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COVID-19 Rapid Letter

Radiotherapy and COVID-19: Practical recommendations from iran ☆☆☆

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Following the announcement of the COVID-19 pandemic by the World Health Organization in March 2020, the outbreak of new coronavirus in Iran and most of the world has posed severe challenges in the treatment of cancer patients. This group of patients is more prone to this new virus due to immune-compromised status following active treatment and frequent visits to hospitals [1].

At the onset of the outbreak, discontinuation, or postponing, the nonemergent treatments were considered. In contrary to this idea, as time goes on, we understand that this problem is not a short duration crisis. It is not logical to deprive patients of life-saving treatment like radiotherapy (RT). As we all know, delaying RT in some patients will lead to reducing the benefit of this treatment and affected patient survival, as well as, it can cause a high mortality rate for patients and also a higher financial burden on health systems after the COVID 19 era. Therefore canceling or too much delay in available treatment options does not seem to be logical. In this regard, in Iran Cancer Institute, we have reached a consensus based on the evidence available in the literature, and according to the available facilities.

The main problem was how to continue the activity while protecting patients, families, and health professionals from the infection. Some measures by a working group can help deliver safe radiotherapy [2,3]:

- To educate staff to triage suspicious patients,
- To provide maximum protective care for health care workers contact to patients,

- To encourage patients to protect themselves by personal protective equipment, physical distancing and
- To separate highly vulnerable patients (e.g., patients >65-years with severe comorbidities) in the early day and terminal cleaning of treatment rooms and clinics according to local guidelines.

For early detection of positive cases of COVID-19, in our center, an online system has been set up to register patients' symptoms and their underlying disorders like cancer, in case of any suspicion of COVID-19; they will be contacted in order to get treatment and supportive care as soon as possible.

- In COVID-19 confirmed infected patients, we do not start radiotherapy, and discontinue the treatment that began before, till the patient becomes symptom-free for 14 days or two negative PCR tests. Therefore in some circumstances like cord compression, radiotherapy is crucial for the patient. We recommend doing the radiotherapy at the end of the shift to limit the chance of exposure, and after the treatment, all the facilities should be sanitized.
- If there is any suspicion of COVID-19 infection in the presence of typical symptoms during radiotherapy, the treatment should be paused until the confirmatory tests are done. Considering the sensitivity of SARS-cov2 PCR is 43–70% (it depends on where the sample took place) in our hospital, even if the PCR is negative for COVID-19, we withhold the radiotherapy for at least two weeks.

Coping with the pandemic, we made a priority list of the indications for radiation therapy (Table 1) based on other published guidelines [3–5] and the available evidence on the cost of treatment delays [6]. However, as time passed, we decided to emphasize more on the modification of treatment rather than postponing.

In case of a modification of RT treatment, generally, hypofractionated regimens are preferred over conventional, albeit with established evidence. For example, in rectal cancer, we could opt for short-course radiotherapy with immediate or delayed surgery [7]. Another good examples are the hypofractionated whole-breast irradiation [8] or accelerated partial breast irradiation for eligible candidates. For prostate cancers that radiation of the whole pelvis is not intended, we can use stereotactic body radiation therapy (SBRT), an abbreviated course, or a single 19-Gy-fraction of high-

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☆☆ This study was completely conducted in Radiation Oncology Department, Iran Cancer Institute, Imam Khomeini Hospital Complex, Tehran University of Medical Sciences.

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dose-rate (HDR) brachytherapy [9,10]. In cases in which we are desperate to use a conventional schedule, we could opt for techniques with less time-consuming fractions to minimize patients' exposure and staff work-load at all possible. For example, when there is minimal difference between 3D conformal RT and IMRT, we prefer 3D. For palliative radiation, a single 8-Gy-fraction or four 5-Gy-fractions for bone and brain metastasis, respectively, are encouraged.

In the case of concurrent chemo-radiotherapy, we know that in all scenarios, it may increase the complications of treatment. Thus, each treating physician should weigh the benefits over the risk of toxicities, primarily bone marrow suppression. Administration of chemotherapy orally, or in the outpatient setting or at home, is proposed to reduce visits.

It may be reasonable to postpone regular follow-up visits of patients not on active cancer treatment or to conduct those appointments via telemedicine. It is highly recommended to have virtual MDT for decision making in the radiation oncology clinics during the COVID-19 outbreak with the use of social network applications.

In the current COVID-19 crisis, the safe delivery of radiation therapy should follow institutional protocols set based on logistics and priorities.

Conflict of interest

The authors declare no conflict of interests.

Appendix A. Supplementary data table 1

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.radonc.2020.04.051>.

References

- [1] Liang W, Guan W, Chen R, Wang W, Li J, Xu K, et al. Cancer patients in SARS-CoV-2 infection: a nationwide analysis in China [Internet]. *Lancet Oncol* 2020;21 [cited 2020 Mar 29]. p. 335–7. Available from: [https://www.thelancet.com/journals/lanonc/article/PIIS1470-2045\(20\)30096-6/fulltext?utm_source=yxnews&utm_medium=desktop&utm_referrer=https%3A%2F%2Fyandex.com%2Fnews](https://www.thelancet.com/journals/lanonc/article/PIIS1470-2045(20)30096-6/fulltext?utm_source=yxnews&utm_medium=desktop&utm_referrer=https%3A%2F%2Fyandex.com%2Fnews).
- [2] Slotman B, Ricardi U, Lievens Y. Radiotherapy in a time of crisis, ESTRO Presidents' statement [Internet]. [cited 2020 Mar 25]. Available from: <https://www.astro.org/About/Newsroom/News/Radiotherapy-in-a-time-of-crisis>.
- [3] NHS. Specialty guides for patient management during the coronavirus pandemic: clinical guide for the management of noncoronavirus patients requiring acute treatment: Cancer [Internet]. [cited 2020 Mar 29]. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/869827/Coro.
- [4] Riccardo Filippi A, Russi E, Maria Magrini S, Corvò R. COVID-19 outbreak in northern Italy: first practical indications for radiotherapy departments [in press]. *Int J Radiat Oncol Biol Phys* [Internet] 2020 [cited 2020 Mar 29]; Available from: <https://doi.org/10.1016/j.ijrobp.2020.03.007>.
- [5] Simcock R, Thomas T, Mercy C. AF-C and, 2020 undefined. COVID-19: global radiatio oncology's's targeted response for pandemic preparedness. Elsevier [Internet]; 2020 [cited 2020 Mar 29]; Available from: <https://www.sciencedirect.com/science/article/pii/S2405630820300227>.
- [6] Neal R, Tharmanathan P, France B, ND-B journal of, 2015 undefined. Is increased time to diagnosis and treatment in symptomatic cancer associated with poorer outcomes? Systematic review. *nature.com* [Internet]. [cited 2020 Mar 29]; Available from: <https://www.nature.com/articles/bjc201548/>.
- [7] Aghili M, Sotoudeh S, Ghalehtaki R, Babaei M, Farazmand B, Fazeli MS, et al. Preoperative short course radiotherapy with concurrent and consolidation chemotherapies followed by delayed surgery in locally advanced rectal cancer: preliminary results. *Radiat Oncol J* 2018;36:17–24.
- [8] Smith BD, Bellon JR, Blitzblau R, Freedman G, Haffty B, Hahn C, et al. Radiation therapy for the whole breast: executive summary of an American Society for Radiation Oncology (ASTRO) evidence-based guideline. *Pract Radiat Oncol* 2018;8:145–52.
- [9] Freedman-Cass D, Shead DA, Armstrong AJ, Bekelman JE, Cheng H, Victor AD, et al. Guidelines panel disclosures NCCN guidelines version 1.2020. *Prostate Cancer* 2020.
- [10] Siddiqui ZA, Gustafson GS, Ye H, Martinez AA, Mitchell B, Sebastian E, et al. Five-year outcomes of a single-institution prospective trial of 19-Gy single-fraction high-dose-rate brachytherapy for low- and intermediate-risk prostate cancer. *Int J Radiat Oncol Biol Phys* 2019;104:1038–44.