Original Article

SABR/SBRT for oligometastatic cancer within NHS commissioning through evaluation program—a single centre experience

Xin Chen-Zhao[1], Thiagarajan Sridhar[2], Luis Aznar-García[3]

[1]Radiation Oncology Department, University Hospital HM Puerta del Sur, Mostoles, Spain; [2]Department of Oncology, University Hospitals of Leicester NHS Trust, Infirmary Square, Leicester, UK; [3]Department of Oncology, Nottingham University Hospitals NHS Trust, City Hospital Campus, Nottingham, UK

Contributions: (I) Conception and design: L Aznar-García; (II) Administrative support: L Aznar-García, T Sridhar; (III) Provision of study materials or patients: L Aznar-García, T Sridhar; (IV) Collection and assembly of data: L Aznar-García, T Sridhar; (V) Data analysis and interpretation: X Chen-Zhao, L Aznar-García; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

Correspondence to: Dr. Xin Chen-Zhao. Radiation Oncology Department, University Hospital HM Puerta del Sur, Avenida Carlos V, Mostoles, Spain. Email: xchen@hmhospitales.com.

Background: To describe the oligometastasis treated with stereotactic ablative body radiotherapy (SABR) at our center.

Methods: We reviewed outcome and tolerance for patients treated for oligometastatic disease with SABR from January 2015 to November 2016 at our centre. Evaluation Questionnaires completed by physicians and patients, as quality of life, pain score and toxicity were gathered before and in every follow-up appointment, as well as disease status.

Results: Fourteen patients were included. The median follow-up was 6.5 months (range, 0.69–15.41 months). The treatment was very well tolerated and all of them kept a very good quality of life.

Conclusions: SABR seems to be a safe and cost-effective treatment. Further data from randomised studies as CORE are needed to determine if the high local control rates and improved disease progression survival could translate into an overall survival benefit.

Keywords: Stereotactic ablative body radiotherapy (SABR); oligometastasis; stereotactic body radiation therapy (SBRT)

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Introduction

In the last two centuries, many theories about the pathways of cancer progression have been proposed. Halsted (1,2), based on breast cancer surgical treatment outcome, suggested, that cancer spread is orderly, from the primary tumour to the regional lymph nodes and then to distant sites. In the 1980s an opposite theory became prominent which considered cancer as a systemic disease where the local treatment lost its importance and systemic treatment became the main stay in cancer management (3). A few years later, Hellman *et al.* proposed the idea of an oligometastatic state in 1995 (4). They suggested that a few metastases exist some time before the malignant cells acquire widespread metastatic potential. Some patients at this stage, with a limited number of metastases should be amenable to a curative therapeutic strategy. None of those theories has been tested in a randomised trial but all of them have a big impact in clinical practice.

Surgical removal of metastases has been shown to result in good outcomes in several settings (5-7). Surgery is nowadays a standard treatment for oligometastatic disease, including lung and liver metastases, improving local control and thereby overall survival (7-11).

Significant advances in the last decade in image and radiotherapy techniques, allowed the development of more accurate treatments like stereotactic ablative body radiotherapy (SABR). SABR delivers a large dose of external

beam radiation in a small number of fractions, looking to eradicate the in-field cancer cell. SABR treatment is better tolerated than traditional surgery and minimizes inpatient stay and in the best hands, causes significantly less morbidity and almost no mortality. According to the literature, SABR seems to be a safe and cost-effective treatment (12,13).

Our objective is to assess outcomes and toxicities associated with this treatment base on our current practice in line with the UK SABR Consortium Guidelines (14).

Methods

Our study is a prospective, observational study designed to evaluate safety and clinical outcomes in patients with oligometastatic disease suitable for SABR. No control group has been proposed. Patients were selected according to the UK SABR Consortium Guidelines. Inclusion criteria are: Karnofsky performance status (KPS) of ≥70 or WHO performance status 0–2; life expectancy of more than 3 months; no, or limited and potentially treatable disease with a maximum of three metastases at two sites; age ≥18 years. Patients enrolled in the Oncology Department at University Hospitals of Leicester, UK, from December 2015 to November 2016 were included in this report. All the patients underwent a first clinical evaluation before the treatment where their physician explained all the information related to the treatment and clinical trial. All the questions were answered. Written informed consent was obtained from all participants. SABR doses and schedules were performed according to the metastases location and surrounding normal tissue tolerance according to UK SABR Consortium Guidelines.

Data was collected prospectively using Microsoft Access version 14.0. Data analysis has been done using IBM SPSS Statistics version 22. The primary outcome has been defined as local progression-free survival and secondary outcomes were overall survival, global progression-free survival, quality of life in terms of pain control and treatment tolerance.

SABR Commissioning through Evaluation Questionnaire are completed by physicians and patients, firstly at baseline and then after the treatment at 4 and 6 weeks and 3, 6 and 12 months. This questionnaire included assessment of toxicities, disease control and quality of life measurement tools, including a pain score, EQ-5D and CTCAE as a measure of health outcome.

Results

From December 2015 and November 2016, 14 patients were included in this study. The median follow-up was 6.5 months (range, 0.69–15.41 months). All patients had an oligometastatic disease at the moment of treatment and a good performance status (WHO performance status 0–2). Summary of the demographic and treatment related data is given in *Table 1*. Primary cancer sites included breast (35.7%), colorectal (28.6%), lung (21.4%), sarcoma (7.1%) and endometrial (7.1%). The median progression-free survival from the first diagnosis of the primary tumour to the appearance of metastases was 4.25 years (range, 1–19 years). At the first clinical evaluation before SABR, 8 patients (57.1%) had limited lung metastases, 3 patients (21.4%) had limited bone metastases, 2 patients (14.3%) had liver and lung metastases and 1 patient (7.1%) had lymph node metastasis. PET-CT scan was used as staging image in 13 patients (92.9%) and in 1 case CT scan (7.1%) was used for that propose. Ten patients (71.4%) have received systemic treatment before SABR, whether as an adjuvant treatment or as a treatment for metastatic disease. Systemic treatment includes any kind of oral or intravenous treatment like hormonal treatment, immune or targeted therapy, or chemotherapy. The number of systemic treatment used were among one up four lines. Six patients did not discontinue their systemic treatment (hormonal treatments) during SABR. Eight patients had received prior radiotherapy for their primary tumour, however, there was no overlap with SABR field. All the treatments were delivered by a Varian 2300 linear accelerator and cone beam CT as IGRT. RapidArc was always used. All the treatments were delivered in 3 to 8 fractions according to the tumour size and location. The median dose per treatment was 52.8 Gy (range, 30–60 Gy) and the median biological effective dose (BED) was 101.5 Gy (range, 60–151.2 Gy). At 4–6 weeks assessment for acute toxicities, four patients had fatigue relieved by rest, one with bone pain at chest wall and one with a cough related to their treatment. None of them required pharmacological treatment. Five patients reported no toxicities. Data was unavailable for three patients. Median pain score improved from 2.36 (range, 0–8) at baseline to 0.83 (range, 0–5). Patients had a better perception of their generic quality of life (*Table 2*). No patient presented worsening. All were either likely or extremely likely to recommend SABR treatment. At 3 months we reviewed data for 9 patients; 6 had stable

Table 1 Demographic and treatment related data

Characteristic	Number, n (%)
Age, median [range] years	60 [30–86]
Gender	
Female	10 (71%)
Male	4 (29%)
Baseline PS	
0	7 (54%)
1	5 (38%)
2	1 (8%)
Baseline quality of life	
EQ-5D	
100–81	6 (43%)
80–61	6 (43%)
60–50	2 (14%)
Pain score	
0	8 (57%)
1–5	3 (21%)
6–8	3 (21%)
>8	0 (0%)
CTCAE	
No	12 (92%)
Bone pain	1 (8%)
Primary cancer histology	
Breast	5 (36)
Colorectal	4 (29%)
Lung	3 (21%)
Endometrial	1 (7%)
Sarcoma	1 (7%)
Systemic treatment before SABR	
Hormonal treatment	6 (43%)
No Hormonal treatment	4 (29%)
Time to metastases, years	4.25
Treatment area	
Lung	9 (64%)
Bone	3 (21%)
Lymph nodes	2 (14%)
Radiotherapy schedule	
30 Gy/3 fractions	2 (14%)
55 Gy/5 fractions	3 (21%)
40 Gy/3 fractions	1 (7%)
54 Gy/3 fractions	1 (7%)
60 Gy/8 fractions	7 (50%)

PS, performance status; SABR, stereotactic ablative body radiotherapy.

Table 2 EQ-5D

EQ-5D	Baseline	4–6 weeks after SABR	3 months after SABR
100–81	6 (43%)	8 (57%)	7 (50%)
80–61	6 (43%)	4 (29%)	1 (7%)
60–50	2 (14%)	0	0

SABR, stereotactic ablative body radiotherapy.

disease, 3 had distant progression. All the patients kept having a better perception of their generic quality of life (*Table 2*) in comparison to the baseline. The median of local progression-free survival, the primary endpoint of the study, has not achieved because all patients had local control of the metastases treated with SABR.

Conclusions

SABR seems to be a safe and cost-effective treatment (12,13) which could contribute to reducing sanitary costs. In our centre, SABR has been used in patients with a number of different primary cancer and metastatic sites. Treatment resulted in improvement in symptoms control and quality of life and helped achieve local control in all patients. We were compliant with SABR consortium guidelines. We will continue to collect data on longer term clinical outcomes and toxicities. From January 2016, in any UK centre, every patient eligible for SABR in oligometastatic cancer with primary breast, lung or prostate cancer should be recruited to the CORE trial. The aim of this program and CORE trial is to determine if the high local control rates and improved disease progression survival could translate into an overall survival benefit.

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Footnote

Conflicts of Interest: The authors have completed the ICMJE uniform disclosure form (available at http://dx.doi.org/10.21037/amj.2018.07.09). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Written informed consent was obtained from all participants.

References

1. Halsted WS. I. The Results of Operations for the Cure of Cancer of the Breast Performed at the Johns Hopkins Hospital from June, 1889, to January, 1894. Ann Surg 1894;20:497-555.
2. Halsted WS. I. The Results of Radical Operations for the Cure of Carcinoma of the Breast. Ann Surg 1907;46:1-19.
3. Fisher B. Laboratory and clinical research in breast cancer--a personal adventure: the David A. Karnofsky memorial lecture. Cancer Res 1980;40:3863-74.
4. Hellman S, Weichselbaum RR. Oligometastases. J Clin Oncol 1995;13:8-10.
5. Fong Y, Fortner J, Sun RL, et al. Clinical score for predicting recurrence after hepatic resection for metastatic colorectal cancer: analysis of 1001 consecutive cases. Ann Surg 1999;230:309-18; discussion 318-21.
6. Miller G, Biernacki P, Kemeny NE, et al. Outcomes after resection of synchronous or metachronous hepatic and pulmonary colorectal metastases. J Am Coll Surg 2007;205:231-8.
7. Casiraghi M, De Pas T, Maisonneuve P, et al. A 10-year single-center experience on 708 lung metastasectomies: the evidence of the "international registry of lung metastases". J Thorac Oncol 2011;6:1373-8.
8. Kaifi JT, Gusani NJ, Deshaies I, et al. Indications and approach to surgical resection of lung metastases. J Surg Oncol 2010;102:187-95.
9. Pawlik TM, Choti MA. Surgical therapy for colorectal metastases to the liver. J Gastrointest Surg 2007;11:1057-77.
10. Abdalla EK, Vauthey JN, Ellis LM, et al. Recurrence and outcomes following hepatic resection, radiofrequency ablation, and combined resection/ablation for colorectal liver metastases. Ann Surg 2004;239:818-25; discussion 825-7.
11. Benson AB, Robert CH, Venook AP et al. NCCN Guidelines Version 2.2017 Panel Members Colon Cancer MD/Vice-Chair UCSF Helen Diller Family Comprehensive Cancer Center, 2017.
12. Wild AT, Yamada Y. Treatment Options in Oligometastatic Disease: Stereotactic Body Radiation Therapy - Focus on Colorectal Cancer. Visc Med 2017;33:54-61.
13. Louie AV, van Werkhoven E, Chen H, et al. Patient reported outcomes following stereotactic ablative radiotherapy or surgery for stage IA non-small-cell lung cancer: Results from the ROSEL multicenter randomized trial. Radiother Oncol 2015;117:44-8.
14. UK SABR Consortium: Stereotactic Ablative Body Radiation Therapy (SABR): A Resource. Version 5.1, January 2016:1-112.

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