Assessment of mGTV reduction when using abdominal compression in SABR treatments of oligo-metastatic disease to the adrenal gland: a single institution case series

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Introduction

The adrenal gland is the 4th most common site of metastases in cancer after lung, liver and bone metastases. Various primary tumours can metastasise to the adrenal gland with melanoma being the most commonly associated (50%) followed by lung and breast (40%). Generally adrenal metastases occur within widespread metastatic disease however there are a group of patients who present with an adrenal metastasis as their only site of disease. The gold standard for treating oligo-metastatic adrenal metastases is surgical resection. A meta-analysis of data regarding surgical resection has suggested that up to 25% of patients have an excellent outcome post adrenalectomy with long term survival suggesting that local therapy is beneficial.

Stereotactic Ablative Body Radiotherapy (SABR) is an alternative local therapy for those who cannot have surgery. There have been no published prospective data but several retrospective studies have shown local control rates from 55-100% at 1-2 years.

Having a robust immobilisation technique and effective respiratory motion control are important in the safe and effective delivery of SABR. The UK SABR consortium guidelines for SABR to the adrenals state movement with respiration of greater than 5mm should have appropriate measures taken to account for or reduce this. One way of achieving motion reduction is by using an abdominal compression device. There is no current data regarding the volumetric impact of abdominal compression when treating adrenal metastases with SABR.

The aim of this case study was to evaluate the impact of abdominal compression on reducing respiratory motion and thus the volume of the mobile GTV in patients treated with VMAT SABR.

Method

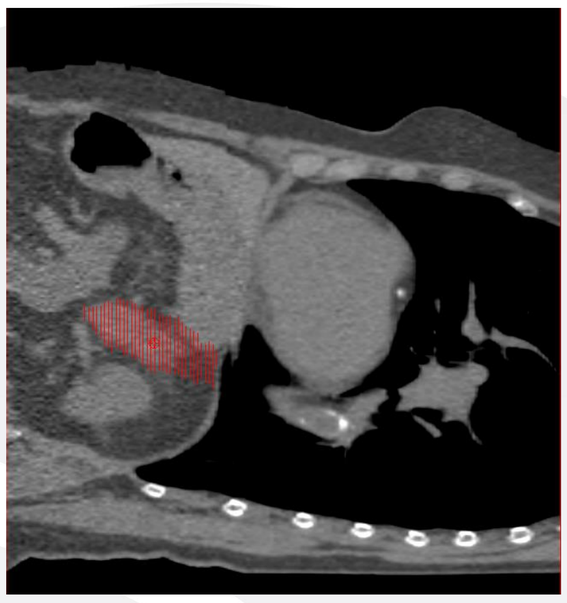
We reviewed data for the first 12 patients with oligo-adrenal metastases treated with SABR at our centre. The median age of the patients was 67.3 years. Radiation doses prescribed were 30-36Gy in 3 fractions.

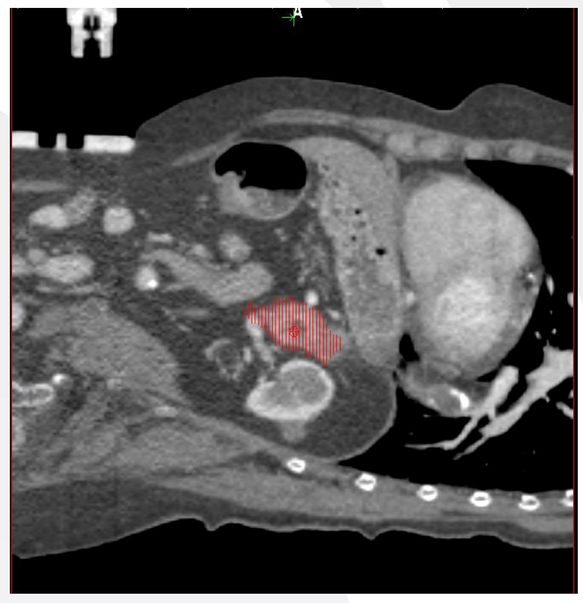
An initial free breathing 4DCT scan without abdominal compression was acquired in the supine position with a wing board and VacBag to provide patient immobilisation. The extent of lesional movement on the initial scan was evaluated by a clinical oncologist. If the motion was greater than 5mm this was followed by a further 4D CT scan with abdominal compression. The abdominal compression device used was the CIVCO Body Pro-Lok and was attached to the treatment couch with the patient in the same treatment position as for the initial 4DCT scan. Abdominal compression was applied as per patient tolerance.

The patient's actual radiotherapy treatment was contoured on the 4DCT scan with abdominal compression using Prosoma planning system. We then retrospectively contoured a mobile GTV on the initial non-compressed scan and compared the two treatment volumes.

Results

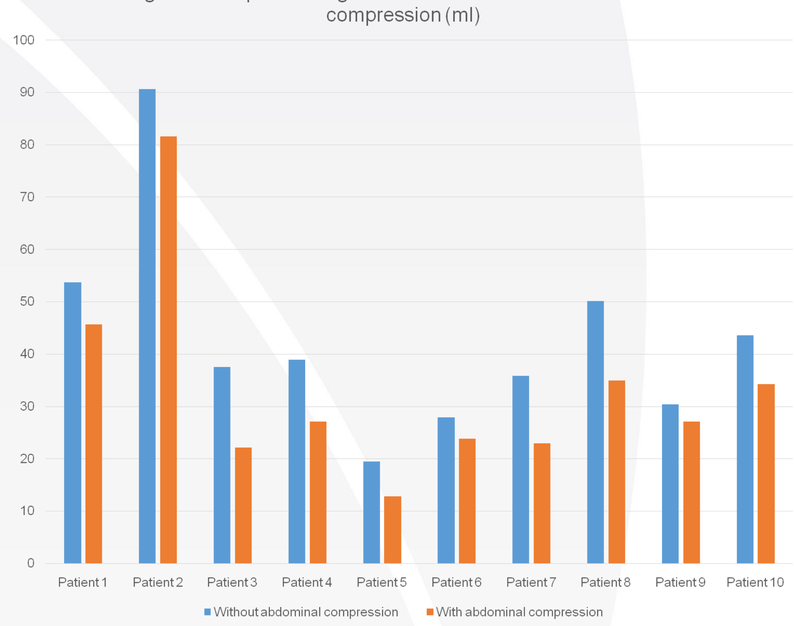
10 patients were included in the final data set. 2 patients were excluded as one was unable to tolerate abdominal compression and the other did not meet the requirements for abdominal compression. Results showed a reduction in treatment volume with abdominal compression in all patients, with an average volume reduction of 24.37% (range 10.00-41.01%).





Patient	Volume reduction %
1	14.9
2	10
3	41.01
4	30.33
5	34.35
6	14.7
7	36.03
8	30.14
9	10.86
10	21.38
Average	**24.37**

Figure 1: Graph showing volumes with and without abdominal compression (ml)



Conclusion

In this small series of 10 patients, abdominal compression significantly reduced the volume of the mobile GTV in the majority of patients. In turn this should have a positive impact on the irradiation of the adjacent normal tissue and the associated toxicity.

To our knowledge this is the first time data of the actual amount of volume reduction when utilising abdominal compression has been published. However further work needs to be done to confirm this and explore further possible benefits of treatment volume reduction with regards to dose to the surrounding organs at risk, treatment tolerability and potential dose escalation.

References

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