



## Anaesthetic management of brachytherapy

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**Abstract:** Radiotherapy is a commonly employed modality for cancer therapy. The large dose of radiation used has its inherent radiation hazard. To minimize this source specific 'brachytherapy' is employed. Brachytherapy is administered by inserting a radiation source inside a specific cancer site. Both insertion and removal of implant is done under anaesthesia. Hence we decided to study the anaesthesia requirements in employing these modalities. Our study aims (1) To study anaesthetic, analgesic and sedative requirement of patients for application of implants. (2) Hemodynamic effects associated with implant insertion. (3) Study the effectiveness of various anaesthetic modalities and (4) Note side-effects due to anaesthetic techniques. The present study was performed in 70 ASA 1, 2 & 3 patients scheduled for brachytherapy under local, regional and general anaesthesia. Written and informed consent was obtained. After thorough pre-operative evaluation for any co-morbidities, previous radiation exposure, airway assessment and blood and radiological evaluation, patients were given consent. Patients posted for Head & Neck and breast implants were given general anaesthesia, Pelvic implant patients were given spinal + epidural anaesthesia and intra cavitary radiation was performed under total intravenous anaesthesia. Out of 70 patients studied, 18 patients were given total intravenous anaesthesia, 23 given general anaesthesia, 3 given subarachnoid block, 20 were given combined spinal+epidural anaesthesia and 6 were given local anaesthesia. Of these 4 patients had hypotension, 1 had bradycardia & bronchospasm each, 2 had hypertension and 3 patients experienced hypoxia. Successful anaesthetic management of brachytherapy requires accurate preoperative assessment, vigilant intraoperative monitoring & excellent intraoperative analgesia.

**Key Words:** Brachytherapy; Anaesthesia; Subarachnoid Block; Total Intravenous Anaesthesia.

### INTRODUCTION

As the knowledge of cancer is increasing, the modes of treatment are also challenging and improving. Radiotherapy is a specific modality of treatment meant for cancers which is palliative treatment employed in advanced cases. Radiotherapy has inherent hazards because of large dose and areas not intended to receive radiation also receive and adverse effects encountered. To minimize this source specific radiation are employed and referred as "brachytherapy".

Brachytherapy is done inserting a radiation source which is kept inside specific cancer site. It needs analgesia, anaesthesia and relaxation. Both insertion and removal is done under anaesthesia. Anaesthetic management is crucial because the patients planned to receive brachytherapy are elderly with many comorbidities which needs to be taken into consideration.<sup>(21)</sup> Various modalities of anaesthesia employed include general, spinal, combined spinal epidural anaesthesia and local anaesthesia with sedation.<sup>(11)</sup>

### MATERIALS AND METHODS

The study was conducted on a total of 70 adult patients belonging to ASA grade I-II-III of either sex scheduled for brachytherapy under anaesthesia.

#### *Pre-operative assessment*

This was done by careful and detailed present history, history of previous illness, associated comorbid conditions, drug therapy, radiation, chemotherapy, previous surgery, anaesthesia and complications, drug allergy, addiction etc. A thorough physical examination of all systems, airway examination in terms of mallampatti grading, location of trachea and presence of stridor were noted.

#### *Investigations*

Routine pre-operative investigations including chest X-ray, hemoglobin, urine examination in every case.

Elderly patients with hypertension were demanded ECG, liver function tests, renal function tests. Blood sugars and pulmonary function tests were ordered in special cases. For all patients on operation table monitors were applied and intravenous line secured.

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#### *Head and Neck implants*

Patients were pre oxygenated and induced with thiopentone sodium and injection succinylcholine and nasal intubation was done in all patients. Preoperative tracheostomy was done in 6 patients. Nasogastric tube was introduced in all patients and oropharyngeal packing was done. Eyes were protected with gauze piece. Patients were put in head up position with extension of neck. All patients were maintained with nitrous oxide, oxygen and halothane and kept on spontaneous breathing. Patient's vitals were monitored. Analgesia and airway edema were taken care of. Oropharyngeal packing removed and extubation was done after full consciousness. For removal of implants either general anaesthesia or total intravenous anaesthesia was given. Proper post-operative care given.<sup>(15)</sup>

#### *Pelvic implants*

Patients were pre-loaded with ringer lactate 500ml. Under all aseptic precautions, local skin infiltration at L2-L3 space was done for anaesthetizing skin and epidural catheter number 19 gauge was guided through 18 gauge touhy needle and after giving a test dose with 2% lidocaine, epidural catheter was secured.

One space lower to epidural puncture, with 23 gauge needle under aseptic precautions lumbar puncture was done in lateral position and after confirming free flow of CSF, 3 ml of 0.5% bupivacaine was given and patient turned to supine position. The level was checked and surgeon was allowed to do procedure. Intraoperative and post-operative vitals were monitored carefully. Post-operative pain relief was taken care by injection buprenorphine 60 mcg diluted in 10cc normal saline epidurally twice daily. Implant was removed after 3 days.

#### *Intracavitary radiation*

It is also carried out as an outpatient procedure usually under total intravenous anaesthesia using ketamine and thiopentone sodium. During procedure need for oxygen, airway device, hypoxic episodes were noted. Intraoperative and post-operative analgesia were taken care of by injection diclofenac sodium intramuscularly. In 2 patients with valvular heart disease, patients were given paracervical block supplemented with sedation.

**Breast implants**

These patients were carried out under general anaesthesia with thiopentone sodium 5mg/kg, succinyl choline 2mg/kg and patient intubated with appropriate endotracheal tube. Injection fentanyl citrate was given for analgesia and patients maintained on oxygen, nitrous oxide and inhalational anaesthesia and spontaneous assisted ventilation. At the end of procedure patient was extubated after checking for full recovery of consciousness and ability to follow commands. Adequate post-operative analgesia was taken care of.

**Limb implant**

General anaesthesia was given with thiopentone sodium 5mg/kg, succinyl choline 2mg/kg, patient intubated with conventional laryngoscope. Patient was maintained on oxygen, nitrous oxide and volatile agents. Intermittent relaxation was given. After the procedure patient was reversed and extubated. Implants were removed under our supervised care.

**RESULTS**

In this study 70 patients were selected randomly for anaesthetic management of brachytherapy. 32% were of head and neck implant, 61% were pelvic implant, 3% of breast implants, 1% were limb implant. Most of the patients belonged to old age group and were having one or two coexisting disease. 12 patients were having hypertension, 4 diabetes mellitus, 5 person with respiratory disorders, 3 patients with ischaemic heart disease and 2 patients had rheumatic heart disease. Anticipated difficult airway was in 35% patients.

**Table 1: Demographic Data**

Patients Data	Mean	Range
Age	47.28	24-72 Yrs
Sex	21:49	
Weight(Kgs)	49.94	27-90 Kgs
ASA I	49	
II	19	
III	3	

**Table 2: Pre-Operative Associated Illness**

Associated Illness	Number
Hypertension	12(2.85%)
Diabetes Mellitus	4(5.71%)
Asthma	1(1.42%)
Pleural Effusion	2(2.85%)
Tuberculosis	2(2.85%)
Ischaemic Heart Disease	2(2.85%)
Rheumatic Heart Disease	2(2.85%)

Anaesthesia was given in the form of total intravenous anaesthesia in 25%, 32% with general endotracheal anaesthesia, 4% were given spinal anaesthesia, 28% were done under combined spinal and epidural anaesthesia, 6 were done under local anaesthesia. Regional anaesthesia is preferred technique in pelvic implant while general anaesthesia was preferred in head and neck, breast and limb implants.

In this study 4(5%) developed hypotension, 1 developed bradycardia, 3 hypoxia, 1 had bronchospasm, 2 developed hypertension and inadequate analgesia was found in 1 patient. Complications were more severe with general anaesthesia.

Post-operative 3 patients developed hypertension, 3 developed nausea, vomiting, pain was reported in 1, hypotension in 1, mucositis in 6 and altered taste in 6 patients.

**Table 3: Airway Status (MPG-mallampatti grading)**

MPG-I	45(64.28%)
MPG-II	4(5.71%)
MPG-III	10(14.28%)
MPG-IV	9(12.85%)
Tracheostomy In Situ	6(8%)

**Table 4: Brachytherapy Procedures**

Name Of Procedure	No. of Patients (%)
Head & Neck Implant	23(32.85%)
Implant Removal	14(20%)
Pelvic Implant	20(28.57%)
Breast Implant	03(4.28%)
Limb Implant	01(1.42%)
Intracavity Radiation	23(32.85%)
	70

**Table 5: Anaesthetic Management**

	No. Of Patients
Total intravenous anaesthesia	18(25.71%)
General anaesthesia (With Inhalation)	23(32.85%)
Spinal anaesthesia	3(4.28%)
Combined spinal epidural	20(28.57%)
Local anaesthesia	6(8.57%)

**Table 6: Complications**

	% Of Patients
Hypotension	4(5.71%)
Bradycardia	1(1.42%)
Hypoxia	3(4.28%)
Drug Reaction	-
Airway Related	2(2.85%)
Bronchospasm	1(1.42%)
Hypertension	2(2.85%)
In Adequate Analgesia	1(1.42%)
Bleedings	-

**Table 7: Post-Operative Complications**

Complications	Numbers
Hypertension	3(4.28%)
Nausea, Vomiting	3(4.28%)
Pain	1(1.42%)
Hypotension	1(1.42%)
Mucositis	6(8.57%)
Altered Taste	6(8.57%)

**DISCUSSION**

Now a days brachytherapy is emerging as very useful treatment for cancer patients. Brachytherapy presents the anaesthetist a unique problems. Airway assessment and management was very crucial in head and neck implants as anaesthetist and radiotherapist share same field. Previous radiation can cause fibrosis of soft tissue of neck which leads to restricted flexion and extension of neck. Keeping these in mind difficult airway cart was kept ready.<sup>(15)</sup> Desideriodp et al<sup>(5)</sup> in their study of evaluation of patients with oncologic disease found that about 65% of the patients have altered anatomy of airway due to previous radiation and surgery. Dr. Preeti Sanghavi, Dr. Geeta Joshi, Dr. Bipin Patel<sup>(15)</sup> in their study of 20 patients of head and neck implant, 2 developed bronchospasm and in 6 patients tracheostomy needed to be done.

J. S. Peyyety, A. Trikha and A. Saxena<sup>(10)</sup> in their study for anaesthetic implication for brachytherapy for head and neck cancer patients said that they have disease related emaciation and oncotherapy related nausea, vomiting and loss of appetite. All of these were taken due care.

In pelvic implant patients regional anaesthesia was satisfactory than general anaesthesia as general anaesthesia is associated with complications more than regional anaesthesia

which takes care of intraoperative as well as post-operative pain.<sup>(11)</sup> In a retrospective review of 18 patients, Lim and colleagues<sup>(11)</sup> concluded that general anaesthesia is associated with higher rate of anaesthesia related complications than conscious sedation.

In the study conducted by J. Benrath, S. Kozek-Langenecker, M. Hupfl<sup>(9)</sup> more than 33% were at high risk ASA grade III or IV and 40% were more than 60 years. Similar to our study regional anaesthesia was the predominant technique for pelvic brachytherapy.

No untoward outcome was observed in patients undergoing limb and breast implant surgery. Regional anaesthesia is preferred technique in pelvic implant while general anaesthesia was preferred in head and neck, breast and limb implant.<sup>(8)</sup>

Post operatively all patients were observed for respiratory obstruction for 2 hours and shifted to treatment room. Care was given for ryles tube, tracheostomy tube, hydration of patients, provision of analgesics and antibiotics.<sup>(15)</sup>

### CONCLUSION

Thus anaesthetic management of brachytherapy needs vigilance on part of anaesthetist. It starts with preoperative assessment of airway, excellent analgesia during and after procedure and adequate monitoring. Successful outcome depends on close monitoring and supervision.

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