiation. In cases of carcinoma of cervix, we have delivered 46 Gray to 50 Gray (2 Gray per fraction, one fraction a day, 5 days a week) of external radiotherapy followed by 2-3 applications of intracavitary radiotherapy treatment (ICR), one week interval between the ICRs. Three to five patients were treated daily. The Fletcher-Suit-Delclos (FSD) type of applicator was used for the treatment of uterine cervix with intact uterus and vaginal cylinder applicator for postoperative cases.

Female patients who were diagnosed to have FIGO (International Federation of Gynecology Obstetrics) stage IA, IB, IIA, IIB, IIIA, IIIB were candidates for intracavitary radiation, excluding the patients with gross residual disease following external radiotherapy making insertion of uterine tandem impossible. Brachytherapy was not used in stage IVA and IVB. Patients were investigated for hemoglobin, total leucocytes count, differential count, blood sugar and creatinine. Patients were prepared by shaving the area and administration of soap water enema in the morning. Sedative (e.g. lorazepam 1 mg, orally) was given the previous night at bedtime. Patients' counseling was done regarding the procedure and expected side effects. The patient was transferred to application room, IV line opened and Pethidine 25 mg. and Phenargan 25 mg injected intravenously. We did not use general anesthesia or regional anesthesia, which is a common practice in developed nations. Patient was placed on the gynae-brachy table in the lithotomy position. Vulva, perineum, and upper thigh were cleaned with savlon and povidone iodine. Foley's catheter was inserted aseptically and 7 ml of radio opaque dye (urograffin) pushed into the balloon that helped us to locate the bladder reference point. Local examination was done and cervical Os was located. The uterine sound was inserted in the uterine cavity to assess the length and position of uterine cavity. Cervical canal was dilated as required. Uterine tandem was placed according to the length of uterine cavity and flange was fixed to remain at the external Os. The Cusco speculum was removed slowly and two Sim's vaginal speculums were inserted to retract the anterior vaginal wall and posterior vaginal wall as much as possible. Largest possible ovoids were placed in lateral fornices and fixed with the uterine tandem.

The vaginal packing was done adequately with barium soaked ribbon gauge. Barium was used to locate rectal reference point in orthogonal film. After insertion of the applicator, patient was transferred to simulator room and orthogonal films (anteroposterior and lateral) were obtained. The planning computer system (Brachyvision software) imports images from hard films through Vidar scanner. Several reference points such as point A (2 cm superior to external cervical Os or cervical end of the uterine tandem and 2 cm lateral to cervical canal,<sup>6</sup> point B (3cm lateral to point A), bladder and rectal reference points were considered as per International Commission on Radiological Unit and Measurement (ICRU)-38 reports.<sup>7</sup> During planning, the spacing of radioactive source and indwelling time both could be manipulated to get best dosimetry (pear shape). The maximum dose to bladder and rectum should be, as far as possible, less than the dose to point A (e.g. 80% or less of the dose point A).<sup>8</sup> Once satisfied with dosimetry, plan was then transferred to treatment computer that makes the isotope source move through the catheters inserted within the applicators according to the plan verification. In the planning, the target volume is designed with sufficient safety margin. Applicators were removed once the treatment was over and patients were advised to have oral analgesics.

## RESULTS

The total number of 232 patients received brachytherapy treatment for cervical cancer during this period. Altogether 657 insertions were carried out. Two hundred patients had completed three sittings with one-week interval between the applications. Ten patients had received two applications as advised. Fifteen patients had received 2 cycles out of three cycles planned. Seven patients had received only one application. Among 232 patients, 35 patients (17 from Bir Hospital, Kathmandu, 16 from Bhaktapur cancer care center, Bhaktapur and 2 patients from Manipal Hospital, Pokhara)

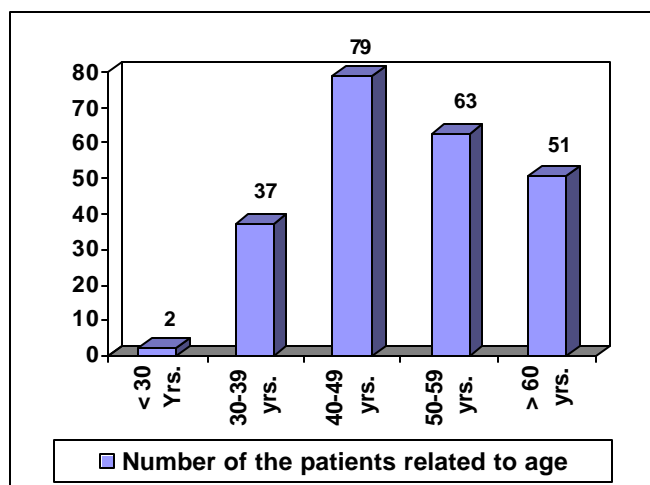
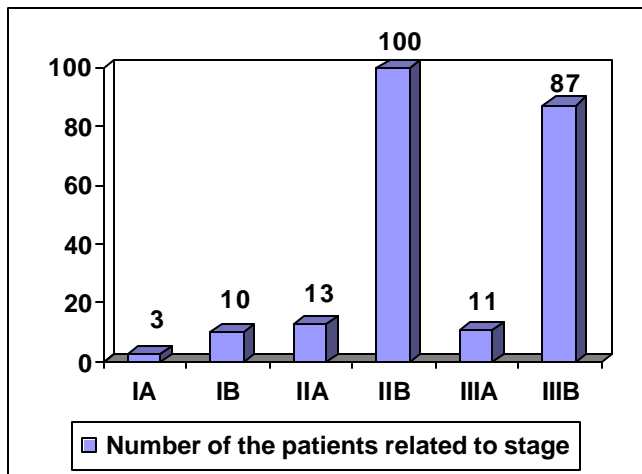


Fig. 1 : Age Distribution

were referred from other radiotherapy units of Nepal after delivering external radiotherapy. Rest of the patients was treated with external radiotherapy at B.P.K.M.C.H. Four patients were from India. The youngest patient was 26 years old and oldest patient was of 82 years.

**Stage distribution**

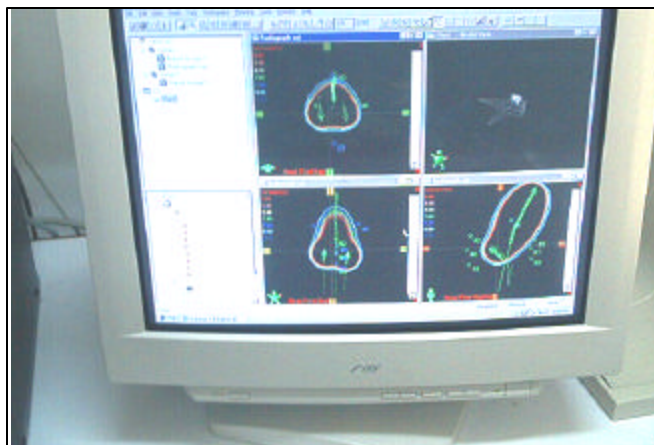
FIGO (1994) staging was used for staging of the disease. Per-speculum, per- vagina, per- rectum, bimanual examination



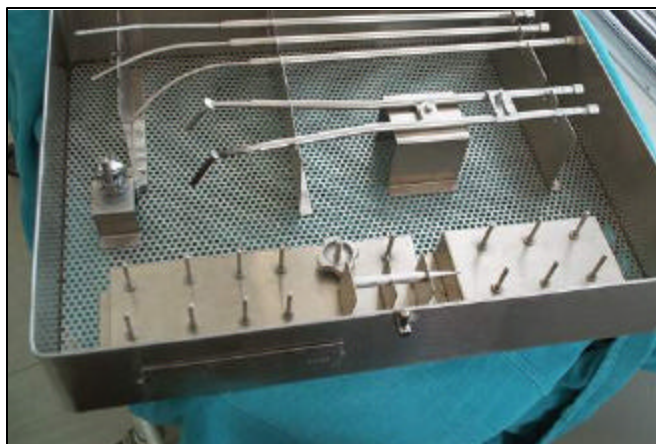
**Fig. 2 : Stage Distribution**



**Fig. 3 : This picture is anteroposterior and lateral orthogonal films imported by scanning hard film to the computer.**



**Fig. 4 : This is picture of the computer planning where here dimensional isodose distribution is visualised.**



**Fig. 1 : This picture is showing FSD applicator used for brachytherapy treatment of cancer of cervix.**



**Fig. 5 : Patient ready for the treatment with applicators connected with HDR Brachytherapy machine through the catheters.**



**Fig. 2 : This picture is showing FSD applicator inserted and with the packing.**

and lymph node examination was done to evaluate the patients. Chest x-ray and ultrasound of abdomen and pelvis were done routinely. Stage was not mentioned in 8 post operative cases.

**DISCUSSION**

The procedure was well tolerated with intravenous sedation and analgesics as no case was postponed due to difficulty in

insertion of applicators and vaginal packing was satisfactory in relation to the anatomy. Eighty-eight percent of cases received all three sittings. In our series, the peak incidence was in fifth decade of age followed by sixth decade. Stage IIB was the commonest stage (43%) followed by IIIB (37.5%). Only 4.74% of the patients were found to be in stage IIIA. The number of cases treated with brachytherapy during this period of one year was comparable to other well-recognized cancer center. In Tata Memorial Hospital, Mumbai, total number of 574 sittings (HDR + LDR)<sup>9</sup> and in Cancer center welfare home and research institute, Kolkota, total number of 424 sitting were performed in one year time.<sup>10</sup> To achieve a balance between Intracavitary radiation (ICR) and external beam radiation in terms of dose rate per fraction, number of fraction, dose per fraction, and overall duration, which gives maximum tumor clearance and minimum early and late morbidity is important. Absolute equivalence between HDR and LDR treatment with respect to all biological effects seems to be difficult on the basis of radiobiological theory. Linear quadratic (LQ) model gives the biological equivalent. Various clinical reviews have confirmed the equivalence of HDR and LDR in terms of tumour control, survival, and effects on normal tissue.<sup>11,12,13</sup>

## ACKNOWLEDGEMENTS

We are thankful to executive director and deputy director for granting permission to publish this paper. We appreciate the help of Dr. Abha Prasai for helping to prepare manuscript, Mr. Pawan Rayamajhi for computer work, and Ms. Buddhikala Chapagain and Ms. Sabitri Bhurtel for record keeping. We sincerely acknowledge all the staff of department of Radiation Oncology for their support extended to us and to the patients. We would like to express good wishes to the patients who underwent brachytherapy in this hospital.

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