

CLINICAL EXPERIENCE IN THE USE OF HIGH DOSE RATE ENDOCAVITARY RADIATION (RALSTRON-20) IN NASOPHARYNGEAL CARCINOMA

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SUMMARY

Nasopharyngeal carcinoma is an extremely difficult cancer to manage due to difficulty in diagnosis and proximity of pathology to vital structures like brain, spinal cord, eyes and ears. Over a period of 30 months, we have managed nine patients by radiotherapy for the primary tumour and all potential local and regional extensions by a regime of combining external radiation with a high dose rate after loading radiation (Ralstron-20); the results are encouraging.

INTRODUCTION

Radiotherapy is well established as the sole curative treatment of carcinoma of nasopharynx. The disease is very difficult to be cured by external radiation alone inspite of the advance of Super-voltage radiation, in view of the proximity of the tumor to sensitive structures like spinal cord, brain, eyes and ears. To cure carcinoma nasopharynx a tumor dose of 65-70 grays is required. This dose level exceeds the tolerance of many sensitive adjacent structures specially the spinal cord, brain stem, optic-nerve and retina. So an accurate radiotherapy technique is of paramount importance, if patients are to be cured with a minimal incidence of complications. In an attempt to improve the local control, we have devised a regime of combining external radiation with remote after loading (High Dose Rate) endocavitary radiation 1-2.

MATERIAL AND METHODS

Between August, 1984 to February, 1987, nine patients (7 Male, 2 Female) with previously untreated carcinoma nasopharynx were treated with curative intent at

LINAR, Larkana by a regime of combining external radiation with remote after loading (High Dose Rate) endocavitary radiation. All the above patients were clinically staged according to T.N.M. staging system.

External radiation was first delivered on Cobalt-60 with a large shrinking field technique with a rest interval of two weeks by applying lateral opposing neck and anterior facial fields, delivering a tumor dose of 55 grays in 5.5 weeks to diff. sq.cell Ca, 50 grays in 5 weeks time to anaplastic carcinoma and 45 grays in 4.5 weeks to malignant lymphoma.

An additional 30-35 grays tumor dose was given to the anterior neck to complete neck treatment to the lymph/node area by anterior neck field, shielding a central strip of 8 x 2 c. The lateral fields deliver about 2/3rd of the tumor dose.

Endocavitary radiation: After a rest period of 4-6 weeks, an additional tumor dose of 30-40 grays was delivered of ralstron to each patient as a supplementary boost to tumor site as a part of the total treatment. (Treatment Parameters are shown in Table-I).

TABLE - 1
TREATMENT POLICY FOR POTENTIALLY CURABLE N.P.C.

S. No.	Tumour Histology	External Beam Therapy in (cgys)	Duration in weeks	No. of Fraction	No. of Endocavitary treatment	Interval between last Ext: Beam Rt: & Ist Ralstron treatment (in weeks)	Cumulated Endocavitary Therapy dose in (cgys)
1)	Diff: Sq. Cell Ca.	5500	5½	27	04	06	4000
2)	Anaplastic Ca	5000	5	25	03	04	3000
3)	M. Lymphoma	4500	4½	22	02	04	2000

N.B. Additional 30-35 Grays Tumour dose delivered to Anterior Neck.

Ralstron is a remote after loading system for endocavitary radiation using high intensity Cobalt-60 sources. The technique is very simple and requires no general anaesthesia or analgesia but is expensive, requires a special costly equipment, shielded room and a facility of treatment planning simulator.

Patient is put in supine position with the neck fully extended on the Table of treatment planning simulator and 4% Xylocaine is sprayed into the nostril and oropharynx. A flexible, polyethylene (commercially available) after loading applicator is passed with dummy source through a disposable soft polyethylene tube. The tube carrying after loading applicator and dummy source is introduced via the nostril into the nasopharynx after immersing its distal 3rd in liq-paraffin. Under direct fluoroscopic control, the position of the tube is adjusted to the desired level and check radiographs are taken on simulator. The tube with applicator is then fastened with tape to the tip of the nose and upper lip and the dummy source is withdrawn. The patient is brought to Ralstron room and the metallic end of applicator is connected to the flexible tube of the radiation storage safe of the machine.

A 3-curie high intensity Cobalt-60 source is mechanically impelled into the applicator from radiation safe through a remote control and the source is rapidly returned to the radiation safe at pre-set time.

Each insertion hardly takes 3-4 minutes for delivering a tumor dose of 1000 cgys and 3-4 insertions are carried out at weekly intervals delivering a tumor dose of 30-40 grays.

The source delivers the desired radiation dose in 3-steps by automatic pull-back system i.e. the source stays at 3 points at a pre-set distance for a pre-set time for delivering a precalculated dose of radiation. The time and dose calculations are made on a programmable radiotherapy calculator from a printed table provided with the machine.

RESULTS

With this combined approach, we have achieved extremely encouraging results concerning the local tumor control rate. The results of our study are shown in Table-2. All the patients were thoroughly followed for a period of 2.5 years. One patient died due to liver metastasis, after 11 months of

TABLE - 2
RESULTS OF RADIOTHERAPY IN N.P.C. (09 CASES)

S. No.	Type of Tumour	Stage	No. of patients	External Beam Therapy (cgys)	Endocavitary Ralstron trea (cgys)	%age local control rate 2½ years
1)	Diff: Sq. Cell Ca.	All stage	04	5500	3500	3/4 75%
2)	Anaplastic Ca:	—do—	03	5000	3000	3/3 100%
3)	Malignant Lymphoma	—do—	02	4500	2000	2/2 100%

Overall 89%

treatment. Female patients responded better than male patients. Also the response was quicker in patients with anaplastic carcinoma and malignant lymphoma as compared to diff. sq. cell carcinoma which responded slowly.

Significant improvement occurred in patients with advanced lesions T3, T4 and patients with nodal metastasis. This study clearly shows that the gains in local tumor control and survival have not come from earlier diagnosis but from better radiation techniques.

Most of the patients tolerated this combined treatment very well. No serious radiation complications appeared during and after the treatment, except that symptoms of sore-throat, dysphagia and temporary loss of taste were noticed by all patients during treatment due to mild mucositis but all patients responded well to symptomatic treatment. Only in one patient a small perforation in the soft palate persisted after treatment.

DISCUSSION

Most of the malignant tumors of nasopharynx arise from the surface epithelium and are therefore, sq. cell carcinoma or one of its many variants including lympho-epithelioma, spindle cell carci-

noma, transitional cell Ca. and undiff carcinoma.

Undiff lymphoma and undiff carcinoma may appear similar under microscope. It is better to treat these lesions as carcinomas. The goal in treating NPC with radiation is local tumor control with a minimum of treatment complications. In trying to achieve this goal, various treatment techniques and schedules have evolved through years; While many schedules were developed through a rational stepwise progressions of science and accumulated clinical experience, many others developed through a process of trial and error.

It is now known that optimum control of NPC with a minimum of complications is achieved by combining External radiation with endocavitary radiation. Various techniques have been introduced for delivering endocavitary radiation but the most widely used technique is the after loading system.

The low dose rate after loading technique was first introduced by Wang and colleagues in 1974 in the endocavitary treatment of Carcinoma nasopharynx, using Caesium sources manually and the technique is still in practice at few cancer centres while the remote after loading

(High dose rate) technique is for the first time being introduced in the Endocavitary treatment of NPC at our Institute, using high intensity Cobalt-60 source.^{1,2}

It can be said with confidence that this technique is superior in terms of local tumor control with minimum complications and offers an opportunity to improve on the previous manually loaded (Low dose rate) techniques. Logically, the intention has been to use remote after loading system to produce almost guaranteed local tumor control, virtually free of serious morbidity because this technique allows the tumor to receive a higher dose of radiation than would be tolerated by the large volume of tissue which would have to be included in external beam radiation fields.³ The rapid fall-off of dose also allows relative sparing of adjacent critical normal tissue. Therefore, it is often best to give external beam radiation first and to deliver a dose which is sufficient to sterilize sub-clinical disease in nodes. The primary tumor can then be boosted by remote after loading system (Ralstron) which raises the dose to a curative level.^{4,5}

In this report, our experience with a limited number of patients over a period of 2.5 years is presented. The combined approach of using external radiation with remote after loading (Ralstron) therapy is useful in the curative treatment of NPC and offers better local tumor control with

minimum of complication, improved survival and good quality of life. Patient can expect not only many years of freedom from consequences of the disease but also the hope of a cure.

Through the procedure is clinically acceptable yet there has been no controlled clinical trials of this method and it will be pre-mature to advocate its routine use at this stage. Therefore, co-operation from other centres is needed to further evaluate the efficacy of this technique and to substantiate the conclusion of our study.

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