

Supplementary tables

Supplementary table S1

Mean normal tissue doses (Gy) using VBH technique for 'learning curve' patients and those treated subsequently ('non-learning curve') with 95% confidence intervals in brackets, *p*-values calculated using one-way ANOVA.

	<i>Learning curve</i>	<i>Non-learning curve</i>	<i>p</i>
Heart	1.04 (0.95-1.13)	1.04 (0.93-1.16)	0.97
LAD	6.0 (4.6-7.4)	4.7 (3.8-5.5)	0.10
LAD _{max}	27.4 (23.1-31.8)	20.9 (16.4-25.5)	0.04
Ipsilateral lung	4.1 (3.8-4.4)	3.8 (3.4-4.1)	0.13
Whole lung	2.1 (1.9-2.2)	1.9 (1.7-2.1)	0.18

Supplementary table S2

Population mean displacement (M), systematic (Σ) and random (σ) translational (mm) errors using VBH technique for 'learning curve' patients and those treated subsequently ('non-learning curve'), measured by electronic portal imaging (EPI) and in the (u,v)-plane.

		Right anterior oblique beam (RAO)		Left posterior oblique beam (LPO)	
		<i>Learning curve</i>	<i>Non-learning curve</i>	<i>Learning curve</i>	<i>Non-learning curve</i>
u-plane	M	0.7	0.2	-0.1	-0.2
	Σ	1.7	2.0	1.7	1.7
	σ	1.8	2.0	1.9	1.9
v-plane	M	0.7	-0.1	0.0	0.2
	Σ	1.6	0.8	1.7	1.0
	σ	1.9	1.4	2.1	1.5

Supplementary table S3

Median of mean radiotherapy CT-planning scan and treatment times using VBH technique for 'learning curve' patients and those treated subsequently ('non-learning curve') with mean ranges in brackets, *p*-values calculated using one-way ANOVA.

		<i>Learning curve</i>	<i>Non-learning curve</i>	<i>p</i>
CT-Planning	Setup	14 (5-32)	12 (2-30)	0.64
	Scan	4 (0-12)	3 (2-27)	0.11
	Dismount	5 (1-15)	4 (1-10)	0.27
	Total session time	21 (9-42)	21 (6-50)	0.98
Treatment	Setup	12 (6-19)	11 (6-19)	0.08
	Delivery	7 (3-17)	8 (4-20)	0.07
	Leaving treatment room	2 (1-6)	2 (1-6)	0.27
	Total session time	22 (13-34)	22 (14-32)	0.49

Supplementary table S4

Mean normal tissue doses (Gy) for free-breathing and VBH techniques (95% confidence intervals in brackets), grouped by participating centre.

	Centre 1 (n=7) *			Centre 2 (n=20)			Centre 3 (n=12)		
	Free-breathing	VBH	% change	Free-breathing	VBH	% change	Free-breathing	VBH	% change
Heart	1.7 (1.5-2.0)	1.4 (1.3-1.6)	- 18	1.5 (1.3-1.6)	0.9 (0.8-0.9)	- 40	1.8 (1.5-2.0)	1.0 (0.9-1.1)	- 56
LAD	9.4 (3.4-15.4)	5.4 (2.8-8.0)	- 43	10.2 (7.3-13.2)	3.2 (2.6-3.7)	- 69	9.8 (6.5-13.1)	4.0 (2.2-5.7)	- 59
LAD _{max}	36.5 (28.4-44.5)	31.0 (12.6-49.5)	- 15	25.5 (20.6-30.4)	6.9 (3.9-9.8)	- 73	34.9 (28.3-41.5)	21.6 (11.8-31.3)	- 38
Ips. lung	3.1 (1.8-4.4)	3.1 (1.9-4.2)	0	3.1 (2.6-3.7)	3.1 (2.8-3.4)	0	4.1 (3.2-4.9)	4.4 (3.7-5.1)	+ 1
Wh. lung	1.8 (1.5-2.1)	1.8 (1.5-2.0)	0	1.6 (1.3-1.8)	1.5 (1.3-1.7)	- 1	2.1 (1.6-2.6)	2.4 (1.9-2.9)	+ 14

	Centre 4 (n=5)			Centre 5 (n=12)			Centre 6 (n=9)		
	Free-breathing	VBH	% change	Free-breathing	VBH	% change	Free-breathing	VBH	% change
Heart	1.9 (1.6-2.2)	1.1 (0.5-1.7)	- 42	2.6 (2.2-3.1)	1.5 (1.2-1.7)	- 42	2.0 (1.6-2.5)	1.0 (0.8-1.3)	- 50
LAD	12.6 (8.6-16.5)	6.7 (0-13.8)	- 47	12.1 (9.2-15.1)	5.7 (3.8-7.5)	- 53	15.5 (11.8-19.1)	8.0 (2.8-13.2)	- 48
LAD _{max}	41.4 (40.4-41.9)	30.2 (10.0-50.4)	- 27	39.0 (37.5-40.4)	29.1 (21.1-37.1)	- 25	38.0 (33.3-38.4)	35.2 (28.9-41.5)	- 7
Ips. lung	4.1 (2.3-5.8)	4.0 (3.3-4.7)	- 2	4.7 (3.8-5.5)	4.6 (3.9-5.3)	- 2	3.6 (2.6-4.6)	3.9 (3.1-4.7)	+ 8
Wh. lung	1.8 (1.0-2.6)	1.9 (1.5-2.2)	+ 6	2.3 (1.9-2.7)	2.4 (2.0-2.7)	+ 4	1.7 (1.3-2.2)	1.9 (1.5-2.2)	+ 11

	Centre 7 (n=9)			Centre 8 (n=10)			Centre 9 (n=2)		
	Free-breathing	VBH	% change	Free-breathing	VBH	% change	Free-breathing	VBH	% change
Heart	1.2 (0.8-1.6)	0.8 (0.6-1.1)	- 33	1.7 (1.4-2.0)	1.0 (0.9-1.1)	- 41	2.1	1.2	- 43
LAD	12.1 (7.6-16.6)	7.3 (3.6-11.0)	- 40	14.1 (10.0-18.2)	6.6 (4.0-9.3)	- 53	18.9	4.8	- 75
LAD _{max}	38.4 (34.8-41.9)	29.8 (18.4-41.2)	- 22	40.4 (39.9-41.0)	35.1 (28.7-41.5)	- 13	41.0	28.1	- 31
Ips. lung	4.3 (3.7-0)	4.3 (3.7-4.8)	0	4.5 (3.6-5.4)	4.2 (3.6-4.9)	- 7	5.5	5.3	- 4
Wh. lung	2.1 (1.7-2.4)	2.1 (1.8-2.3)	0	2.1 (1.7-2.5)	2.0 (1.7-2.3)	- 5	2.7	2.7	0

	Centre 10 (n=5)		
	Free-breathing	VBH	% change
Heart	1.6 (1.3-1.9)	0.9 (0.7-1.1)	- 44
LAD	12.2 (6.6-17.8)	3.6 (2.3-5.0)	- 70
LAD _{max}	35.7 (28.4-43.1)	18.8 (6.6-31.1)	- 47
Ips. lung	3.9 (2.6-5.2)	4.5 (3.0-6.0)	+ 15
Wh. lung	1.9 (1.3-2.5)	2.2 (1.5-2.9)	+ 16

* The lower relative reduction in mean heart dose seen in Centre 1 may be due to a smaller data set from this centre and the fact that in 2/7 patients mean heart dose was the same for both free-breathing and VBH treatment plans. These two patients were identified as keen yoga participants, a relaxation technique in which abdominal breathing methods are taught. It appears that this breathing method reduces the effectiveness of breath-hold at sparing heart tissue, although experience at our centre suggests that such patients may be retrained to breathe in a more chest-dominant manner.

Supplementary table S5

Population mean displacement (M), systematic (Σ) and random (σ) translational errors (mm) for VBH technique measured by electronic portal imaging (EPI), grouped by participating centre.

		Centre 1 (n=7)		Centre 2 (n=20)		Centre 3 (n=11)		Centre 4 (n=5)		Centre 5 (n=12)	
		RAO	LPO	RAO	LPO	RAO	LPO	RAO	LPO	RAO	LPO
u-plane	M	2.3	-	0.6	-0.5	-1.1	-1.0	-	-0.3	-0.1	0.4
	Σ	0.8	-	2.2	2.3	1.4	1.1	-	2.6	2.0	1.6
	σ	2.1	-	2.3	2.1	1.9	1.7	-	3.1	2.0	1.7
v-plane	M	1.2	-	-	-	0.8	0.9	-	-1.8	0.4	0.5
	Σ	1.5	-	-	-	1.0	0.9	-	2.5	1.5	1.3
	σ	1.7	-	-	-	1.9	2.0	-	3.2	1.4	1.4

		Centre 6 (n=9)		Centre 7 (n=9)		Centre 8 (n=10)		Centre 9 (n=2)		Centre 10 (n=5)	
		RAO	RAO	RAO	LPO	RAO	LPO	RAO	LPO	RAO	LPO
u-plane	M	1.3	1.3	0.0	0.5	0.3	0.1	1.3	1.1	1.1	-0.3
	Σ	1.2	1.2	1.5	1.3	1.7	1.5	1.2	0.9	1.6	1.5
	σ	1.5	1.5	1.7	1.8	1.7	1.7	1.4	1.7	1.9	1.9
v-plane	M	0.1	0.1	-0.2	0.3	-0.3	-0.9	0.1	0.0	0.7	0.9
	Σ	0.3	0.3	0.7	1.1	2.2	1.5	0.4	0.1	0.4	0.9
	σ	1.0	1.0	1.4	1.5	2.4	2.0	1.2	1.0	1.8	1.6

Supplementary table S6

Patient comfort scores (PCS) and radiographer satisfaction scores (RSS), grouped by participating centre

		Centre 1			Centre 2			Centre 3			Centre 4		
		CT (n=4)	#1 (n=6)	#4 (n=6)	CT (n=19)	#1 (n=20)	#4 (n=17)	CT (n=10)	#1 (n=11)	#4 (n=11)	CT (n=5)	#1 (n=5)	#4 (n=5)
PCS	Median	9	8.5	9	8	7	7	8	9	9	9	9	9
	IQR	7.5-9	6-9	9-9	6-9	6-9	6-9	6-9	7-9	8-9	9-9	9-9	9-9
	Range	6-9	2-9	6-9	2-9	5-9	5-9	3-9	5-9	0-9	8-9	6-9	8-9
		CT (n=4)	#1 (n=7)	#4 (n=6)	CT (n=21)	#1 (n=19)	#4 (n=17)	CT (n=10)	#1 (n=11)	#4 (n=11)	CT (n=5)	#1 (n=5)	#4 (n=5)
RSS	Median	1.5	1	1.5	2	1	1	3.5	1	0	2	2	0
	IQR	0-3.5	0-2	0-3	0-3	0-2	1-2	0-6	0-2	0-2	0-3	2-2	0-1
	Range	0-4	0-7	0-9	0-9	0-4	0-5	0-9	0-4	0-4	0-5	0-3	0-5

		Centre 5			Centre 6			Centre 7			Centre 8		
		CT (n=12)	#1 (n=12)	#4 (n=12)	CT (n=9)	#1 (n=9)	#4 (n=9)	CT (n=10)	#1 (n=7)	#4 (n=6)	CT (n=10)	#1 (n=10)	#4 (n=10)
PCS	Median	7.5	8	9	7	7	8	8.5	9	8.5	8	7.5	8
	IQR	6-9	5.5-9	5.5-9	7-9	6-9	7-9	6-9	6-9	7-9	7-9	6-9	6-9
	Range	3-9	3-9	0-9	6-9	6-9	5-9	3-9	5-9	6-9	3-9	5-9	3-9
		CT (n=12)	#1 (n=11)	#4 (n=12)	CT (n=9)	#1 (n=9)	#4 (n=9)	CT (n=10)	#1 (n=10)	#4 (n=9)	CT (n=9)	#1 (n=10)	#4 (n=10)
RSS	Median	2.5	0	0	3	3	1	2.5	3	3	2	2	2
	IQR	1.5-3.5	0-1	0-4	1-4	0-5	0-2	1-4	1-7	1-5	1-2	1-2	0-2
	Range	0-9	0-6	0-7	0-9	0-5	0-7	1-5	0-9	0-9	0-3	0-7	0-4

		Centre 9			Centre 10		
		CT (n=2)	#1 (n=2)	#4 (n=2)	CT (n=5)	#1 (n=5)	#4 (n=5)
PCS	Median	8	8	9	9	9	9
	IQR	-	-	-	9-9	8-9	7-9
	Range	-	7-9	-	6-9	6-9	7-9
		CT (n=2)	#1 (n=2)	#4 (n=2)	CT (n=5)	#1 (n=5)	#4 (n=5)
RSS	Median	3	1.5	4	2	2	1
	IQR	-	0-3	1-7	1-6	2-4	0-1
	Range	-	0-3	1-7	0-8	1-9	0-9

Supplementary table S7

Median of mean radiotherapy CT-planning scan and treatment times for VBH technique with mean ranges in brackets (minutes), grouped by participating centre.

		Centre 1 (n=7)	Centre 2 (n=20)	Centre 3 (n=10)	Centre 4 (n=5)	Centre 5 (n=12)
CT-Planning	Setup	8 (7-15)	8 (5-13)	15 (9-30)	17 (13-23)	16 (2-30)
	Scan	6 (6-7)	3 (2-13)	3 (1-4)	3 (1-6)	3 (2-12)
	Dismount	5 (3-6)	3 (1-7)	7 (3-13)	1 (1-6)	4 (1-7)
	Total session time	21 (16-24)	15 (10-25)	28 (17-40)	23 (16-32)	22 (6-35)
Treatment	Setup	11 (6-13)	12 (7-19)	12 (11-15)	16 (15-19)	10 (6-12)
	Delivery	11 (5-17)	11 (8-15)	7 (4-11)	4 (3-6)	9 (7-20)
	Leaving treatment room	3 (2-6)	2 (1-4)	4 (3-6)	2 (1-2)	2 (2-3)
	Total session time	22 (20-31)	24 (19-34)	24 (21-28)	21 (20-25)	21 (19-29)

		Centre 6 (n=9)	Centre 7 (n=9)	Centre 8 (n=10)	Centre 9 (n=2)	Centre 10 (n=5)
CT-Planning	Setup	14 (6-21)	18 (5-25)	15 (5-21)	12	17 (13-32)
	Scan	2 (1-3)	13 (5-27)	5 (0-15)	5	5 (2-5)
	Dismount	2 (1-10)	10 (5-10)	5 (2-15)	8	4 (2-5)
	Total session time	18 (9-33)	40 (30-50)	25 (17-34)	25	25 (19-42)
Treatment	Setup	14 (12-19)	10 (8-14)	10 (8-14)	7	15 (11-15)
	Delivery	4 (3-6)	7 (6-10)	6 (4-9)	4	6 (5-7)
	Leaving treatment room	1 (1-1)	3 (1-4)	1 (1-1)	2	1 (1-1)
	Total session time	19 (17-25)	20 (17-28)	16 (14-23)	13	22 (17-23)