Acknowledgements

This study was financially supported by the Finnish Breast Cancer Group, Kuopio University, and Kuopio University Hospital. I declare that I have no conflict of interest.

References

[1] Hirvikoski PP, Kumpulainen EJ, Johansson RT. CNF combination as adjuvant treatment in breast cancer patients is well tolerated. Anti-Cancer Drugs 1997;8:376–8.
[2] Hirvikoski PP, Kumpulainen EJ, Johansson RT. Hepatic toxicity caused by adjuvant CMF/CNF in breast cancer patients and reversal by tamoxifen. Breast Cancer Res Treat 1997;44:269–74.
[3] Kumpulainen EJ, Hirvikoski PP, Pukkala E, Johansson RT. Cancer risk after adjuvant chemo- or chemohormonal therapy of breast cancer. Anti-Cancer Drugs 1998;9:131–4.
[4] Bonadonna G, Valagussa P. Dose-response effect of adjuvant chemotherapy in breast cancer. N Engl J Med 1981;304: 10–5.
[5] Saarto T, Blomqvist C, Rissanen P, Auvinen A, Elomaa I. Haematological toxicity: A marker of adjuvant chemotherapy efficacy in stage II and III breast cancer. Br J Cancer 1997; 75:301–5.
[6] Poikonen P, Saarto T, Lundin J, Joensuu H, Blomqvist C. Leucocyte nadir as a marker for chemotherapy efficacy in node-positive breast cancer treated with adjuvant CMF. Br J Cancer 1999;80:1763–6.
[7] Mayers C, Panzarella T, Tannock IF. Analysis of the prognostic effects of inclusion in a clinical trial and of myelosuppression on survival after adjuvant chemotherapy for breast carcinoma. Cancer 2001;91:2246–57.
[8] Bergh J, Wiklund T, Erikstein B, Lidbrink E, Lindmar H, Malmström P, et al. Tailored fluorouracil, epirubicin, and cyclophosphamide compared with marrow-supported high-dose chemotherapy as adjuvant treatment for high-risk breast cancer: A randomised trial. Scandinavian Breast Group 9401 study. Lancet 2000;356:1384–91.

First report on prostate displacements immediately before and after treatment relative to the position during VMAT delivery

KEIICHI NAKAGAWA[1]*, KENSHIRO SHIRAISHI[1]*, SATOSHI KIDA[1], AKIHIRO HAGA[1], KENTARO YAMAMOTO[1], SHIGEKI SAEGUSA[1], ATSURO TERAHARA[1], SAORI ITOH[1], KUNI OHTOMO[1] & KIYOSHI YODA[2]

[1]*Department of Radiology, University of Tokyo Hospital, 7-3-1 Hongo Bunkyo-ku Tokyo 113-8655 Japan and* [2]*Elekta KK, Kobe, Japan*

To the Editor

Previously we reported the first clinical kilovoltage (kV) cone-beam CT (CBCT) imaging during volumetric modulated arc therapy (VMAT) using a linac with an on-board CBCT unit (Elekta Synergy, Crawley, UK) [1], The effect on CBCT image quality during rotational treatments was first presented in ESTRO conference in 2004 [2] and the first clinical in-treatment CBCT images were acquired for rotational lung treatment [3]. The purpose of in-treatment CBCT imaging is direct verification of time-averaged tumor position during treatment. Reported standard deviation of intrafraction prostate movements for 20 patients during 10 fractions was 1.4 mm in cranio-caudal direction [4], which may support the validity of the time-averaged CBCT images. In this letter, prostate displacements immediately before and after treatment relative to the position during VMAT delivery have been reported for the first time. As was described in our previous articles [1,3], the current Synergy system does not allow simultaneous delivery of kV CBCT beams and MV rotational beams. A method for disabling this interlock was therefore investigated and it was deactivated with the first author's responsibility.

A treatment planning system, ERGO++ 1.7.1 (Elekta 3DLine, Milano) was employed to create a VMAT plan for a prostate cancer patient. A single arc consisting of 73 fixed beams was defined with 5 degree spacing. More detailed VMAT delivery and CBCT procedures were described in our previous article [1].

* Equal contributors.

Correspondence: Keiichi Nakagawa, Department of Radiology, University of Tokyo Hospital, 7-3-1 Hongo Bunkyo-ku, Tokyo 113-8655, Japan.

(Received 24 May 2009; accepted 6 June 2009)

ISSN 0284-186X print/ISSN 1651-226X online
DOI: 10.3109/02841860903101190

Tumor registration was performed between a planning CT image and a CBCT image immediately after patient set-up. CBCT imaging was conducted four times a day once a week for six weeks; the timings were before couch adjustment, after couch adjustment, during VMAT delivery, and immediately after the treatment. The couch adjustment was done by automatic bone matching between planning CT and the CBCT images followed by manual operation based on calcification inside the prostate organ. Subsequently, off-line image registration was performed between two CBCT images of the same day to evaluate prostate displacements using the above mentioned matching procedures.

Figure 1 shows CBCT prostate images of a particular day for a patient with calcification inside the prostate organ. Images in the first row were acquired immediately before VMAT treatment after couch adjustment, the second row refers to images during VMAT delivery, and the third row images were taken immediately after the treatment. Crossing lines indicate the isocenter.

The mean and standard deviation of displacements at the time of pre-treatment against the in-treatment position of all the six days for the patient were 0.1 ± 0.2 mm, -0.3 ± 0.4 mm, and -0.4 ± 0.6mm in lateral, vertical, and longitudinal directions. The mean and standard deviation of displacements at the time of post-treatment against the in-treatment position of all the six days for the same patient were 0.2 ± 0.3 mm, -0.8 ± 0.7 mm, and -0.3 ± 0.6 mm in lateral, vertical, and longitudinal directions. No statistical conclusion can be drawn using the present limited data sets.

In conclusion, displacements of the prostate gland immediately before and after treatment relative to the position during VMAT delivery were reported for the first time using kV CBCT, which may facilitate decision making for subsequent treatment margin or dose adjustment.

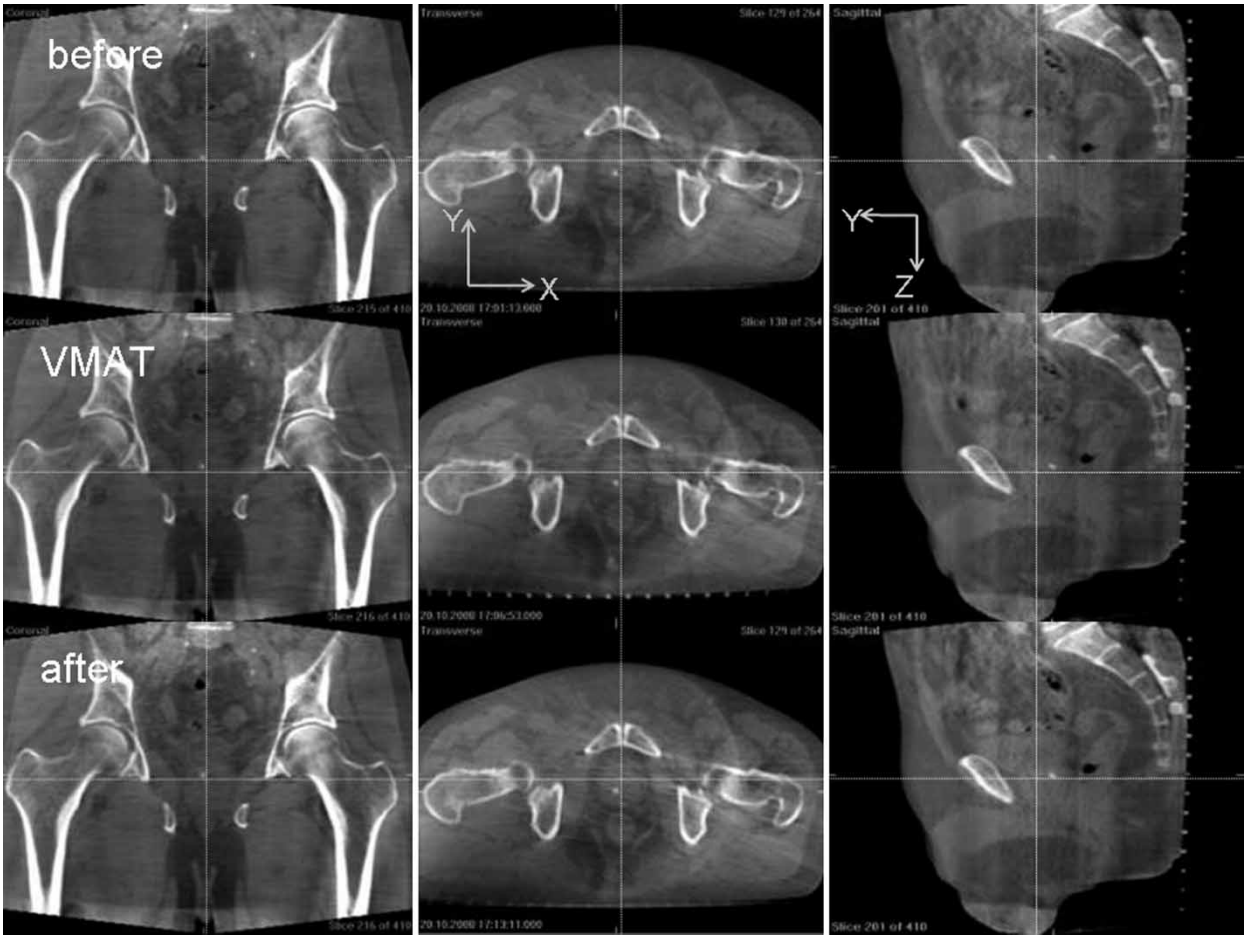

Figure 1. Cone-beam CT images of a prostate cancer patient with calcification inside the prostate organ. Images in the first row were acquired immediately before VMAT treatment after couch adjustment, the second row refers to images during VMAT delivery, and the third row images were taken immediately after the treatment. Crossing lines indicate the isocenter.

Declaration of interest: Dr. Nakagawa receives research funding from Elekta K.K.

References

[1] Nakagawa K, Haga A, Shiraishi K, Yamashita H, Igaki H, Terahara A, et al. First clinical cone-beam CT imaging during volumetric modulated arc therapy. Radiother Oncol 2009;90: 422–3.

[2] Williams P, Sykes J, Moore CJ. The effects of radiation scatter from simultaneous MV irradiation on kV fluoroscopic and x-ray volume imaging with the Elekta Synergy system, ESTRO, Amsterdam 2004. Radiother Oncol 2004;73 (Suppl 1).

[3] Nakagawa K, Yamashita H, Shiraishi K, Igaki H, Terahara A, Nakamura N, et al. Verification of in-treatment tumor position using kilovoltage cone-beam computed tomography: A preliminary study. Int J Radiat Oncol Biol Phys 2007;69: 970–3.

[4] Haskå TM, Honoré H, Muren LP, Høyer M, Pousen PR. Intrafraction changes of prostate position and geometrical errors studied by continuous electronic portal imaging. Acta Oncol 2008;47:1351–7.

Badminton, rectal cancer and 25 kg weight gain during chemotherapy

CHRISTIAN RIKLIN[1], DANIEL GUNTERN[2], SERGE LEYVRAZ[1] & MICHAEL MONTEMURRO[1]

[1]*Multidisciplinary Oncology Centre, University of Lausanne Hospitals (CHUV), Rue du Bugnon 46, CH-1011 Lausanne, Switzerland and* [2]*Radiology, University of Lausanne Hospitals (CHUV), Rue du Bugnon 46, CH-1011 Lausanne, Switzerland*

To the Editor

Chemotherapy is an integral part of today's multimodality cancer treatment. Side effects related to chemotherapy such as vomiting or weight loss are well known and treated routinely. Weight gain on the other hand is an often neglected problem although it has an important impact on both patient's quality of life and cancer prognosis. Analysis of the impressive weight gain in this case report clearly highlights the problem.

A 40-year-old premenopausal female patient in excellent general health was diagnosed in our institute in April 2006 with a locally advanced rectal cancer, cT4 cN1 cM0. The patient is a non-smoking, top female athlete and professional badminton teacher, who exercised three hours per day in addition to teaching badminton during the rest of the day. There was no incidence of weight changes before cancer diagnosis in our 162 cm tall patient. After establishing a protective colostomy neoadjuvant radiochemotherapy was started, during which the patient gained 2.7 kg body weight.

In June 2006, three weeks after radiochemotherapy, a pT4 pN1 tumor was successfully resected and adjuvant chemotherapy was started. In December 2006 the patient had gained another 12.5 kg body weight, when a seizure struck her. A CT scan showed left cerebral vein thrombosis of the inferior anastomotic vein of Labbé, the transverse sinus, the sigmoid sinus and the internal jugular vein. Extensive investigations did not identify any predisposing reason or underlying condition. Thus we concluded on a multifactorial origin; we hypothesized that chemotherapy-induced hypercoagulability, antiemetic steroid medication and the patient's physical inactivity likely induced a prothrombotic state. We suspected that the significant weight gain might in itself have also contributed to the thrombosis [1]. The patient was put on Valproate for seizure control and anticoagulated with low molecular heparin followed by acenocoumarol. Adjuvant chemotherapy was not reintroduced.

From start of treatment in April 2006 until October 2007 the patient's body weight increased from 61.8 kg to 87 kg, i.e. a total weight gain of 25.2 kg in 18 months. Being a top athlete, the patient had regular follow-up at the Swiss Accident Insurance Fund where her body composition was regularly monitored before, during and after treatment (Figure 1), indicating that weight gain was almost entirely due to an increase in body fat, amounting to at least 20.9 kg.

Correspondence: Michael Montemurro, Multidisciplinary Oncology Centre, University of Lausanne Hospitals (CHUV), Rue du Bugnon 46, CH-1011 Lausanne, Switzerland. Tel:+41 21 314 09 13. Fax:+41 21 314 02 00. E-mail: michael.montemurro@chuv.ch

(Received 10 March 2009; accepted 20 March 2009)

ISSN 0284-186X print/ISSN 1651-226X online
DOI: 10.3109/02841860902913561