



“Thermoplastic Mould Vs Vaccum Lock Device in patients of Carcinoma Cervix”



Dr. Poonam Gupta*

M.B.B.S MD Radiation Oncology, Senior Consultant, Hanuman Prasad Poddar Cancer Hospital & Research Centre, India

Submission: April 27, 2023; **Published:** May 05, 2023

***Corresponding author:** Dr. Poonam Gupta, M.B.B.S MD Radiation Oncology, Senior Consultant, Hanuman Prasad Poddar Cancer Hospital & Research Centre, India

Abstract

Background: Strategies to immobilize patients for radiotherapy have been developed since it was introduced as a treatment modality over 100 years ago. We have also presented highly specialized systems that may be used in the most sophisticated of radiation therapy treatment modalities that address specific needs of image guidance, highly conformal and high-dose stereotactic treatments, brachytherapy, and intraoperative therapy. Common themes in modern radiation therapy immobilization include striking a balance between patient comfort and stability, supporting effective and safe approaches for target localization during treatment, and supporting systems to verify the patient position prior to treatment using x-ray or surface imaging. Image-guided radiation therapy (IGRT) and immobilization are interlinked, and IGRT is proving to play an increasing role with every type of treatment. It is therefore not surprising that the radiation therapy commercial industry will continue to focus on providing safe and effective immobilization that is compatible in both CT and MRI.

Material & Method: This study was performed in 23 patients of carcinoma cervix in Hanuman Prasad Poddar Cancer Hospital-Gorakhpur, India in Jan 2023. For immobilization Vaccum lock device used in 13 patients and thermoplastic mould used in 10 patients doing IMRT for carcinoma cervix treatment.

Results: There are no significant shifts in either arm of patients during treatment.

Conclusion: There is no significant isocentric deviation in use of both the immobilization devices. The reproducibility was better with thermoplastic moulds.

Introduction

The success or failure of a radiotherapy treatment hinges on the accuracy with which the radiation is delivered. There are many sources of uncertainty in the radiation therapy delivery process that can result in a geometric miss of the intended target volume. A geometric miss of the intended target volume will not only decrease the probability of tumor control but also increase the volume of normal tissue that is irradiated, which can increase the probability of a treatment related complication. Geometric uncertainties may be broadly classified as mechanical inaccuracies, localization inaccuracies, and positioning inaccuracies. Mechanical inaccuracies include the coincidence of the light and radiation fields, mechanical stability of the couch,

laser alignment, and correspondence of the simulation and treatment isocentres. Localization error relates to the difficult nature of defining the location and extent of the target volume during both planning and treatment delivery [1].

The goal is to reduce positioning uncertainties during each fraction (intrafraction error) and to increase the reproducibility of the patient setup for each fraction (interfraction error). In addition, immobilization devices can decrease the time needed for daily setup and target localization. Certain immobilization devices may also allow setup marks to be made directly on the device instead of the patient's skin, which can improve the patient's psychological well-being while under treatment, and some devices

may even confer dosimetric advantages in treatment planning. The immobilization system should be lightweight for ease of setup and transport, yet strong and durable so that the device does not break during the patient's course of treatment. Furthermore, the device should be made of materials that minimally affect the megavoltage treatment beam and do not cause imaging artifacts that could impact three-dimensional (3D) visualization of the patient's anatomy for target identification or imaging used for patient alignment. Thermoplastic mask system, and Vaccum lock bags, alpha cradle is used for immobilization in patients during radiation [2-4].

Material & Method

This study was performed in 23 patients of carcinoma cervix patients during IMRT in Hanuman Prasad Poddar Cancer Hospital-Gorakhpur, India in Jan 2023. For immobilization Vaccum lock device used in 13 patients and thermoplastic mould used in 10 patients. All patients received IMRT 50 Gy in 25#. CBCT images were taken on the start of radiation and after each 5# in all patients. The shift during set up was compared in longitudinal, vertical and horizontal and in rotational dimensions in patients with both immobilization devices (Tables 1 & 2).

Table 1: Shifts found in patients with vacuum lock device.

Patients	1 st week			2 nd week			3 rd week		
	Vert (cm)	Lon (cm)	Lat (cm)	Vert (cm)	Lon (cm)	Lat (cm)	Vert (cm)	Lon (cm)	Lat (cm)
1.	-0.05	0	0.16	0.11	0	0.47	0.09	0.48	0.8
2.	0.55	0.96	0.32	0.37	0.35	0.47	0.02	0.58	0.34
3.	0.1	0.31	0	0.27	0.46	0.11	0.11	0.18	0.33
4.	0.61	0.34	0.03	-0.01	0.6	-0.62	0.38	-0.17	-0.52
5.	0.11	0.18	0.14	-0.8	0.19	0.22	-0.4	0.1	0.1
6.	0.15	0.04	-0.49	0.03	0.47	-0.11	0.31	0.33	0.05
7.	-0.34	0.24	-0.28	-0.08	0.38	0.09	0.08	0.39	0.08
8.	0	-0.2	0.07	0.04	-0.06	-0.33	-0.15	0.11	-0.39
9.	0.31	0.36	-0.15	-0.38	0	0.42	-0.3	-0.21	-0.27
10.	-0.53	-0.26	-0.42	-0.05	-0.36	-0.47	-0.11	0	-0.17
11.	0.64	0.16	0.29	0.33	-0.23	-0.26	0.39	0.28	-0.05
12.	0	0	-0.16	0.1	0	0.21	-0.16	0.22	0.33
13.	0.52	-0.1	0.21	-0.38	0.4	-0.22	0.27	0.11	0.03

Table 2: Shifts found in patients with thermoplastic mould.

Patients	1 st week			2 nd week			3 rd week		
	Vert (cm)	Lon (cm)	Lat (cm)	Vert (cm)	Lon (cm)	Lat (cm)	Vert (cm)	Lon (cm)	Lat (cm)
1.	-0.35	0	0.16	0.01	-0.26	-0.23	0.1	-0.26	-0.36
2.	-0.03	0.96	0.32	0.37	0	0.31	-0.11	-0.15	-0.76
3.	0.05	0.31	0	0.05	0.05	0.17	-0.04	0.08	-0.14
4.	0	0.34	0.03	0	-0.04	0.16	0	0.06	0.33
5.	0.1	0.18	0.14	0.21	0	0.33	-0.46	0.11	0
6.	-0.34	0.04	-0.49	0	0	0.33	0.04	0.33	0.11
7.	0.04	0.24	-0.28	-0.11	-0.22	-0/01	0.02	0.03	-0.33
8.	0.21	-0.2	0.07	0.07	-0.06	0.34	-0.15	0.11	0.03
9.	-0.06	0.36	-0.15	0.01	-0.02	0	-0.03	0.31	0.31
10.	0.23	-0.26	-0.42	0.17	-0.27	0	-0.05	0	0.34

Results

When comparing the patients in both arms there were no significant shifts found in each imaging. Patients were more comfortable with vacuum lock but there were chances of changes in measurement due to piercing of device and decrease in air volume.

Conclusion

There is no significant isocentric deviation in use of both the immobilization devices during set up of patient for treatment. The reproducibility was better with thermoplastic moulds.

Discussion

The goal of immobilization and stabilization of the radiotherapy patient is to reduce positioning uncertainties during each fraction (intrafraction error) and to increase the reproducibility of the patient setup for each fraction (interfraction error). In addition, immobilization devices can decrease the time needed for daily setup and target localization, thus increasing a clinic's throughput. Certain immobilization devices may also allow setup marks to be made directly on the device instead of the patient's skin, which can improve the patient's psychological well-being while under treatment, and some devices may even confer dosimetric advantages in treatment planning. The immobilization system should be lightweight for ease of setup and transport, yet strong and durable so that the device does not break during the patient's course of treatment. Furthermore, the device should be made of materials that minimally affect the megavoltage treatment beam and do not cause imaging artifacts that could impact three-dimensional (3D) visualization of the patient's anatomy for target identification or imaging used for patient alignment.

References

1. Jolly T, Williams GR, Jones E, Muss HB (2012) Treatment of metastatic breast cancer in women aged 65 years and older, *Women's Health*, London 8(4): 455-469. quiz 470-471.
2. Hensen F, Sawatzky, JV (2008) Stress in Patients with Lung Cancer: A Human Response to Illness, *Oncology Nursing Forum*, Pittsburgh 35(2): 217-223.
3. Cataldo JK, Dubey S, Prochaska JJ (2010) Smoking Cessation: An Integral Part of Lung Cancer Treatment. *Oncology Basel* 78(5-6): 289-301.
4. Ciria-Suarez L, Jimenez-Fonseca P, Palacin-Lois M, Antonanzas-Basa M, Fernandez Montes A, et.al. (2021) Breast cancer patient experiences through a journey map: A qualitative study. *PLoS One* 16(9): e0257680.
5. Peate I (2001) Caring for men with breast cancer: Causes, symptoms and treatment. *Br J Nurs* 10(15): 975-981.
6. Neal AJ, Hoskin PJ (1997) *Clinical Oncology: Basic Principles and Practice*.
7. Young-McCaughan S (1996) Sexual functioning in women with breast cancer after treatment with adjuvant therapy. *Cancer Nurs* 19(4): 308-319.
8. Fredette SL (1995) Breast Cancer Survivors: Concerns and Coping. *Cancer Nursing* 18(1): 35-46.
9. Binka C, Doku DT, Awusabo-Asare K (2017) Experiences of cervical cancer patients in rural Ghana: An exploratory study. *PLoS One* 12(10): e0185829.
10. Kirshbaum M (2005) Promoting physical exercise in breast cancer care. *Nurs Stand* 19(41): 41-48.
11. Parry C (2003) Embracing uncertainty: An exploration of the experiences of childhood cancer survivors. *Qualitative Health Research*; Thousand Oaks 13(2): 227-246.
12. Jiwa M, Saunders CM, Thompson SC, Rosenwax LK, Sargent S, et.al. (2008) Timely cancer diagnosis and management as a chronic condition: opportunities for primary care. *Med J Aust* 189(2): 78-82.
13. International Agency for Research on Cancer (IARC), WHO.



This work is licensed under Creative Commons Attribution 4.0 License
DOI: [10.19080/CTOIJ.2023.23.556124](https://doi.org/10.19080/CTOIJ.2023.23.556124)

Your next submission with Juniper Publishers will reach you the below assets

- Quality Editorial service
- Swift Peer Review
- Reprints availability
- E-prints Service
- Manuscript Podcast for convenient understanding
- Global attainment for your research
- Manuscript accessibility in different formats
(Pdf, E-pub, Full Text, Audio)
- Unceasing customer service

Track the below URL for one-step submission

<https://juniperpublishers.com/online-submission.php>