



Stereotaksična radioterapija, mogućnosti kod karcinoma pluća

Stereotaxic Radiotherapy, Possibilities in Lung Carcinoma

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Apstrakt

Stereotaksična radioterapija pripada grupi takozvane slikom vođene radioterapije i njen cilj je precizno određivanje mete i precizna isporuka same doze zračenja. Na taj način, veoma mali volumen zdravog okolnog tkiva biva uključen u zračno polje, što vodi u mogućnost povećanja radioterapijske doze na sam tumor, kao i smanjenja toksičnosti tretmana.

Nesitnoćelijski karcinom pluća je vodeći uzrok smrtnosti od raka i kod muškaraca i kod žena širom sveta. Za pacijente u najranijem, prvom stadijumu bolesti, standardni način lečenja je hirurgija, torakoskopska hirurgija ili klasična lobektomija. Skoro četvrtina bolesnika u ranom stadijumu bolesti neće moći biti operisana zbog loše disajne funkcije ili komorbiditeta.

Do sada 3D konformalna radioterapija (3D CRT) ili radiofrekventna ablacija bile su alternativne metode za lečenje inoperabilnog karcinoma pluća u prvom stadijumu. Danas SBRT pruža mogućnost lečenja ovih bolesnika veoma visokim dozama zračenja, uz minimalnu toksičnost. Pored pacijenata kojima se dijagnostikuje tumor u ranom stadijumu bolesti (primarni periferno lokalizovani tumor pluća, veličine do 5 cm, bez metastaza u limfnim čvorovima) SBRT se može primeniti u lečenju centralno lokalizovanih tumora pluća, sekundarnih depozita u plućima i tumora u plućima koji nisu patohistološki potvrđeni.

Definitivnu odluku o najboljoj terapijskoj opciji za svakog pacijenta, pa i za SBRT tumora pluća, donosi tim onkološkog konzilijuma. Pre odluke o definitivnom tretmanu, potrebna je kompletna dijagnostička evaluacija – CT grudnog koša i gornjeg abdomena, testovi plućne funkcije, bronhoskopija i ph nalaz. Da bi se sprovela SBRT pluća, neophodno je uraditi niz procedura – pozicioniranje i imobilizacija pacijenta, delineaciju ciljnog volumena, analizu plana, verifikaciju radio-terapijskog tima i sprovođenje zračnog tretmana na linearnom akcelatoru.

U cilju određivanja volumena mete zračenja, potrebno je uraditi CT simulaciju zbog pokretljivosti tumora, usled normalnog disanja. Na svakom urađenom skenerskom preseku, radijacioni onkolog vrši obeležavanje organa od rizika, tj. zdravog tkiva koje se nalazi neposredno u blizini tumora. Delineacija ciljnog volumena podrazumeva iscrtavanje tumorske promene u svim fazama disanja. Medicinski fizičar zatim vrši planiranje zračnih polja tako što se što veća doza aplikuje na tumor, uz maksimalnu poštedu okolnog zdravog tkiva i organa. Doza i broj seansi se određuju individualno za svakog pacijenta i mogu se koristiti od 20 gu u jednoj seansi do 50 gu u 5 seansi. Zračenje se može sprovesti svaki dan ili svaki drugi dan.

Abstract

Stereotaxic radiotherapy belongs to the group of so-called image-guided radiotherapy and it aims to precisely determine the target and precisely deliver the radiation dose itself. In this way, a very small volume of healthy surrounding tissue is included in the airfield, which leads to the possibility of increasing the radiotherapy dose to the tumor itself, as well as reducing the toxicity of the treatment.

Non-small cell lung cancer is the leading cause of cancer death in men and women worldwide. For patients in the earliest first stage of the disease, the standard way of treatment is surgery, thoracoscopic surgery, or classic lobectomy. Almost a quarter of patients in the early stage of the disease will not be able to be operated on due to poor respiratory function or comorbidities.

Until now, 3D conformal radiotherapy (3D CRT) or radiofrequency ablation have been alternative methods for the treatment of inoperable lung cancer in the first stage. Today, SBRT offers the possibility of treating these patients with very high doses of radiation with minimal toxicity. In addition to patients who are diagnosed with a tumor in the early stage of the disease (primary peripherally localized lung tumor up to 5 cm in size, without metastases in the lymph nodes), SBRT can be used in the treatment of centrally localized lung tumors, secondary deposits in the lungs and lung tumors that are not pathohistologically confirmed.

The definitive decision on the best therapeutic option for each patient, including lung tumor SBRT, is made by the oncology council team. Before deciding on a definitive treatment, a complete diagnostic evaluation is required - CT of the chest and upper abdomen, pulmonary function tests, bronchoscopy, and pH test. In order to perform SBRT of the lungs, it is necessary to perform a series of procedures - positioning, and immobilization of the patient, delineation of the target volume, analysis of the plan, verification of the radiotherapy team, and the implementation of radiation treatment on the linear accelerator.

To determine the volume of the radiation target, it is necessary to perform a CT simulation due to the mobility of the tumor due to normal breathing. On each scanned section, the radiation oncologist marks the organs at risk, i.e. the healthy tissue located near the tumor. The delineation of the target volume implies the delineation of the tumor change in all phases of breathing. The medical physicist then plans the radiation fields by applying a higher dose to the tumor while sparing the surrounding healthy tissue and organs as much as possible. The dose and number of sessions are determined individually for each patient and can be used from 20Gy in one session to 50Gy in 5 sessions. Radiation can be administered every day or every other day.