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Case Report

Beyond conventional brachytherapy: a customized intracavitary approach for carcinoma cervix in an elderly patient

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ABSTRACT

Brachytherapy remains cornerstone in treatment of gynaecological carcinoma for both definitive and adjuvant treatments. Due to rapid dose-gradient fall of brachytherapy, targets receive high dose with low dose to organ at risk and hence increasing tumor control. We present a rare case report of locally advanced case of Carcinoma cervix treated at our center with customised brachytherapy applicator comprising of tandem and cylinder. This application is simple and feasible in resource constraint setting offering similar local control and toxicity as compared to traditional Fletcher suit applicator. We Present a Case report of patient treated with this customised applicator with tandem and cylinder with acceptable toxicity and local control.

Keywords: Cancer cervix, Brachytherapy tandem and cylinders, Dose-volume histogram, Intracavitary, Toxicity

INTRODUCTION

Cervical cancer contributes to fourth among the most commonly diagnosed cancers as well as the fourth leading cause of cancer mortality in women globally in 2020, there were an estimated 604,127 cases and 341,831 deaths attributed to cervical cancer.¹ Cervical cancer in India contributes to second most common cancer in both incidence (18.3%) and cancer mortality (18.7%) among women in 2020, with a 5-year prevalence of 18.8%.²

The incidence of cervical cancer usually varies among countries. It contributes to significant cancer-related death among females in Western, Eastern and Middle-Africa, South -Central Asia. Although screening tests comprising of Papanicolaou and HPV DNA testing have dramatically reduced cervical cancer deaths in developed countries, still

disparities between poverty and health plays major role in this high mortality rates. Treatment of cervical cancer depends on cancer stage and its spread in and around cervix, it comprises of multimodality approach comprising of surgery, radiation therapy, chemotherapy and targeted therapy. Although surgery is limited to early and locally limited disease, however majority of patients present with locally advanced diseases, so they are usually treated with concurrent chemoradiation.³ Radiation therapy is usually given in combination with chemotherapy for cervical cancer treatment.⁴

Radiation therapy forms a pivotal role in management of cervical cancer treatment. These cancer can be treated widely with use of External Beam radiation therapy (EBRT) alone or a combination of EBRT and brachytherapy or brachytherapy alone depending upon

tumor stage and extent of disease.⁵ There are multiple brachytherapy applicators available such as Tandem and ovoid, Tandem and cylinders, Tandem and ring, needles used to direct radioactive source in the uterus and near the cervix as per stage and bulk of disease.⁵

Tandem and ring are usually used for shallow fornices, tandem and ovoids used for treating barrel-shaped cervix with large ovoids to include cervix, uterus bilateral medium parametrium and upper 1-2cm of vagina and tandem and cylinder for upper vaginal stenosis or narrowing and superficial disease in lower vagina.⁶

We present a case report in which we have used tandem and cylinder applicator for high dose rate brachytherapy (HDR) for treatment of cervical cancer due to resource constraints and non-availability of advanced applicator. Though it is not an ideal applicator to treat advanced stages and there is paucity of literature for this type of applicator due to logistic constraints, refusal of patients for referral, catering rural population with low socioeconomic status, it's an alternative when resource is limited and when patient anatomy restricts use of conventional applicators, rather than deferring the treatment.

CASE REPORT

A 70-year-old post-menopausal female G2P1L1 with no familial history of cancer, no addiction habits presented with complaints of persistent post coital bleeding for 6 months associated with lower abdominal pain. Following detailed clinical evaluation and assessment a bulky cervical mass measuring 7×7×6 cm starting just from introitus involving lower third of vagina with moth eaten cervical lips extending up to medial two third of parametrium.

Patient had history of traumatic fall 8 years back for which she underwent right hip replacement surgery outside with metallic implant henceforth Contrast enhanced computed tomography of Thorax, abdomen and pelvis was done as staging workup along with cervical biopsy under aseptic precautions which revealed squamous cell carcinoma.

After Imaging, detailed clinical evaluation, cervical cancer staging was FIGO stage III A and she was planned for definitive chemoradiation treatment. She was counselled in detail in her vernacular language regarding treatment plan after her informed written consent she was planned for chemoradiation.

Patient was simulated using frog leg position, using immobilisation device (VACLOC) contrast enhanced RTP scan was taken from L1 to mid-thigh. Target volumes were delineated and contoured as per specified guidelines and planned treatment was 45 Gy in 25 fraction using IGRT technique to primary and draining lymph nodes (Pelvic+inguinal:I.v.o lower third vaginal involvement) along with concurrent chemotherapy using cisplatin @ 40 mg/m² as per institutional protocol.

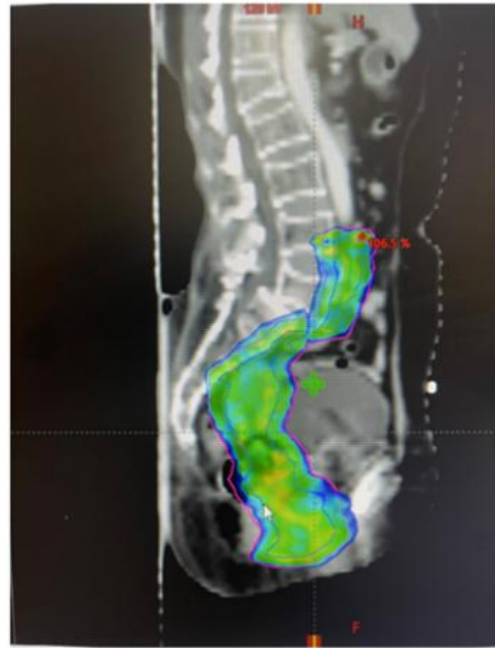


Figure 1: Sagittal section showing 95% dose coverage in target volume.

Patient was assessed during weekly reviews with blood tests and clinical evaluation and she completed her treatment in stipulated time with Grade 1 Skin reaction and Grade 2 genitourinary and gastrointestinal toxicity. Patient was planned for intracavitary brachytherapy after 1 week, as patient had lower third vaginal involvement during baseline examination it warranted use of hybrid brachytherapy to cover lower third vaginal involvement, upon EUA findings for first brachytherapy there was minimal disease involving cervical lips, all fornices were effaced, bilateral parametrium was free and lower third of vaginal showed soft induration. Due to non-availability of hybrid applicator, we had used Central tandem of 15 degrees with tandem length of 5 cm after verifying through uterine sound; to cover lower third of vagina we had customised central tandem with 3cm vaginal cylinders.



Figure 2: Customised tandem and cylinder applicator.

The procedure was done under aseptic precautions, after insertion of tandem, cylinder was negotiated through tandem and were positioned likewise to cover lower third of vagina. After segmentation of the target and organs at risks (OARs), i.e., bladder, rectum and sigmoid, the reference points were defined (Reference point A: Left and

Right) and the dose of 7 Gy was prescribed at point, dose optimization was done such that the target receives the prescribed dose with limited dose to organ at risk as per the standard guidelines.



Figure 3: Representative image showing 7Gy prescription.

Thorough evaluation of plan was done to check the adequacy of dose to target and verifying dose-volume histogram for the OARs dose. Once dose volume histogram for OAR's was within prescribed limits, the dosimetric plan was approved and treatment was executed. We had followed patient weekly, during treatment and after completion of treatment; patients up to 9 months and still under follow up with clinical complete response.

DISCUSSION

Concurrent chemoradiation combined with brachytherapy remains a cornerstone in management of locally advanced cervical cancer.⁶ Radiotherapy comprising of external irradiation and intracavitary brachytherapy, forms an important form of treatment in cervical cancer.⁷ Brachytherapy forms a pivotal role in treatment of cervical cancer.⁸ Due to high dose gradient Organ at risk receives less dose during intracavitary brachytherapy. With selection of suitable and successful applicator it is easy to achieve desired dose distribution. The above case receives both radiotherapy and chemotherapy as a part of treatment paradigm.

The current case innovatively received tandem and vaginal cylinders placement during brachytherapy. The principles of brachytherapy usually follow ICRU REPORT No. 89, but almost each and all criteria are based on normal tissues and organs.⁹ Brachytherapy is an integral component of radiotherapy treatment of cervical cancer with addition of brachytherapy after definitive chemoradiation or EBRT alone contributes to boost the gross tumor and improving survival outcomes with acceptable toxicities.^{10,11} Study by Ahmed et al with similar application demonstrated Out of

31 patients, post-EBRT treatment 16.1% which developed grade 1 skin toxicity and during brachytherapy, 3.2% developed gastrointestinal toxicity of grade 1 and 3.2% developed Grade 1 vaginal mucositis is comparable with a study conducted by Sahil N et al in which similar toxicities were observed.^{12,13} Post-treatment assessment done at 6-8 weeks showed all patients were diseases free on radiological imaging.

During 3 months of follow-up, 3.2% had 9.7% had Grade 2 cystitis and Grade 1 proctitis which is compatible with the study conducted by Kara D Romano who observed similar toxicities.¹⁴ At 6 months of follow-up, 3.2% had Grade 1 proctitis, 3.2% had Grade 2, and 3.2% had Grade 3 proctitis, with no genitourinary toxicity was observed in any patient, which is compatible with the study of Mazon R Fokedal et al.¹⁵ Three patients who had Grade 1, Grade 2, and Grade 3 proctitis underwent colonoscopy.

The patient who had Grade 1 proctitis had a normal colonoscopic report but the patients who had Grade 2 proctitis had a radiation-induced ulcer and the patient who had Grade 3 proctitis had developed a fistula. These two patients were initially managed conservatively, but they did not respond to treatment and underwent diverting colostomy.¹¹ At 3 months of follow-up, 93.5% were disease-free while 6.5% had the residual disease and were given chemotherapy. After 6 months of follow-up, all the patients were diseases free. After 1 year of follow-up, 83.9% of patients were alive and diseases free, 3.2% had local recurrence while 6.5% developed distant metastasis, and 6.5% of patients expired due to posttreatment complications.

Upon evaluation at 2 years, 26 patients were disease-free on evaluation, and out of two patients, who had distant metastasis at 12 months, one expired and the other lost to follow-up. One patient with local recurrence at 12-month follow-up was referred to surgical department for possible salvage did not report back and lost follow up. Overall survival reported was 93.5% after 66 months. Local control and toxicities as seen in our study were similar to other studies that used traditional applicators such as tandem and ovoid or Fletcher-Suit Delclos, namely Toita et al.¹⁷

Similar study conducted in this context was done by Barney et al who also concluded that patients treated with tandem and cylinder have similar outcome and toxicities as patients treated with tandem and ovoid or Fletcher-Suit Delclos and their data supported the fact that this treatment modality represents an acceptable alternative for patients with disease extension to the distal third of the vagina or with obliteration of vaginal fornices or where nonideal anatomy or tumor characteristics prohibiting tandem and ovoid brachytherapy.¹²

Study by Gadda et al 19 demonstrated acute and late toxicities were similar to those used in the treatment of carcinoma cervix by standard brachytherapy applicators.¹⁷

Total number of 31 patients treated with tandem and cylinder demonstrated local control was in 83.87% of cases with two-year survival was 93.5%.

CONCLUSION

There is paucity of literature in brachytherapy application in resource constraints settings, current study the local control and toxicities were similar to standard Fletcher - Suit Applicators, although required dose prescription to point A was not feasible due to limitations of OARs, as tandem and cylinder were only available applicator at our hospital, we had optimised the dose so as the target receives prescribed dose and sparing of OARs to maximum done, having said that tandem and cylinder are not ideal applicators in locally advanced carcinoma cervix. Furthermore long-term follow-up is warranted to look for survival outcomes and long-term toxicities in treated patient.

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Ethical approval: Not required

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