

Implementation of a phased-gating decision pathway for large lung SABR lesions

Roeum Butt and Jose Lourdhurajan
Mount Vernon Cancer Centre, Radiotherapy

April 2026



Mount Vernon
Cancer Centre



East and North
Hertfordshire Teaching
NHS Trust

ProudToBeENHT

What will be covered

- Why it was felt there is a need?
- How are patients selected?
- How was the technique commissioned?
- How well does it work on set?

Why it was felt there is a need?

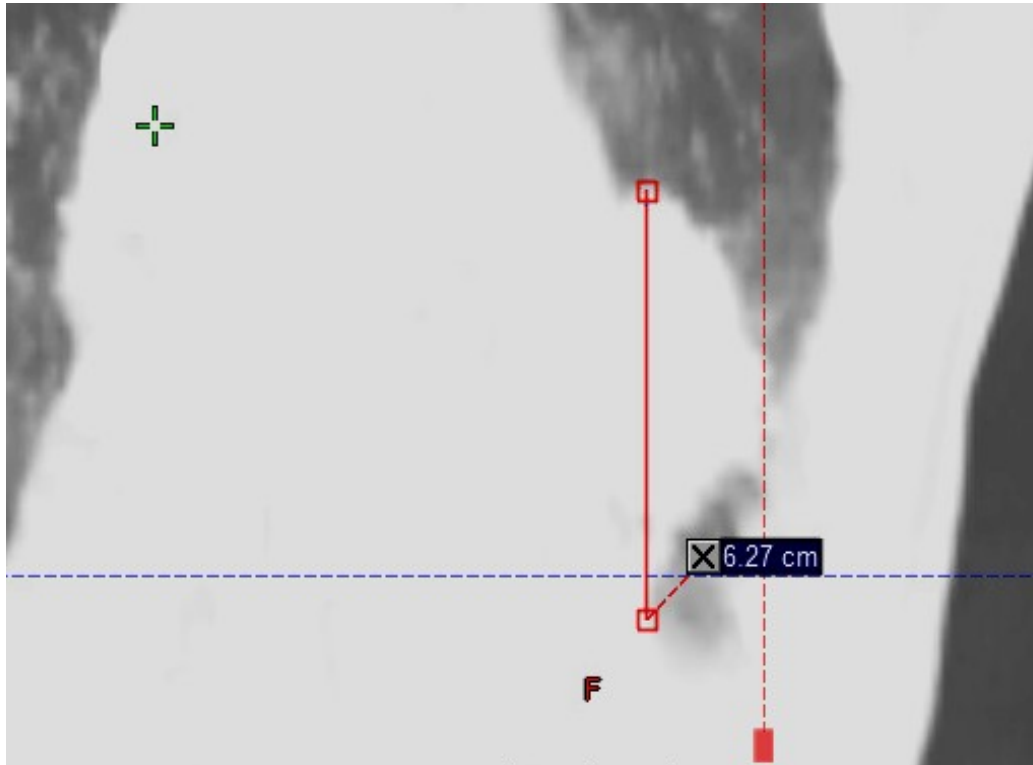
- Patients with large lesions, co-morbidities and ones who had limited radical treatment options
- Large motion resulted in a large ITV for patients who already had a high risk of pulmonary toxicity
- A large ITV also resulted in OAR's such as the pulmonary trunk and stomach to receive a higher dose.
- Motion management strategies such as abdominal compression made little to no difference in the ITV motion for larger patients.

What metrics were used?

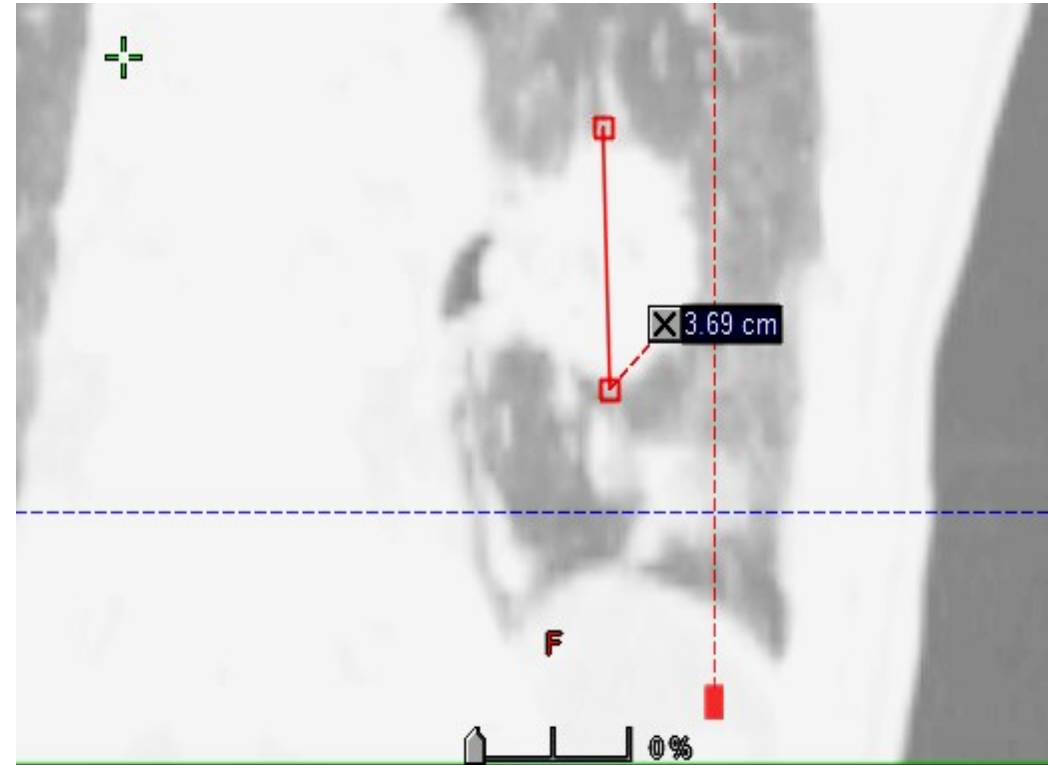
- Selection based on dosimetry
 - PTV (due to large ITV motion) greater than 6 cm
 - GTV moves more than 2.5 times its original size
 - Proximity to trachea/bronchus or any high-risk oars
 - Tumour motion stability
- Selection based on the patient's coping mechanisms.
 - Age or other issues

What does it look like?

Non gated



Gated



How are patients selected?

- Patients who have large lower lobe lesions identified at MDT/CT
- Initially VCD coaching was used in order to control their breathing
- If this did not result in a suitable ITV or if significant motion was noted then a phased gating approach was explored.
- Patients lesion would be contoured on select phases where motion was minimal or away from concerning OAR's this normally ranged between 30-70%
- These phases were then individually contoured by the consultant and a combined ITV was produced.

How was the technique commissioned?

The commissioning of phase gating involves several steps prior to clinical use, such as

- Baseline output differences between static non-gated and static gated beam delivery.
- Gating latency measurement.
- Synchronization check between gated CBCT and the target for the selected phases.
- End to end measurements and safety interlock check
- Establishment of PTV margin.

How well does it work on set?

- On set initially a kV pair was taken for a gross error assessment
- Once the gross patient position was verified a phased gated CBCT scan was acquired based on the phases selected during planning.
- The CBCT was matched against the AV (from the selected phases) with an initial bone match followed up by a soft tissue adjustment to ensure ITV coverage was maintained.
- Once this was verified the patient was then treated with the Linac gating to particular phases of the breathing cycle. If a difference in amplitude or frequency was noted, treatment was paused until the patient returned to their reference breathing pattern. A mid treatment kV pair was also taken to ensure there was no gross position change due to the increased treatment delivery time.

Any questions?

- Roeum.butt@nhs.net