Proceedings Paper:
Ahmad, S., Whitaker, J., Bates, M.G. et al. (2024) 1048: Cardiac SABR for ventricular tachycardia – UK experience of safety and efficacy. In: Radiotherapy and Oncology. ESTRO 2024, 03-07 May 2024, Glasgow, United Kingdom. Elsevier BV, S1881-S1884. ISSN: 0167-8140. EISSN: 1879-0887.

https://doi.org/10.1016/s0167-8140(24)01527-5

Cardiac SABR for Ventricular Tachycardia – UK experience of safety and efficacy

Authors:

S Ahmad[1] J Whitaker[1] M Bates[3] J Lee[2] G Ntentas[1] A Bhuva[5] C Dean[5] S Riley[2] M Dhinoja[5] N Plowman[5] M Khan[1] C Sisodia[1] J Daniel[3] R Preston[1] E Shepherd[4] P Atherton[4] A Rinaldi[1] N Kelland[2] C Peedel[3] M Hatton[2]

Author affiliations:

1. Guy's & St Thomas NHS Foundation Trust

2. Sheffield Teaching Hospitals NHS Foundation Trust

3. South Tees Hospitals NHS Foundation Trust

4. Newcastle upon Tyne Hospitals NHS Foundation Trust

5. Barts and the London NHS Trust

Purpose/Objective

Ventricular tachycardia (VT) is a potentially life-threatening condition, for which standard treatments include implantable cardioverter defibrillator (ICD) implantation, anti-arrhythmic drugs (AAD) and catheter ablation (CA). In situations where AAD and CA are contra-indicated or have failed to control VT, cardiac stereotactic ablative radiotherapy (cSABR) is a new treatment strategy that is showing promising early results. Through the UK SABR Consortium Cardiac Subgroup five hospitals have started cSABR programmes and we report safety and outcomes from all patients treated in the UK.

Methods

Patients were identified by their treating cardiologist and reviewed in a monthly UK cSABR MDM attended by clinical oncologists, cardiologists, radiotherapy physicists, dosimetrists and therapeutic radiographers to fully assess suitability and feasibility of treatment. Treatment was offered on a compassionate use basis. A 4D CT technique, with or without abdominal compression was used for radiotherapy planning and treatment. The target, typically comprising a region of myocardial fibrosis representing the target substrate for clinical VT is then outlined, agreed by consensus. Data used to facilitate outlining of target volumes include 12-lead ECG, cardiac CT/MRI, invasive electrophysiological mapping data from prior CA and non-invasive body surface mapping techniques. Subsequent VT events, ICD delivered therapies and patient survival data were collected at each local Institution and summarised according to the total number of episodes and therapies in the 6 months preceding cSABR and the 6 months following cSABR.

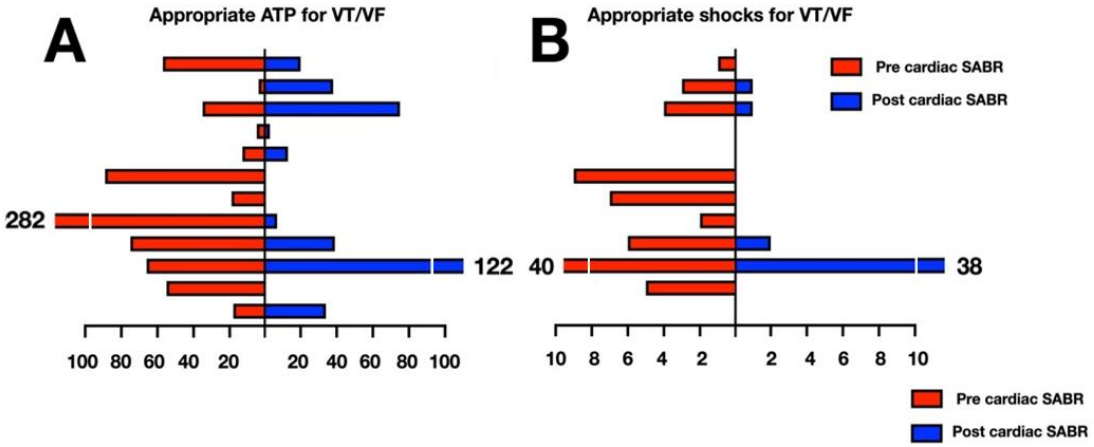
Results

Twenty-three patients were treated in total on either Varian TrueBeam STx Linac, Elekta HD linac, or Accuray Cyberknife VSI. Twenty-two received 25Gy in a single fraction and one patient received 20 Gy to avoid unacceptable risk to adjacent structures. cSABR treatment was tolerated well by all patients. Most patients had received prior CA treatment and had underlying ischaemic heart disease (IHD). There were no acute complications following delivery of cSABR and no acute device malfunctions. Device recorded arrhythmia data was available for 12 patients. The mean number of appropriate Anti-Tachycardia Pacing (ATP) for VT and appropriate high-energy ('shock') therapies in these patients reduced post-SABR.

Table: Characteristics and outcome of patients treated with cSABR

Patient	Age	SABR date	Previous Catheter Ablations	IHD	Survival in months (cause of death)
S01	75	June2019	2	N	9 (HF)
S02	68	Jan 2020	2	Y	27 (VT)
S03	81	Nov 2020	0	Y	3 (HF/COVID)
S04	64	Dec 2021	1	Y	10 (VT)
S05	71	Apr 2023	1	N	7 (VT)
S06	77	Nov 2023	0	Y	alive
S07	74	Dec 2023	0	Y	alive
N01	76	June 2019	3	N	1 (HF)
N02	68	Dec 2019	3	Y	30 (HF)
N03	72	Jan 2020	2	Y	alive
M01	77	July 2019	1	Y	33 (HF)
M02	79	Jan 2020	0	Y	1 (HF)
M03	66	Dec 2020	2	Y	29 (HF)
M04	59	June 2021	2	N	alive
M05	77	Sep 2021	0	Y	alive
M06	80	Sep 2023	0	Y	alive
G01	69	Dec 2021	0	N	21 (HF)
G02	69	Jan 2022	5	Y	alive
G03	64	Mar 2022	2	Y	10 (HF)
G04	75	Feb 2023	1	Y	alive
G05	70	April 2023	0	Y	5 (HF)
G06	59	June 2023	2	N	alive
G07	88	June 2023	2	Y	alive
B01	72	March 2023	5	N	3 (HF)
BO2	85	June 2023	0	N	alive

Abbreviations: HF, Heart Failure; VT, ventricular tachycardia; S, N, M, G, B indicate the five hospitals where patients were treated



Legend: **Panel A:** Patient level data for 12 patients showing appropriate ATP therapies for VT pre- and post-cSABR. **Panel B:** Patient level data for 12 patients showing appropriate high-energy ('shock') therapies for VT pre- and post-cSABR.

Conclusions

The UK has successfully developed a multi-centre, multi-platform service for cSABR use in the treatment of refractory VT within the NHS infrastructure.

Delivery of cSABR is acutely safe, well tolerated by patients and results in a reduction in the burden of high energy therapies for VT. Two patients died one month after cSABR; in both cases this was attributed to progressive heart failure. The remaining deaths were late and cause of death was most commonly heart failure. Our data shows a marked and consistent reduction in VT events following cSABR. Assessment of the severity of the underlying heart condition remains key in patient selection to avoid early post treatment mortality.

The UK cSABR Centres are setting up international collaborations and planning participation in clinical trials in order to gain further experience in treating this condition.