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Case report

Single dose radiotherapy in soft tissue tumoral masses: just enough palliation

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ABSTRACT

Introduction: Single fraction radiotherapy (SFR) is effective in palliation of symptoms related to advanced cancer. Despite this, several studies have shown that the trend towards multiple fraction treatment (MFR) is largely maintained. Even in patients with limited life expectancy, SFR is significantly underutilized in current practice.
Cases description: Four patients diagnosed with advanced cancer who developed soft tissue lesions were treated with SFR due to frailty and/or a poor performance status.
Conclusion: Despite the effectiveness of SFR is well-established in BM, its use in symptoms caused by soft tissue lesions have been underreported. SFR could be a good option for providing palliation in some patients, particularly in those who are frail or have a poor performance status.

1. Introduction

Single fraction radiotherapy (SFR) is effective in the palliation of symptoms related to advanced cancer. Published data supports its effectiveness in relieving symptoms such as bleeding, pain, obstruction and mass compression effect[1–6] In spite of this, several studies have shown that the trend towards using multiple fraction treatment (MFR) has been largely maintained. Even in patients with limited life expectancy, SFR is significantly underutilized in current practice.[7–10]

1.1. Case study 1

A 74-year-old man was diagnosed with metastatic prostatic adenocarcinoma in 2016. He was treated with denusumab and triptorelin. During the follow-up he presented a right-shoulder painful mass. On examination, a 6 cm diameter mass with evident shoulder deformation was observed in the acromioclavicular joint. Mobility of his right shoulder and arm was severely limited. Visual analogue scale for pain (VASPain) scored 8/10. ECOG PS 2. The patient was treated with 8 Gy SFR, intensity-modulated radiotherapy (IMRT) (Fig. 1a). One week later, he presented neither acute skin toxicity nor other symptoms related to the treatment. Six weeks after completing radiation therapy, the right-shoulder mass was not evident on examination, its mobility was nearly normal and VASPain scored 0/10. Three months after treatment, there was no evidence of the right shoulder mass and the patient remained asymptomatic. (Fig. 1b)

1.2. Case study 2

A 64-year-old woman was diagnosed with stage IV non-small-cell lung cancer (NSCLC) in 2016. After being treated with three palliative chemotherapy lines, she presented with progressive dyspnea and a left hiliar mass blocking up the main bronchus was visualized in chest CT. On examination, she presented decreased breath sounds in the superior 2/3 of the left hemithorax. On the modified Medical Research Council dyspnea scale she scored a grade 3 dyspnea. She was treated with 10 Gy SFR IMRT (Fig. 2 a). One week later, she had suffered no acute toxicity and six weeks after completing radiotherapy she presented at our department without dyspnea. (Fig. 2b).

This patient died three months after treatment due to symptomatic multiple brain metastasis. Nevertheless, she remained free of dyspnea until her death.

1.3. Case study 3

A 77-year old man was diagnosed with a low grade locally advanced squamous anal carcinoma (cT4N3M0) in 2017. Due to socio-economic issues and frailty he was institutionalized at the moment of diagnosis and his condition precluded curative treat-

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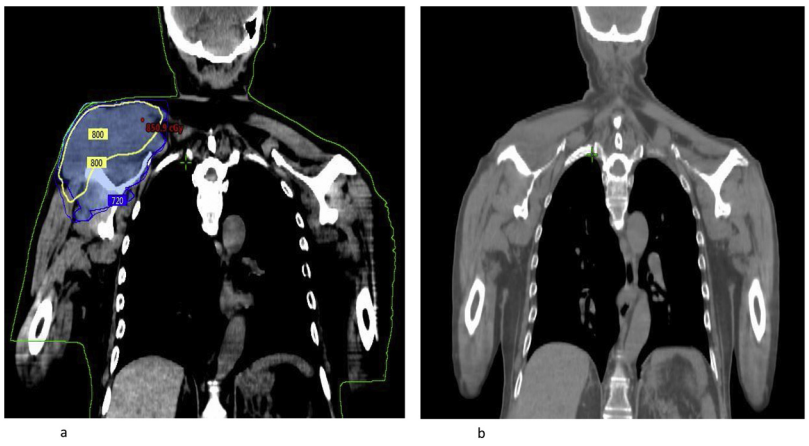

Fig. 1. Case study 1. (a) Pretreatment right shoulder mass. Isodose lines: yellow (100%) and blue (90%). (b) Clinical response 6 weeks postradiation treatment.

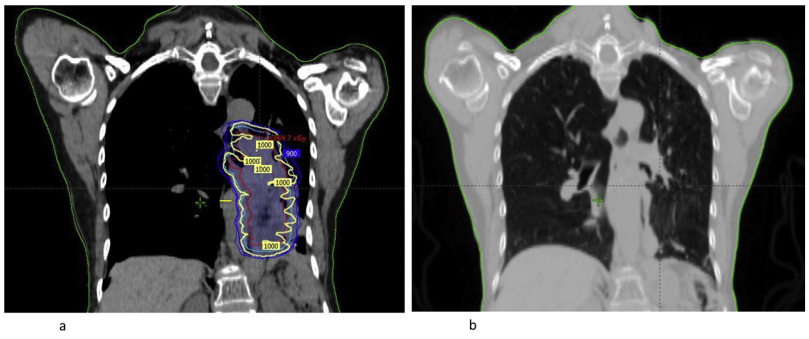

Fig. 2. Case study 2. (a) Pretreatment left hiliar mass. Isodose lines: yellow (100%) and blue (90%). (b) Clinical response 6 weeks postradiation treatment.

ment. He developed a rapid locoregional progression of the disease with a large, ulcerated and malodorous mass in the groins and anus. On examination, the patient was in ECOG PS 3, mainly due to pelvic pain, anal discharge and unable to stay seated or standing up. A 10 Gy SFR IMRT was prescribed for the anal tumour and groins metastases (Fig. 3a). One week later, he did not present acute skin toxicity or any other related symptoms. After six weeks, the pain had been completely relieved, the groins masses presented a complete clinical response and the anal mass had shrunk (Fig. 3 b). He had neither anal discharge nor malodour. He improved his functionality and achieved an ECOG PS 1. Six months after treatment he remained completely asymptomatic.

1.4. Case study 4

A 50-year-old man with a medical background of HIV had been on treatment with anti-retroviral therapy for 8 years. He was diagnosed as a case of high grade locally advanced squamous anal carcinoma (cT4N2M0) in 2018. A colostomy was performed and he was referred to the radiation oncology department. On examination he had a body mass index (BMI) 18 and ECOG PS 3 due to anal pain, discharge and malodorous anal mass. He was treated with 10 Gy SFR IMRT (Fig. 4a). As treatment related toxicity, he presented grade 3 asthenia and pain flare in the first 72 h post treatment. Eight weeks later he had a BMI 20, his pain had been completely relieved and the anal mass had shrunk, ECOG PS 1.

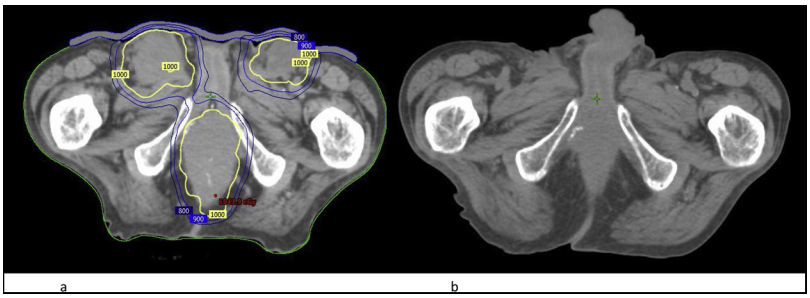

Fig. 3. Case study 3. (a) Pretreatment anal and groins masses. Isodose lines: yellow (100%) and blue (90%) (b) Clinical response 6 weeks postradiation treatment.

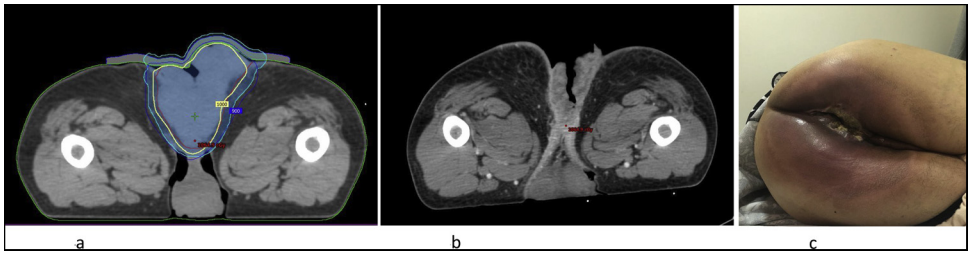

Fig. 4. Case study 4.
(a) Pretreatment anal mass. Isodose lines: yellow (100%) and blue (90%).
(b) Clinical response 8 weeks post 10 Gy SFR.
(c) Clinical response 6 weeks post 30 Gy/10 fractions.

Ten weeks after SFR, the patient received a chemoradiation treatment with a curative intent. Weekly 5-Fluoruracil continuous infusion was administered for four weeks and MFR 30 Gy/10 fractions were delivered to the anal tumor and pelvic and groins nodes. Eight weeks later he presented a very significant treatment response, with neither pain nor malodour (Fig. 4b).

2. Discussion

SFR is a useful treatment for palliation of bone metastases (BM), which are the most studied setting. Published data concludes the equivalency of SFR and MFR for pain relief from "uncomplicated" BM. Compared with MFR, 8 Gy SFR provides equal palliation with improved patient convenience and cost-effectiveness.[4–6,11] However, "uncomplicated" BM have not been explicitly stated in the vast majority of studies. In practice, radiation oncologists consider complicated BM to be those causing pathologic fractures or compression of the spinal cord/cauda equina, those within weight bearing bones at high risk of fracture or those with associated soft tissue component. Because a clearer definition of "uncomplicated" BM is required to determine who the patients are where the results of the prospective randomized trials apply, Cheon et al. conducted a systematic review.[12] In their review, none of the analyzed studies excluded BM with associated soft tissue mass; therefore, they defined "complicated BM" as the presence of impending or existing pathologic fracture or existing spinal cord/cauda equina compression.

Therefore, the absence of a soft tissue mass cannot be clearly considered a characteristic of uncomplicated BM and available evidence supports the use of SFR in palliation of BM with associated soft tissue mass. Additionally, SFR yields similar improvement to MFR in patient-reported outcomes for pain, function and symptom frustration.[13]

SFR has also been studied in the treatment of symptoms, such as dyspnea, airway and vascular obstruction, pain resulting from chest wall invasion, cough and hemoptysis caused by advanced NSCLC. Several fractionation regimes have been used with doses ranging from 10 Gy in 1 fraction to 60 Gy/30 fractions over six weeks.[2,3] However, the optimal dose has not been well defined and studies comparing different regimes have reported contradictory results. Even more controversial is whether palliative radiotherapy has an impact on survival. A meta-analysis by Stevens et al. found that symptoms needing palliation can be treated safely and effectively with SFR or MFR because both schedules had similar responses. That study did not show significant survival advantage when more fractionated regimes and higher biological doses were used. Additionally, a higher dose was clearly associated with more visits to hospital and toxicity.[2]

In the meta-analysis by Fairchild, doses in each treatment regime were converted to Biologically Equivalent Dose (BED) values and analysis was made comparing the dose-outcome relation among all the trials. This study confirmed the equivalence of SFR and MFR in the palliation of specific symptoms and a statistically lower total symptom score was observed after high dose radiotherapy. In addition, they reported a 4.8% absolute increase in overall survival at 1 year, favouring dose schedules of 35 Gy_{10} BED at the expense of significantly increased esophagitis. They also found a statistically insignificant difference in chest re-irradiation after low dose radiotherapy.[3] While SFR has shown satisfactory outcomes for most patients, MFR and higher doses should be considered for patients with a better performance status and realistic potential for longer term survival.[2,3,14]

Although SFR has not been specifically assessed in anal cancer, several studies conducted in low digestive tract tumours provide support for palliation of pelvic and anorectal symptoms. However, there are no established optimal radiotherapy schedules and clinical practices vary.

A systematic review included 27 studies.[1] Treatments were given both as SFR and MFR over several weeks. Total doses ranged from 5 to 70 Gy. In this study, BED could not be assessed for comparative purposes given limited data regarding radiotherapy delivery. Reported overall symptom relief for pain, bleeding/discharge and mass/tenesmus was 78%, 81% and 71%, respectively. Symptomatic responses were reported at low total doses of radiotherapy (<20 Gy) during MFR and after 5–10 Gy SFR.

Studies included in this review claimed to demonstrate a direct relationship between the duration of symptomatic response and an increased dose. Nevertheless, these results should be interpreted with caution due to the risk of selection bias which precluded valid conclusions regarding target doses, optimal fractionation schemes and dose-response relationships. Hence, SFR may be particularly meaningful in patients with a poor performance status and/or limited life expectancies because long treatments with higher doses are time-consuming and, eventually, more toxic.

3. Conclusion

Despite the effectiveness of SFR is well-established in BM, its use in symptoms caused by soft tissue lesions have been underreported. SFR could be a good option for providing palliation in some patients, particularly in those who are frail or have a poor performance status.

Studies assessing this issue in a larger number of patients are needed.

Financial disclosure

None declared.

Conflict of interest

The author has not conflict of interest to declare.

Ethical approval

All procedures performed in this study were in accordance with the ethical standards of scientific ethical committe of Servicio de Salud Metropolitano Oriente.

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