

# Anaesthesia for Brachytherapy Procedures for Gynaecological Malignancies- A Case Based Discussion

**Nori A\*, Varsha KS and Parusha S**

Assistant Professor, Department of Anesthesiology, MNJ Institute of Oncology and Regional Cancer Center, India

**\*Corresponding author:** Aparna Nori, Senior Resident, Department of Anesthesiology, MNJ Institute of Oncology and Regional Cancer Center, Red Hills, Hyderabad, Telangana, India, Email: aparnanori9@gmail.com

**Received Date:** January 30, 2025; **Published Date:** February 19, 2025

## Abstract

Brachytherapy for gynaecological malignancies can be carried out, utilising one of the many modes of anaesthesia. The anesthetic conduct of such procedures comes with the daunting task of handling in a non-operating room/ remote location. We describe two patients posted for interstitial brachytherapy, conducted under regional anaesthesia, and explain the rationale behind formulating the above plan for procedure. With meticulous planning, and individualised approach for conduct of anaesthesia, brachytherapy procedures can be performed with minimal anesthetic complications, whilst navigating the complications associated with remote location anaesthesia.

**Keywords:** Brachytherapy; anaesthesia; Gynaecological Malignancies

## Introduction

Till date, brachytherapy continues to remain a chief therapeutic modality for malignancies involving either of the female genital organs.

Brachytherapy (brachy= short, therapy= treatment) entails the placement of radioactive material within the body cavities (intracavitary) or tissues (interstitial). Brachytherapy possesses the advantage of high dose irradiation to the tumour, while relatively sparing surrounding healthy tissue, and minimising the extent of likely radiation-induced complications.

The anaesthesiologist has a prime role in the smooth and seamless conduct of brachytherapy procedures, and one is expected to face numerous challenges in the conduct of anaesthesia for such procedures, as these procedures are carried out in a non-operating room environment, in addition to the possibility of continued exposure over time, during

delivery of multiple fractions of irradiation, and higher ASA status of such patients, along with antecedent comorbidities, and cancer-induced malnutrition. The anaesthesiologist is also expected to employ pain management strategies to minimise the discomfort the patients face, from the placement of pellets and applicators locally for therapy purpose. Elucidated here are two cases performed at our institution, and we aim to enlist, what is to be borne in mind to ensure the smooth conduct of treatment.

## Case Details

### Case 1

A 43 year old female, with no comorbid conditions, along with a history of previous pneumonia, now resolved, and diagnosed with synovial sarcoma of vaginal vault, came to our pre-anesthetic checkup clinic, in October 2024, posted for interstitial brachytherapy. She reported a history of 5 cycles of chemotherapy with doxorubicin and ifosfamide

with mesna, with the last cycle delivered in April 2024, along with prior radiotherapy in September 2024. Her physical examination and airway assessment showed normal findings, and the laboratory investigations were found to be within normal limits.

MRI pelvis done showed a 45x39x49mm vaginal lesion, posteriorly compressing the rectum, anteriorly abutting the posterior base of the bladder, and inferiorly involving two-thirds of vagina, suggestive of a post chemoradiation residual lesion.

Computed tomography of the chest showed ground glass changes in both lungs, along with fibrobronchiectatic changes in lateral basal segment of right lower lobe, and multiple ill defined soft tissue densities in right and left upper and apical lobes respectively; however there were no clinical findings on auscultation, and the baseline SpO<sub>2</sub> was maintained at 99 pc on room air. Transthoracic echocardiography findings were normal.

Patient was advised to follow nil per oral guidelines with frequent sips of water until 2 hours before the neuraxial procedure, and cleared for anaesthesia.

Patient was shifted to the OR on the day of planned procedure, and monitors were attached, along with insertion of an 18G IV cannula on the left forearm and initiation of cohydration with crystalloids prior to performing neuraxial blockade. Following aseptic preparation of back, combined spinal-epidural was administered in L2-L3, and L3-L4 interspaces, with 18G Tuohy needle to locate epidural space at 4cm, and epidural catheter fixed at 9cm from skin, and 0.5% hyperbaric bupivacaine 3ml with 20mcg fentanyl administered in the subarachnoid space. A sensory level of T10 for pinprick sensations was confirmed and patient taken up for lithotomy position for the aseptic insertion of needles surrounding the tumour under USG guidance. After completion of procedure, our patient was transferred to the brachytherapy suite with a multipara monitor connected, and emergency resuscitative equipment in tow. Patient was found to be comfortable throughout brachytherapy, and epidural catheter was activated with frequent boluses of 0.25% bupivacaine 6 to 8ml, during post-procedural monitoring of the patient in ICU (when VAS found to be  $\geq 5$ ), and during subsequent cycles of irradiation. The epidural catheter was removed on post-procedural day one, and she reported no signs and symptoms of PDPH. A total of 3 cycles of brachytherapy with 6Gy per fraction was delivered during hospitalisation.

The first and second fractions were delivered over duration of 2h30mins and 30 mins respectively. The third fraction was delivered on the next day, over duration of 20 mins. Our patient had no instances of respiratory impairment and did

not require supplemental oxygen throughout the procedure.

However, following repeat MRI after four weeks following brachytherapy, our patient was deemed a candidate for surgery, and she underwent an anterior exenteration with ileal conduit reconstruction in December 2024, whose perioperative period remained uneventful.

## Case 2

A 70 year old female, with a history of diabetes mellitus since 20 years on oral metformin 500mg twice a day, diagnosed to have carcinoma cervix, came to our pre-anesthetic checkup clinic, in December 2024, posted for interstitial brachytherapy. Her physical examination and airway assessment showed normal findings, and the laboratory investigations were found to be within normal limits.

MRI pelvis done showed an ill-defined, T1 hypointense, T2/FLAIR heterogeneously hypointense lesion 31x24x36mm, involving cervix, anteriorly abutting posterior wall of urinary bladder, and posteriorly abutting rectum, with loss of fat planes, involvement of left parametrium more, and inferiorly involving upper two-thirds of vagina, suggesting carcinoma cervix..

Other radiological investigations were found to be within normal limits.

Patient was advised to withhold anti-diabetic agents on the day of surgery, and instructed to follow nil per oral guidelines.

Patient was shifted to the OR on the day of planned procedure, and monitors were attached, along with insertion of an 18G IV cannula on the left forearm and initiation of cohydration with crystalloids prior to performing neuraxial blockade. For the first fraction of irradiation, following aseptic preparation of back, single-shot subarachnoid block was administered with 0.5% hyperbaric bupivacaine 3ml using a 25 G Quincke spinal needle. A sensory level of T10 for pinprick sensations was confirmed and patient was taken up for lithotomy position for the aseptic insertion of needles surrounding the tumour under USG guidance. After completion of procedure, our patient was transferred to the brachytherapy suite with a multipara monitor connected, and emergency resuscitative equipment, with drugs and equipment for conduct of sedation or general anesthesia in tow.

Patient was found to be comfortable throughout brachytherapy, which lasted for 18 minutes, and sensory level of anesthesia was reported at T12 at the end of procedure. Measures for control of shivering in the brachytherapy suite in the form of covering with warm blankets, and Inj. Ondansetron 4mg IV, with infusion of warm crystalloids started in OR were taken. Patient was shifted to the high dependency unit and monitored for six hours, following

which she was transported in ward.

For the second and third fractions of interstitial brachytherapy, after a review pre-anesthetic assessment, which was found to be unremarkable, the patient was shifted to OR with the same advice followed one day prior to planned procedure, and combined spinal - epidural anesthesia performed in L2-L3, and L3-L4 interspaces, with the epidural catheter fixed at 10cm from skin, and sub-arachnoid block in L3-L4 space, with hyperbaric bupivacaine 2.6ml and 20 mcg fentanyl given intrathecally with a 23G Quincke spinal needle. The patient was taken for lithotomy and subsequent needle insertion after confirming a sensory level of T10, and monitored closely for symptoms or signs of hypoglycaemia throughout the procedure. She was shifted to the brachytherapy suite connected to a multipara monitor, and with the equipment for non-operating room anesthesia ensured during transport. She remained comfortable throughout CT simulation, planning, and irradiation, with no requirement of epidural top-ups. Following shift to HDU, she complained of discomfort at applicator site, for which 0.25% bupivacaine 8ml was administered. For the third fraction of brachytherapy, 0.5% bupivacaine 8ml was administered incrementally, and a level of T10 ensured, prior to initiation of irradiation, with continued aspiration to exclude intrathecal migration of epidural catheter during transport and with close haemodynamic monitoring ensured. Patient was shifted to HDU, with a step down to ward soon after, and discharged uneventfully.

The first fraction was administered with a total duration of 2h20mins, while the second and third fractions were delivered on a later date over duration of 2h20mins and 20mins respectively on the same day, with a time interval of 6 hours between two fractions.

## Discussion

Brachytherapy can be performed under general anaesthesia or central neuraxial block [1]; the mode of anaesthesia chosen based chiefly on the location of the tumour. The above patients underwent central neuraxial blockade, given the nature of gynaecological malignancies [2].

In case of diabetics, the advantage of monitoring for signs and symptoms of hypoglycaemia under regional anaesthesia, and to avoid a potential difficult airway situation, keeping in mind the theoretical possibility of diabetic cheiro-arthropathy / stiff joint syndrome, rendering assumption of sniffing position difficult [3], and the ability to provide analgesia on demand, with utilisation of regional techniques. However, prior to initiating central neuraxial blockade, our patient was assessed for occurrence of orthostatic hypotension to rule out the presence of autonomic disturbances in diabetics, and

the assessment was negative for presence of neuropathy [4].

Additional procedure-related factors were borne in mind, while choosing the technique of anaesthesia employed, such as the need for meticulous positioning during the placement of needles, and immobility for needle insertion and irradiation; inadvertent patient limb movement may cause inadvertent dislodgement and extrusion of the needles for brachytherapy, and normal tissue may be subject to the deleterious effects of radiation. Single shot subarachnoid block was employed with intrathecal adjuvant, to increase the efficacy of anesthesia and analgesia, and allow for prolonged duration of blockade, while remaining pain-free during the transport to multiple locations as part of treatment. An epidural catheter was placed to facilitate top-ups for multiple fractions.

In addition, the multiple steps of (interstitial) brachytherapy are carried out at locations (CT simulation, for locating the applicator, and confirming its correct position, and brachytherapy suite where the dose of radiation will be calculated, with planning done), where personnel specialised and trained in care of anaesthetised patients and OR procedures along with requisite equipment is mostly unavailable. This factor poses a significant challenge in front of the anaesthesiologist, and to tackle this, the availability of a suction source, an oxygen source, monitoring tools, an AMBU bag, emergency drugs, airway equipment (as per the SOAP-ME acronym) should be ensured prior to shifting the patient from the OR, which was meticulously followed, by intimating the radiation oncologist in advance to arrange for the same, and by arranging for the equipment to be mobilised from OR, starting a day before planned procedure. A team of two anaesthesia providers and an anesthesia technician was assembled to oversee and ensure the seamless organisation and conduct of the treatment procedure.

It is desirable to have a monitor with electrocardiography, non-invasive blood pressure monitoring, pulse oximetry, and continuous waveform capnography, for assessing patient hemodynamics and respiration during computed tomography simulation, and HDR, where these parameters and the patient should be visualised by the anaesthesiologist by means of a camera connected, or a see-through glass. Due to the non-availability of a multi-para monitor in these location, one such monitor was arranged for and mobilised with our patients to comply with existing standards. We intend to add capnography for monitoring, by taping the sample line to the patient's upper lip. Temperature monitoring may also be considered for further cases, due to the possibility of hypothermia and shivering from central neuraxial blockade, along with the use of air-conditioners in such remote locations for optimal functioning of radiology machines and linear accelerators.

The conduct of anesthesia for brachytherapy procedures at our institution was found to be in accordance with practice at many other esteemed institutions, and some such articles reporting the trends of brachytherapy procedures conducted are listed below.

Benrath J, et al. [5] presented the findings of a study performed, analysing the anesthetic management of brachytherapy procedures performed at their institution over a span of five and a half years, which showed that regional anaesthesia was the preferred modality for pelvic brachytherapy.

Nielsen A, et al. [6] studied the perioperative management of brachytherapy procedures that 23 patients underwent, and proposed a pathway for the optimal management of such procedures, and some components include performance of complete blood count, magnesium levels, and coagulation studies, correction of electrolyte imbalances prior to planned procedure, minimal narcotic administration, combined-spinal epidural anesthesia with or without narcotics, intravenous fluids for hydration, adjunct pain medication, PONV prophylaxis, along with postprocedural epidural infusion for pain control and delirium prophylaxis, and antibiotic coverage. Many of the components of the proposed perioperative pathway were followed in case of our patients barring magnesium studies and electrolyte replacement, as our patients had no electrolyte disturbances, and owing to lack of PCA pumps, post-procedural pain management was carried out with epidural boluses of local anesthetics.

## Conclusion

With meticulous planning, and individualised approach for conduct of anesthesia, brachytherapy procedures can be performed with minimal anesthetic complications, whilst

navigating the complications associated with remote location anesthesia.

**Conflict of Interest:** None declared.

## References

1. Kumar V, Gulia A, Garg R, Gupta N, Bharati SJ, et al. (2021) Perioperative anesthesia management for brachytherapy in cancer patients: A retrospective observational study. *J Anaesthesiol Clin Pharmacol* 37(4): 598-603.
2. Smith M, Todd JG, Symonds RP (2002) Analgesia for pelvic brachytherapy. *British Journal of Anaesthesia* 88(2): 270-276.
3. Cornelius BW (2016) Patients with Type 2 Diabetes: Anesthetic Management in the Ambulatory Setting. Part 1: Pathophysiology and Associated Disease States. *Anesth Prog* 63(4): 208-215.
4. Moningi S, Nikhar S, Ramachandran G (2018) Autonomic disturbances in diabetes: Assessment and anaesthetic implications. *Indian Journal of Anaesthesia* 62(8): 575-583.
5. Benrath J, Langenecker S, Hupfl M, Lierz P, Gustorff B (2006) Anaesthesia for brachytherapy - 51/2 yr of experience in 1622 procedures. *British Journal of anaesthesia* 96(2): 195-200.
6. Nielsen A, Liyanage T, Leiserowitz G, Mayadev J (2017) Optimal perioperative anesthesia management for gynecologic interstitial brachytherapy. *Journal of Contemporary Brachytherapy* 9(3): 216-223.