Original Article

Capsula Eburnea

THE ROLE OF FENTANYL CITRATE DURING ADJUVANT RADIATION THERAPY FOR BONE METASTASES

Antonella Mazzonello[1], Leonarda La Paglia[1], Loredana Purpura[1], Manuela Federico[1], Alfredo Colombo[2], Tommaso Sciacchitano[2], Fabiana De Nicola[2], Ivan Fazio[1]

SUMMARY

Fentanyl citrate administration a few minutes before adjuvant radiotherapy treatment for bone metastases helps the patient to maintain the correct position during treatment, thus ensuring the achievement of optimum therapeutic results. This article describes our experience with the use of this compound.

Introduction

A correct radiation therapy requires reproducible patient positioning, and in particular it is essential for the patient to maintain the correct position on the treatment couch throughout the whole procedure. Patients with bone metastases tend to adopt relieving positions that are often unsuitable for radiation therapy; moreover, such patients are also prone to changing position during a treatment that lasts only a few minutes, thus compromising the efficacy of the treatment. Administration of nasal spray or orodispersible tablets containing fentanyl citrate [1] a few minutes before radiotherapy treatment could help to guarantee sufficient analgesia to successfully complete the treatment.

Materials and methods

Between May and November 2011, 90 patients with various kinds of bone metastases in the spine or pelvis area, receiving basic analgesic drug therapy [2], in comparable doses according to the equianalgesic tables (Fentanyl transdermal system 75 mcg/hr) [3], but no medication to control breakthrough pain, and due to undergo adjuvant radiation therapy, were divided into three groups of 30 patients. Patients assigned to the first group (FENTNAS) received one dose of 100 mcg fentanyl citrate nasal spray, and when no response was detected after 15 minutes, a second dose was administered in the other nostril; patients in the second group (FENTOS) received a 100 mcg orodispersible fentanyl citrate tablet, with a second 100 mcg dose administered after 15 minutes in case of no response [4]; finally, patients in the third group (FENT-) did not receive any medication in addition to the basic analgesic therapy. All patients were due to receive a radiation dose of 20 Gy in 5 fractions of 4 Gy. The accuracy of patient positioning during the treatment was assessed by tracking specific bony landmarks near the treatment area by portal imaging at the beginning and the end of each radiotherapy session.

Results

Of the 30 patients in the FENTNAS group, 30 (100%) completed treatment, with 11 (36%) requiring a second 100 mcg dose of fentanyl citrate nasal spray to obtain satisfactory

Address of the authors
[1] *Radiotherapy Unit, Casa di Cura Macchiarella, Palermo, Italy*
[2] *Medical Oncology Unit, Casa di Cura Macchiarella, Palermo, Italy*

***Send correspondence to**: Dr. Ivan Fazio, ivanfazio@alice.it*

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Figure 1: Distance of the spine from the edge of the radiation field at the start of treatment in the FENTNAS group.

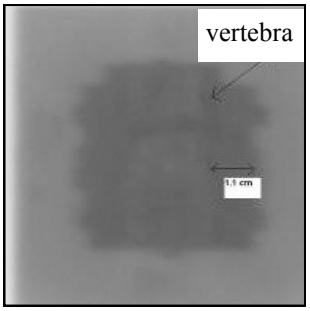
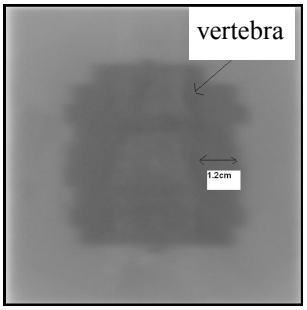


Figure 2: Distance of the spine from the edge of the radiation field at the end of treatment in the FENTNAS group



pain control. The average displacement of bony landmarks, obtained by the pre- and post-treatment portal imaging for each session, was 0.9 cm (0.3 - 1.1) in the latero-lateral axis (Figure 1 and 2), and 0.4 cm (0 - 0.9) in the longitudinal axis; all 30 patients in the FENTOS group also completed the planned 5 fractions of radiotherapy, with nine patients (30%) requiring the administration of a second 100 mcg orodispersible fentanyl citrate tablet. The average displacement of the bony landmarks in this group was 1.1 cm (0.4 - 1.6) in the laterolateral axis (Figure 3 and 4), and 0.3 cm (0 - 1.1) in the longitudinal axis; among the 30 patients who received no medication to control breakthrough pain (FENT-), five (17%) had to discontinue treatment due to failure to maintain the correct supine position (it was not possible to carry out the pre- and post-therapy portal imaging), and were excluded from the study having needed medication to control breakthrough pain. For the remaining 25 patients in the FENT- group who successfully completed the radiation treatment, the average displacement of the bony landmarks was 2.2 cm (0.4 - 3) in the latero-lateral (Figure 5 and 6) and 0,8 cm (0.2 - 1.1) in the longitudinal axis.

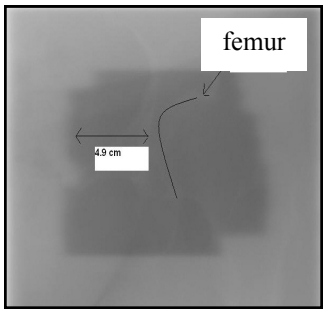


Figure 3: Distance of the femoral head from the edge of the radiation field at the start of treatment in the FENTOS group

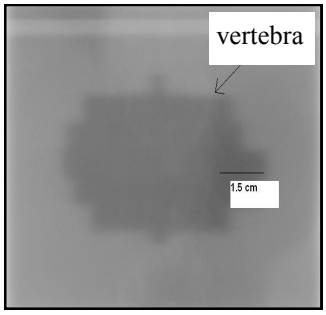


Figure 5: Distance of the spine from the edge of the radiation field at the start of treatment in the FENT- group

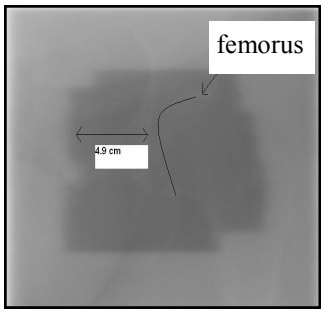


Figure 4: Distance of the femoral head from the edge of the radiation field at the end of treatment in the FENTOS group

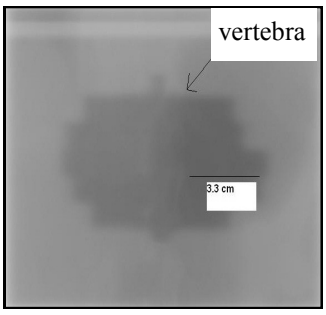


Figure 6: Distance of the spinal column from the edge of the radiation field at the end of treatment in the FENT- group

Discussion

In most cases, a patient with bone metastases is a long-surviving patient, so the integration of all adjuvant therapies available [5] represents an important resource for ensuring a satisfactory quality of life [6]. Radiation therapy is an effective adjuvant treatment method, but it requires complete cooperation from the patient in maintaining the correct positioning during irradiation to avoid underdosing of the therapy target or overdosing the surrounding organs. The drugs used to control breakthrough pain in the present study were found to be effective, manageable and well tolerated [7], enabling 100% of the patients to complete radiation treatment; out of the 60 patients included in the FENTNAS and FENTOS groups, from a total of 300 fractions administered, in only two cases the target resulted just outside the radiation field at the end of the treatment session. In patients belonging to the FENT- group, excluding the five patients who were not able to complete therapy, out of a total of 125 (25 X 5) administered fractions, the target resulted outside the radiation field at the end of the session in 34 cases (27%). Although the patients enrolled in this study were administered comparable basic analgesic therapy, our results may be compromised by the inclusion of patients under different types of pain management prior to the radiation treatment, and the limited pool included in the study does not guarantee an equal distribution, among the three groups of patients, of those subjects with poorly controlled pain management at the outset of treatment. Although it was not one of the goals of the study, it was found that in 19 patients (64%) in the FENTNAS group, it was not necessary to wait the full 15 minutes to obtain a satisfactory analgesic effect.

Conclusions

The use of fentanyl citrate at a dose of 100 -200 mcg in patients undergoing adjuvant radiation therapy, administered 15 minutes before the start of the session, ensures an analgesic effect that allows the patient to maintain the correct position on the treatment couch during irradiation, thus achieving optimal results from the radiation treatment itself.

References

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