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Research Article

New Technique to Avoid General Anesthesia during Brachytherapy for Cancer Cervix

Abstract

Aim: To keep the cervical canal dilated after the first high dose rate (HDR) brachytherapy fraction to avoid general anesthesia during subsequent applications.

Patients and Methods: In the first HDR brachytherapy application: examination and cervical dilatation was done under general anesthesia. The proximal 4 cm of urinary Foley catheter was cut (making the new cervical tube), inserted in the cervical canal and fixed to the cervix by 3 simple silk sutures. Uterine tandem was inserted into the uterus through the new cervical tube and procedure was completed as usual. The new cervical tube was left in place after the end of the session. In the subsequent HDR brachytherapy applications: uterine tandem was inserted into the uterus through this new cervical tube without general anesthesia. All applications were evaluated by CT images and patients were treated according to CT-image-based 3D calculation.

Results: In total: 9 HDR brachytherapy applications were done for 3 cancer cervix patients. For each patient: first application was done under general anesthesia while 2nd and 3rd applications were done without general anesthesia (analgesia or sedation was given if needed). The uterine tandem was inserted easily and correctly with the new cervical tube in place. No complications occurred during or after the procedures.

Conclusion: This is a simple new technique facilitating uterine tandem insertion without general anesthesia. Using this technique, patients can be protected from general anesthesia hazards (especially in risky patients) and time saved during brachytherapy applications. This new cervical tube is as safe and applicable as the cervical Smit sleeve; however, it is more available and cheaper. .

Introduction

There were an estimated 527,600 new cervical cancer cases and 265,700 deaths worldwide in 2012. It is the second most commonly diagnosed cancer and third leading cause of cancer death among females in less developed countries [1].

Radical radiation therapy is effective for patients with local-regional confined cervical cancer of any stage. Treatment must be carefully tailored to the patient and to the extent of disease but usually consists of a combination of external beam irradiation and brachytherapy [2].

The importance of brachytherapy in the curative treatment of intact cervical cancer is indisputable. Results indicate that High Dose Rate (HDR) brachytherapy has provided effective treatment over the past 3 decades, and is an acceptable alternative to Low Dose Rate (LDR) brachytherapy for intracavitary radiation implants [2].

The anesthetist is a vital member of the brachytherapy team. Cervical dilatation can be done using general, regional, or local block anesthesia. The type of anesthesia chosen depends upon the reason of the procedure as well as the medical history of the patient [3].

In most centers, HDR brachytherapy to the cervix uteri is given in 3-6 fractions once or twice weekly [4]. Fractionation of the treatment increases the risk of complications from anesthesia (e.g., cardiovascular, respiratory, and neurological complications) and cervical dilatation (e.g., laceration of the cervix, bleeding, and uterine perforation).

For a long time, many centers used the universal cervical sleeve or Smit sleeve. The cervical sleeve is a plastic tube with drainage holes that is inserted through the cervix into the uterus and sutured in place prior to the first treatment. With the Smit sleeve the cervix remains dilated. The Smit sleeve is designed for fractionated treatment and remains in place throughout

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the course of treatment to provide ease in reinsertion of the intrauterine tandom and acts as a cervical stopper.

The aim of our work was to introduce a new method keeping the cervical canal dilated after the first HDR brachytherapy fraction to avoid anesthesia and cervical dilatation during subsequent applications. We try to introduce a new cervical sleeve that can be a substitute for the well-known ready-made ones.

Patients and Methods

Our candidates were cancer cervix patients, stage Ib2-IIIb, received chemo-radiotherapy for radical intent with external beam radiotherapy (EBRT) dose of 45Gy/25Fractions on 5 weeks concomitant with weekly Cisplatin. After EBRT, MRI pelvis was done to evaluate the patient before brachytherapy.

In the first HDR brachytherapy application: under general anesthesia, per vaginal, per rectal and bimanual examination was done to evaluate the response of the tumor to the concomitant chemoradiation and evaluate the suitability of the case for brachytherapy. If the patient was decided to receive brachytherapy and the cervix was not friable or necrotic (i.e., can hold sutures), she will be eligible to our technique.

Cervical dilatation was done (under general anesthesia). The proximal 4 cm of 3-way latex urinary Foley catheter was cut. So, it will make a tube with 2 open ends (making the new cervical tube) (Figure 1), inserted in the cervical canal and its distal end was fixed to the cervix by 3 simple silk sutures.

Uterine tandem was inserted into the uterus through the new cervical tube and then two vaginal ovoids with suitable size were introduced and fixed to the uterine tandom. The vagina was packed with lubricated gauze to fix the applicator and displace the bladder and rectum.

Contrast media was injected in the bladder through the urinary Foley catheter and also in the rectum through rectal Nelaton catheter. CT scan pelvis was done to evaluate the application and 3D CT-image based calculation was done. After the patient received the 1st brachytherapy dose, applicator was removed and the new cervical tube was left fixed in place. CT scan pelvis was repeated and reconstructed in sagittal and coronal views (Figure 2) to evaluate the cervical tube position and patency and also screen the patient for any pelvic complications.

In-between fractions, the patient was instructed to do antiseptic vaginal douches every other day and observe for vaginal bleeding, discharge, pelvic pain, or constitutional symptoms.

In the second HDR brachytherapy session, procedure was done without general anesthesia. Sedation and analgesia (Midazolam and Fentanyl) was used if needed and the patient was examined using vaginal speculum to inspect the new cervical tube and confirm its presence and fixation in place. The uterine tendon was inserted through the new cervical tube into the uterus and procedure was completed as usual.

In the last HDR brachytherapy session, with sedation and analgesia only, the new cervical tube was removed by cutting the sutures and immediately the uterine tandom was inserted in the uterus (the cervical canal was still dilated) and the procedure was completed as usual.

The patient received 21Gy in 3 weekly fractions (7Gy per fraction) prescribed to point A and the treatment was done using HDR remote afterloader machine with single I^{192} stepping source. The new cervical tube was left in the patient for 2 weeks (the period between 1st and 3rd fractions).

Results

In total: 9 HDR brachytherapy applications were done for 3 cancer cervix patients. For each patient: first application was done under general anesthesia while 2nd and 3rd applications were done without general anesthesia (analgesia and sedation was given). The uterine tandem was inserted easily and correctly with the new cervical tube in place. Fractions were given once weekly.

There were no side effects or complications occurred during the insertion, fixation or removal of the new cervical tube. Also, patients did not complain from any vaginal bleeding, unusual pelvic symptoms, or constitutional symptoms in-between the fractions.

Time used for the first application was increased by about 20 minutes needed for fixation of the new cervical tube. In the second and 3rd fractions, time was decreased by 30 minutes each due to avoidance of general anesthesia (which is the time needed for induction of and recovery from general anesthesia).

Evaluation of the applications using CT scan with applicators in place revealed that the new cervical sleeve did not interfere with achievement of an ideal intracavitary application.

The first patient done using this new technique was high risk for general anesthesia and we did the first brachytherapy

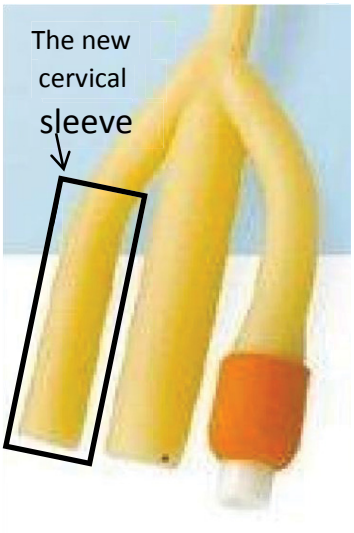

Figure 1: The proximal end of 3-way Foley catheter and the new cervical sleeve.

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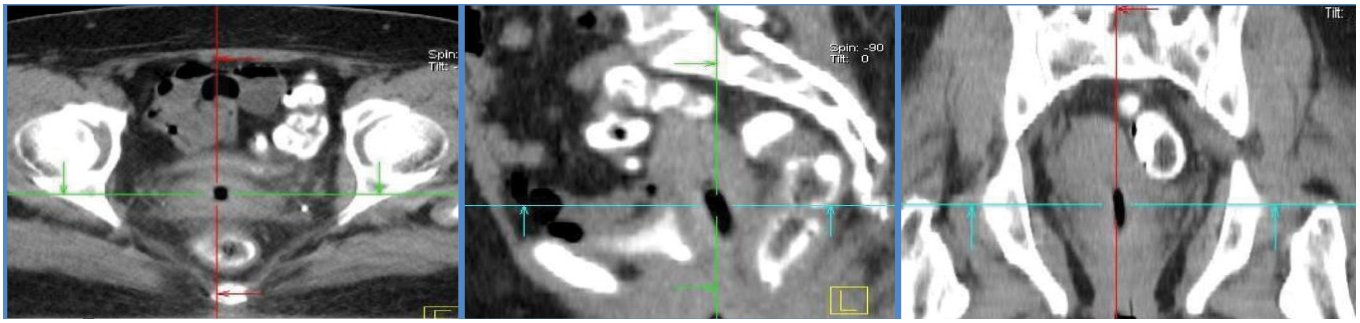

Figure 2: Axial, sagittal and coronal CT images with the new cervical sleeve in-place.

application and insertion of the new cervical sleeve under strict precautions necessary for such patients. The 2nd and 3rd applications were done without general anesthesia; hence the patient was protected from its hazards.

Discussion

Literature on analgesia and anesthesia in brachytherapy has increased over the last years but still limited. A wide range of sedation methods (none to spinal or general anesthesia) was used during the administration of intracavitory HDR brachytherapy for cervical cancer [2]. Each technique has its own advantage and some disadvantages also [5].

Benrath et al reviewed 1622 anesthetic procedures used for brachytherapy. Complications of general anesthesia were documented in 35%. Complications were dominated by cardiovascular incidents, that is, hypotension in 33% and bradycardia in 20%. Post-operative nausea was reported in 3% and vomiting in 1.3%. Two patients developed laryngospasm. For regional anesthesia: hypotension occurred in 10%, bradycardia in 10% and technical problems (as multiple puncture attempts, puncture of the dura or bloody puncture) in 4% [6].

To evaluate the relationship between anesthesia use and dose to organs-at-risk (OAR) in patients undergoing brachytherapy for cervix cancer, Anker et al. reviewed 179 procedures done for 31 patients. In general, decreased OAR dose was associated with increased ovoid size, increased tandem length, and earlier implant number. Anesthesia usage was not correlated with any of these favorable procedure characteristics. They concluded that the use of anesthesia did not correlate with decreased OAR dose [7].

Two methods have been described which avoid repeated anesthesia for serial treatments. First, an indwelling cervical sleeve can be inserted under general anesthesia during the initial treatment [3]. However, 26% of patients still experienced severe uterine pain which was relieved by nitrous oxide [8]. Second, osmotic dilators can be introduced to dilate the cervix before insertion of the applicators. Both methods are particularly useful in medically unfit patients [3].

Osmotic dilators (laminarias) have been used for gradual nontraumatic dilation of the cervical canal for various intrauterine procedures; however, this technique has not been well accepted in gynecological brachytherapy. In a preliminary study, thirteen brachytherapy procedures were performed in 6 patients. An osmotic dilator (synthetic laminaria) was inserted into the cervical os 1012 hours before each brachytherapy procedure and removed just before the procedure. All procedures were performed without general/regional anesthesia. Discomfort was minimal in all cases and there was no intra- or postoperative complications. This preliminary study suggests that this technique may reduce treatment-associated morbidity, shorten procedure time, facilitate intrauterine tandem insertion, and allow the delivery of adequate radiation therapy in patients who cannot tolerate general/regional anesthesia [9].

Universal and Smit cervical sleeves were used in some centers to avoid repeated general anesthesia after the first brachytherapy application in cancer cervix. These ready-made sleeves are not easily available to all centers and sometimes cannot be provided to the patients due to financial or technical reasons.

Our new cervical sleeve is cheap and readily available in all centers. Moreover, its fixation and removal was feasible as the universal or Smit cervical sleeves. To our knowledge, this is the 1st report (no previous report was found in literature review) describing this new cervical tube to be used instead of the well-known smith sleeve.

The new cervical tube was left in the patient for 2 weeks and being elastic and compressible the cervix was not kept opened enough to allow ascending uterine infection during this period. Also, we instruct the patient to maintain vaginal hygiene and use antiseptic vaginal douches to decrease the incidence of infection. None of our 3 patients (9 brachytherapy fractions) developed uterine infection.

In order to minimize the acute complications observed in the present HDR brachytherapy system, Petereit et al., recommended shorter duration in the brachytherapy suite [10]. The work load for the radiation oncologist doing cervical dilatation and insertion of the HDR brachytherapy applicator

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was increased in the 1st session due to effort done to fix the new cervical sleeve in place by sutures. We think that this effort will be less by time due to the learning curve. This increased work load in 1st session was compensated by decreased efforts in the 2nd and 3rd fractions. The anesthesiologist work load was decreased markedly in the second and third fractions. Risk of general anesthesia was avoided in the second and third fractions and this is a great advantage of this new technique especially in high risk patients.

The cervical sleeve, in general, has pros and cons which can be summarized as follows:

Pros: (1) Eliminate multiple dilations of the cervix and hence less need for anesthesia. (2) Decreased risk of perforation. (3) Shorter treatment time due to faster insertion. (4) Easier insertions for the brachytherapist.

Cons: (1) Potential patient discomfort/pain in-between sessions. (2) Sleeve has to be sutured on cervix which can slough off and sleeve will not stay in place. (3) Difficult/Not possible for advanced cases. (4) Potentially more trauma/anxiety/anaesthesia especially if sleeve does not stay in place.

Conclusion

This is a simple new technique facilitating uterine tandem insertion without general anesthesia. Using this technique, patients can be protected from general anesthesia hazards (especially in risky patients) and time saved during brachytherapy applications. This new cervical tube is as safe and applicable as the cervical Smit sleeve; however, it is more available and cheaper.

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