

ASSESSING POSITIONAL ACCURACY AND BODY-SHAPE REPRODUCIBILITY OF BELT INTEGRATED WITH AIRBAG VERSUS THERMOPLASTIC MASK WITH AIRBAG COMPRESSION SYSTEMS FOR ABDOMINAL RADIOTHERAPY MOTION MANAGEMENT IN STEREOTACTIC BODY RADIOTHERAPY.

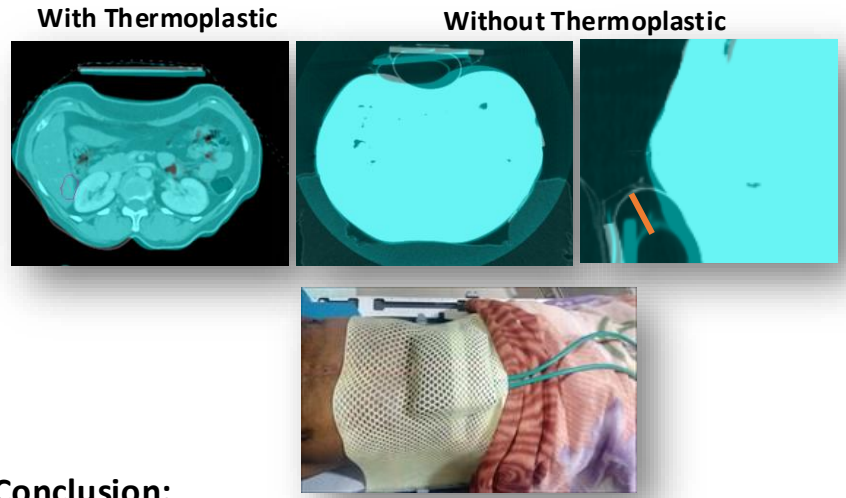
Amit Nirhali, Vishram Naik, Rupesh Pagare, Jaideep Khadke, Sanjay Hunugundmath, Mariya Deputy, Shreya Dwivedi, Sharad Gadhave, Bhushan Hole Sahyadri superspeciality hospital, Radiation Oncology, Pune, India, amitnirhali@gmail.com

Purpose:

This study compares two compression systems: (1) a compression belt with an integrated inflatable air bag and (2) an abdominal thermoplastic mask with an inflatable air bag but without a belt.

Methods:

20 patients who underwent treatment for abdominal stereotactic body radiotherapy using abdominal compression were retrospectively analyzed. The accuracy and reproducibility of the compression system were evaluated by measuring the displacement of the airbag and the abdominal surface with Body shape variation using ClearRT based KVCT imaging during treatment on Tomotherapy.



Results:

Both systems effectively facilitated abdominal compression. However, the compression belt with an inflatable air bag showed greater variation in airbag positioning and abdominal body shape. On the other hand, the thermoplastic system with inflatable airbag demonstrated superior reproducibility of abdominal body shape and more stable airbag placement, due to its rigid structure and the embossed housing of the airbag within the thermoplastic material. Variation in the Dose was observed in case of stomach other OAR was insignificant. PTV coverage of tumor near diaphragm showed significant dose variation

Mean translational setup errors (± SD)

Direction	Belt-Integrated Airbag	Thermoplastic Mask + Airbag
Lateral	2.8 ± 0.5 mm	0.8 ± 0.2 mm
Longitudinal	2.2 ± 0.4 mm	0.7 ± 0.1 mm
Vertical	4.8 ± 0.8 mm	1.6 ± 0.2 mm

Mean Rotational setup errors (± SD)

Rotation	Belt-Integrated Airbag (°)	Thermoplastic Mask + Airbag (°)
Pitch	1.8 ± 0.6	0.4 ± 0.2
Roll	1.2 ± 0.5	0.3 ± 0.1
Yaw	2.1 ± 0.7	0.5 ± 0.2

% Mean Absolute Deviation from Planned Dose

Parameter	Belt-Integrated Airbag	Thermoplastic Mask + Airbag
PTV Coverage Deviation Away from Diaphragm (%)	2.2	0.8
Stomach Mean Dose Deviation (Gy)	3.2	1.4
PTV Coverage Deviation Near Diaphragm (%)	3.8	1.3

Conclusion:

The compression belt with inflatable air bag and the thermoplastic system with inflatable air bag each offer distinct advantages in abdominal compression for radiotherapy. Understanding these differences can support selection of optimal compression techniques to improve respiratory motion management and treatment precision in stereotactic body radiotherapy.