

# Pain and Complications Assessment in Gynecological Cancer Brachytherapy Patients Under Spinal Anesthesia

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## ABSTRACT

**Background:** Brachytherapy is a radiation therapy that can deliver radiation to cancer by minimizing radiation exposure to adjacent organs or tissues. In its implementation, brachytherapy can cause pain so that adequate anesthesia is needed in order to get optimal results. This study was aimed to determine the adequacy of anesthesia and complications that occur in gynecological cancer patients undergoing brachytherapy with spinal anesthesia.

**Methods:** A descriptive observational study using primary data that taken by interviewing the patients who underwent gynecological brachytherapy under spinal anesthesia at dr. Mohammad Hoesin Palembang. The number of samples in this study that met the inclusion criteria was 18 subjects. Pain was assessed using an 11-point numeric rating scale. Data were collected in 5 different times, before procedure, during applicator insertion, during radiation process, during applicator removal, and 4 hours after brachytherapy. In addition, all complications that occurred during the procedure were recorded. Data were analyzed to describe the mean, median, minimum, and maximum of pain scores.

**Result:** The average pain score before brachytherapy was 0.78, at the time of applicator insertion was 0, 0.28 at irradiation, 0.11 at removal of the applicator and 1.33 after the brachytherapy procedure. The most common complications were back pain (27.8%) and urinary retention (27.8%).

**Conclusion:** For most patients, high dose rate (HDR) brachytherapy under spinal anesthesia was well tolerated, in fact most patients experienced no pain and no significant life-threatening complications. The post-brachytherapy pain score had the highest average score. Then, back pain and urinary retention were the most common complications.

**Keywords:** Gynecological cancer, brachytherapy, spinal anesthesia, pain

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## INTRODUCTION

Brachytherapy is a form of radiation therapy employed in cancer treatment, involving the placement of a radioactive source either inside the tumor or in close proximity to it.<sup>1</sup> This method is often used in cancers that require the application of quite high radiation doses within the tumor.<sup>2</sup> Pain is a problem in brachytherapy procedures, which can cause inoptimal results, either the pain caused by the cancer or by the brachytherapy itself. Therefore, to optimize the results, it is necessary to choose the right anesthetic technique.<sup>2,3</sup>

Anesthesia refers to a loss of sensation, with or without a loss of consciousness. Various anesthetic options for brachytherapy include local anesthesia, sedation, regional anesthesia, and general anesthesia.<sup>4</sup> Specifically, spinal anesthesia is a form of regional anesthesia where a local

anesthetic is directly administered into the subarachnoid space containing cerebrospinal fluid. Spinal anesthesia with 0.5% bupivacaine were commonly used in brachytherapy for gynecological cancer. Spinal anesthesia can provide an adequate anesthetic effect and has a minimal risk compared to other anesthetic techniques.<sup>5</sup> Pain score can be used as an assessment indicator to determine the adequacy of anesthesia given to the patient. Pain was collected using the Numeric Rating Scale (NRS), which contains 11 numbers ranging from 0 to 10. In the NRS-11 scoring system, 0 is considered no pain, 1-3 is mild pain, 4-6 is moderate, and 7-10 is categorized as severe pain.<sup>6</sup>

Even though it has a minimal risk of complications, spinal anesthesia can still cause complications such as nausea, vomiting, hypotension, back pain, and urinary retention. So that monitoring is needed both during brachytherapy and after brachytherapy.<sup>5</sup>

The objective of this study was to assess the sufficiency of anesthesia and identify complications in gynecological cancer patients undergoing brachytherapy with spinal anesthesia. Furthermore, this study is expected to guide in considering anesthetic techniques for brachytherapy patients.

## METHODS

This is an observational descriptive study using primary data that taken by interviewing the patients who will undergo gynecological brachytherapy under spinal anesthesia at dr. Mohammad Hoesin Palembang, with the period October - November 2020. Sample data were obtained using a total sampling. The approval of the health study ethics was obtained from Ethics Committee of Mohammad Hoesin General Hospital and the Faculty of Medicine, Sriwijaya University.

The sample of the study were gynecological cancer patients who would undergo brachytherapy under spinal anesthesia and met the inclusion criteria. Inclusion criteria in this sample, including patients who diagnosed with gynecological cancer, patients scheduled for High Dose Rate (HDR) intracaviter brachytherapy under spinal anesthesia with 5-mg bupivacaine 0,5% + 25 µg fentanyl, aged ≥ 18 years, and undergo a second brachytherapy dose during this study period. Each patient can undergo 2-3 sessions of brachytherapy during the course of this research period. Previous studies have indicated that the response to pain is significantly influenced by fear and anxiety, which can increase sensitivity to pain. Therefore, a second brachytherapy session was administered with the aim of ensuring that research subjects do not feel fear and anxiety, especially considering their prior experience with brachytherapy.<sup>7</sup> Then, are willing to be study subjects and sign an informed consent. In patients who have criteria including pregnancy, hypertension, hyperglycemia, sepsis, spinal deformity, and impaired cognitive function were not included in the study sample.

The total population obtained in this study was 26 subjects. But, the number of samples in this study that met the inclusion criteria were 18 subjects. Before the procedure, an informed concern was carried on the patient and asked for their willingness. At the same time, Patient demographics as age, Body Mass Index (BMI), education level, history of giving birth, history of disease, type of cancer, and American Society of Anesthesiologist (ASA) status were documented. All patients underwent spinal anesthesia in the entire brachytherapy procedure start from applicator placement, X-ray imaging, brachytherapy irradiation, and applicator removal. The brachytherapy radiation time will be recorded at the same time when the patient receives the irradiation.

Pain were assessed using an 11-point numeric rating scale. Data were collected in 5 different times, before procedure, during applicator insertion, during brachytherapy irradiation, applicator removal, and 4 hours after brachytherapy. The Numeric Rating Scale-11 has been previously used in gynecologic brachytherapy pain assessments. Verbal scoring was chosen because of its ease of use for assessments of patients on bed rest, particularly in the post anesthesia setting. Additionally, all complications that occurred during the procedure were recorded.<sup>6</sup>

The acquired data were subsequently processed and examined utilizing IBM SPSS Statistics 26 software. Descriptive analysis was employed to characterize the patient population and pain scores. Summary statistics encompassed the use of an arithmetic mean to depict central tendency, standard deviations to illustrate the statistical dispersion of pain scores, and minimum

and maximum values to delineate the overall range of the pain score.

## RESULT

From 26 populations that obtained in this study there were only 18 people who met the research criteria with the following characteristics. This is because 1 subject refuse to participate, and 7 subject were not undergoing their second brachytherapy dose during the research period. Based on age, the most brachytherapy patients were aged 46-55 years, the youngest were aged 26-35 years, and the oldest patients were aged 56-65 years. No brachytherapy patients were found at ages ≤ 25 years and ≥ 65 years. The most brachytherapy patients were in the normal BMI, and only a few were in the underweight group, overweight, and obesity groups (Table 1).

**Table 1.** Characteristics of brachytherapy patients

Characteristics	Amount (n)	Percentage (%)
<b>Age</b>		
26 – 35 years	1	5.6
36 – 45 years	5	27.8
46 – 55 years	10	55.6
56 – 65 years	2	11.1
<b>BMI (Body Mass Index)</b>		
<18.5 (Underweight)	1	5.6
18.5-24.9 (Normal)	15	83.3
25.0-29.9 (Overweight)	1	5.6
≥ 30 (Obesity)	1	5.6
<b>Education Level</b>		
Not attending school	1	5.6
Elementary school	5	27.8
Middle school	5	27.8
High school	6	33.3
Bachelor Degree	0	0
Undergraduate	1	5.6
Graduate	0	0
<b>Profession</b>		
Permanent work	5	27.8
Non-permanent job	3	16.7
Doesn't work	10	55.6
<b>Birth History</b>		
Yes	1	5.6
No	17	94.4
<b>History of Disease</b>		
Hypertension	3	16.7
Asthma	1	5.6
DM type 2	3	16.7
Gout arthritis	1	5.6
No history of disease	10	55.5
<b>Type of Cancer</b>		
Cervical cancer	18	100
<b>ASA status</b>		
ASA II	18	100
<b>Brachytherapy Radiation Time</b>		
< 15 minutes	1	5.6
15 – 20 minutes	5	27.8
>20 minutes	12	66.7

BMI: Body mass index; ASA: American Society of Anesthesiologist

By education level, mostly brachytherapy patients have received education up to high school, but more than half were only received < 9-years education. Only a small group that

received education up to undergraduate and there were no patients in the bachelor and graduate groups. Most of the brachytherapy patients were housewives, did not work, or were retired. Only small groups have non-permanent jobs and some patients have permanent jobs such as civil lecturers, teachers and government employees. Most patients had given birth and only a single person who had never given birth.

Based on medical history, most of patients had no history of the disease and some were diagnosed with hypertension, type 2 diabetes mellitus, Asthma, and Gout Arthritis. At the location where the study was conducted, it only provided brachytherapy for cervical and endometrial cancer. Endometrial cancer patients are rare enough that during this study period, all patients were found with cervical cancer. All brachytherapy patients were in ASA II, which means they have mild systemic disease but do not interfere with daily activities and most of brachytherapy patients received irradiation for >20 minutes.

Majority of patients did not feel pain during the brachytherapy procedures, some experienced mild pain and moderate pain (Table 2). Based on the complications that occurred, majority were experienced back pain and urinary retention, and only a few were found experienced nausea, vomiting, and pain during the brachytherapy procedure (Table 3).

**Table 2.** Description of brachytherapy patients based on NRS-11

Procedures	Mean	Median
Before Brachytherapy	0.78 ± 1.44	0 (0 – 4)
Applicator Insertion	0	0
Irradiation	0.28 ± 0.83	0 (0 - 3)
Applicator removal	0.11 ± 0.47	0 (0 - 2)
Follow-up	1.33 ± 1.78	0 (0 – 4)

**Table 3.** Description of brachytherapy patients based on complications

Complications	Frequency	
	n (people)	%
Nausea and vomiting	2	11.1
Back pain	5	27.8
Urinary retention	5	27.8
Pain during the procedure	2	11.1
Hypotension	0	0

## DISCUSSION

Most women who have cervical cancer are aged 35-44 years. But, most are only diagnosed at the age of 50 years. Furthermore, this type of cancer is also quite rare in women under the age of 20 due to transmission of the HPV that mostly through sex, which is carried out in adolescence and the incubation period of cancer cells, which takes quite a long time.<sup>8</sup>

This study showed that most of the brachytherapy patients had a normal Body Mass Index. According to previous studies, there is an increased risk of cervical cancer by 20% in the overweight and obese group.<sup>9</sup> Most cancer patients (40%-80%) experience weight loss due to malnutrition during cancer treatment. This can be caused by pain that lasts a long time. Chronic pain can reduce patients appetite and reducing nutritional intake.<sup>10</sup>

This study showed that most brachytherapy patients had received education up to high school. However, more than

half of the brachytherapy patients only received <9 years of education. The results of this study are in accordance with previous research, which states that there is a link between cancer incidence and level of education and more than a quarter of cancer patients have an education level of < 9 years.<sup>11</sup> Furthermore, low knowledge about gynecological cancer can also significantly increase cancer risk factors.<sup>12</sup>

This study shows that the majority of brachytherapy patients are housewives, not working, or retirees. This is because many gynecological cancer patients are immobilized due to pain obtained from cancer or from treatment and are no longer able to work, they choose to stop working either temporarily or permanently (retirement). Therefore several women lose their productivity due to cancer.<sup>13</sup>

This study showed that most brachytherapy patients had given birth. History of pregnancy and childbirth are risk factors for cervical cancer, history of pregnancy and childbirth are related to history of sex. where the more the history of pregnancy the more history of sex which is the main cause of transmission of the human papillomavirus (HPV) that caused cervical cancer.<sup>12</sup>

According to this study, the most history of disease in brachytherapy patients was hypertension and type 2 diabetes mellitus. This is agrees with previous studies, which stated that there was a significant association between type 2 diabetes mellitus and the incidence of cervical cancer. This is because diabetics are more susceptible to the HPV. This is associated with a decreased immune system due to hyperglycemia.<sup>14</sup>

In this study, only cervical cancer patients were found. This is due to brachytherapy services in RSUP Dr. Mohammad Hoesin Palembang that only provides brachytherapy for cervical cancer and endometrial cancer. Endometrial cancer is quite rare to find in developing countries like Indonesia, while cervical cancer is the most common cancer.

To determine the physical condition of the patient before brachytherapy, the ASA classification is used, which consists of ASA I-VI which are related to the severity of the patient's disease and physiological changes caused by the disease. In this study, all gynecological cancer patients undergoing brachytherapy at RSUP Dr. Mohammad Hoesin Palembang had ASA II. In this study, it was found that 1 patient with ASA III had decreased cognitive function so that they did not meet the inclusion criteria. These results agree with previous studies of 87 brachytherapy patients, which resulted in 31% of patients being in ASA II and 69% of patients being in ASA III.<sup>15</sup> In this study, there were no patients with ASA IV or higher because patients with ASA IV were at a high risk of death, so it was not recommended to undergo anesthesia procedures.<sup>16</sup>

This study showed that most patients received irradiation for >20 minutes. The brachytherapy irradiation depended on the size of the cancer tissue that wanted to destroy, ranging from 10 to 30 minutes. Each patient can do 2 to 5 times of brachytherapy and will be stopped if there are no remaining cancer cells or if dangerous complications are found. HDR brachytherapy can be done 2 times a day for 2 to 5 days or can be done 1 time a week for 2 to 5 weeks.<sup>17</sup>

This study was followed by 18 brachytherapy patients who underwent brachytherapy using intracavitary techniques from October to November 2022 at Dr. Mohammad Hoesin Palembang using spinal anesthesia with 5-mg bupivacaine 0.5% + fentanyl 25 µg.

Previously, a similar study was conducted by Ericka wiebe on brachytherapy patients under general anesthesia for applicator placement. That study showed that the average pain score before brachytherapy was 0,9, were 2,3 at irradiation, 2,7 at

applicator removal and 1.9 at follow-up. Unlike general anesthesia studies, in this study, all patients were under spinal anesthesia for the entire procedure and showed a lower mean pain score than those previous studies.<sup>6</sup>

In this study, the most common complications encountered were back pain and urinary retention. Back pain usually occurs due to injections made to insert anesthetic drugs, whereas urinary retention is caused by disruption of bladder function during the procedure due to anesthesia. Complications after spinal anesthesia such as nausea and vomiting are quite common, this is agrees with previous research that the incidence of nausea and vomiting during spinal anesthesia was 18.5%.<sup>18</sup>

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## CONFLICT OF INTEREST

The author declares there is no conflict of interest.

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Furthermore, pain during intraoperative still encountered, possibly caused by inadequate analgesia.<sup>5,19</sup>

## CONCLUSION

Evaluating pain and complications was crucial for identifying potential areas for enhancement and ensuring optimal patient care during procedures. In the majority of cases, HDR brachytherapy performed under spinal anesthesia was well-received. The majority of patients reported no pain and encountered no substantial life-threatening complications. However, mild to moderate pain remains a common occurrence following brachytherapy.