

Effectiveness and adverse effects of radical radiotherapy on patients aged 90 or above

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SUMMARY

Purpose: In recent years, there were reports that adults and elderly individuals exhibit similar rates of tumor control, treatment success, and side effects. We aim to evaluate the effects of radical radiation therapy on people aged 90 years or above.

Materials and Methods: Radiotherapy for radical cure purposes was administered on 25 patients. A dose of 60 Gy/30 fraction was given to 20 of the 25 patients. The other doses given were 30 Gy/5 fraction to one patient with skin cancer; SBRT at 52 Gy/4 fraction and 48 Gy/4 fraction, respectively, to two patients with lung cancer; 40 Gy/20 fraction to one patient with plasmacytoma; and 39 Gy/13 fraction to one patient with pancreatic cancer. For the assessment of treatment response, the RECIST. Adverse event was estimated on the basis of the CTCAE.

Results: All 25 patients were able to finish the treatment. The average age was 93.1, with a larger population of women than that of men. Radiotherapy with curative intent provided complete response + partial response in 24 cases.

Conclusion: Among elderly cancer patients aged 90 years or above, particularly those with skin cancer, the response rate was high. No adverse events higher than grade 2 were observed.

Key words: elderly, radical radiotherapy, skin cancer, cancer

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INTRODUCTION

People aged 90 or above comprise approximately 1.2% of the total population of Japan. In addition, the occurrence of cancer in people belonging to this age group is increasing. Over the years, developments in cancer management have been introduced, e.g., robotic surgery, new molecular targeted drugs, intensive modulated radiotherapy (IMRT), stereotactic body radiotherapy (SBRT), and heavy particle and proton therapy for refractory cancer.

Radiotherapy is often given to elderly people but usually for palliative purposes. In recent years, there were reports that adults and elderly individuals exhibit similar rates of tumor control, treatment success, and side effects; however, a majority of reports on radiotherapy incline more toward its palliative benefits [1–5]. In this study, we aim to evaluate the effects of radical radiation therapy on people aged 90 or above.

MATERIALS AND METHODS

Radiotherapy for radical cure purposes was administered on 25 patients at this hospital from 2009 to 2014. We excluded patients who underwent radiotherapy for palliative purposes. The dosage criteria for radical irradiation were determined on the basis of the Radiotherapy Planning Guideline [6]. A dose of 60 Gy/30 fraction was given to 20 of the 25 patients. The other doses given were 30 Gy/5 fraction to one patient with skin cancer; SBRT at 52 Gy/4 fraction and 48 Gy/4 fraction, respectively, to two patients with lung cancer; 40 Gy/20 fraction to one patient with plasmacytoma; and 39 Gy/13 fraction to one patient with pancreatic cancer.

The variables examined were recurrent pattern, overall survival (OS), combination therapy, adverse event, local control time (LCT) (months) of primary tumor, pathology, sex, age, performance status (PS), stage, and radiation

Tab. 1. Patient characteristics, methods of therapy, and outcome of radiotherapy

No.	Site	Pathology	Dose	Sex	Age	PS	Stage	RT	Response	LCT	Recurrence pattern	OS	Therapy	AE
1	Skin	SCC	2Gy x 30	F	91	2	2	Electron	CR	8		Alive	none	1
2	Skin	SCC	2Gy x 30	M	91	2	2	Electron	CR	15		unknown	none	1
3	Skin	BCC	2Gy x 30	F	91	3	2	Electron	CR	18		unknown	none	2
4	Skin	SCC	6Gy x 5	F	102	2	1	Electron	CR	14		Alive	none	2
5	Skin	SCC	2Gy x 30	F	97	1	1	Electron	CR	4		18	Post-op	1
6	Skin	SCC	2Gy x 30	F	97	1	2	Electron	CR	26		unknown	none	1
7	Skin	BCC	2Gy x 30	F	91	3	2	Electron	CR	14		Alive	none	2
8	Skin	SCC	2Gy x 30	F	98	1	3	Electron	CR	6		Alive	none	1
9	Skin	SCC	2Gy x 30	F	94	2	2	Electron	CR	12		unknown	none	1
10	Skin	SCC	2Gy x 30	F	94	3	3	Electron	CR	30		Alive	none	2
11	Skin	SCC	2Gy x 30	F	95	2	3	Electron	PR	18	Local	unknown	none	1
12	Skin	SCC	2Gy x 30	F	93	2	3	Electron	PR	16	Local	unknown	none	1
13	Lung	adeno	2Gy x 30	F	91	3	2	Photon	PR	36	Local	Alive	CCRT	1
14	Lung	adeno	2Gy x 30	M	95	2	2	Photon	CR	12		Alive	CCRT	1
15	Lung	adeno	13Gy x 4	F	91	2	2	SBRT	CR	36		Alive	none	2
16	Lung	SCC	12Gy x 4	F	95	3	2	SBRT	CR	15		unknown	none	2
17	Esophagus	SCC	2Gy x 30	F	97	1	3	Photon	PR	12	Local	18	none	2
18	Ureter	UCC	2Gy x 30	M	91	2	1	Photon	CR	16		unknown	Post-op	1
19	Tongue	SCC	2Gy x 30	F	91	1	1	Photon	PR	14	Local	17	none	2
20	Kidney	RCC	2Gy x 30	F	92	0	2	Photon	PR	6	Local	10	none	1
21	Liver	HCC	2Gy x 30	F	90	2	1	Photon	PR	8	Local	unknown	TACE	1
22	Vagina	SCC	2Gy x 30	F	90	3	1	Photon	PR	4		8	none	2
23	Bone	Plasma	2Gy x 30	M	91	3	2	Photon	CR	18		Alive	none	0
24	Bone	Plasma	2Gy x 20	M	91	2	2	Photon	CR	13		Alive	none	0
25	Pancreas	adeno	3Gy x 13	M	93	2	2	Photon	SD	2	Local	4	none	1

SCC: squamous cell carcinoma; BCC: basal cell carcinoma; adeno: adenocarcinoma; UCC: urethral cell carcinoma; RCC: renal cell carcinoma; HCC: hepatocellular carcinoma; PS: performance status; RT: radiotherapy technique; SBRT: stereotactic body radiotherapy; LCT: local control time (months); OS: overall survival; Therapy: additional therapy; AE: adverse event; CR: complete response; PR: partial response ; SD: stable disease ; CCRT: concurrent chemoradiotherapy; TACE: tranarterial chemo embolization

method (electron or photon). We could not include observation periods, local control rate and survival rate due to nine out of 25 patients were not followed up to death.

The radiotherapy field was determined on the basis of the Radiotherapy Planning Guideline [6]. For the assessment of treatment response, we used the Response Evaluation Criteria In Solid Tumors (RECIST). Complete response (CR) was defined as disappearance of all target lesions. Partial response (PR) was defined as at least a 30% decrease in the baseline sum of the longest diameter (LD) of the target lesions. Stable disease (SD) was determined on the basis of the smallest sum of LD because the treatment started and was defined as an insufficient shrinkage to qualify as a PR or an insufficient increase to qualify as progressive disease (PD). PD was defined as at least a 20% increase in the smallest sum of the LD of the target lesions because the treatment started or the appearance of one or more new lesions.

Adverse event was estimated on the basis of the Common Terminology Criteria for Adverse Events (CTCAE) v4.0. We did not use a specific statistical analysis because the number of patients was limited.

RESULTS

Table 1 shows the characteristics of the study population. All 25 patients were able to finish the treatment regimen. The median follow up period was 13.6 months (range 2-36). The average age was 93.1 (range 90–102 years), with a larger population of women compared with that of men. The average PS was 2 (range 1–3).

Patients with skin cancer were dominantly enrolled in this analysis. There were 12 of 25 patients with skin cancer. During the follow-up period, no fatal event occurred, even if the local tumors increased in size in patients with PR. The other 13 patients with cancer varied. However, only one patient with pancreatic cancer did not respond to radiotherapy (SD). We could not show overall survival rate due to short follow up.

DISCUSSIONS

Similar to past reports and from our results, radical radiotherapy may be provided to elderly people with cancer [1–5]. The lack of this study is a retrospective one and probably this is the reason that survival data are missing in many cases. The group of patients is very he-

terogeneous in terms of diagnosis and treatment. We didn't perform any statistical analysis or comparison with younger adults to prove that results of treatment are similar, thus conclusion is just description of findings. In this study, there was a preponderance of patients who underwent radiotherapy for skin cancer, probably because of aesthetic reasons; in particular, 11 of 12 cases were irradiation to the face or head. One patient who underwent 30 Gy/5 fraction was irradiated on the finger. The tumor size ranged from 1 × 1 cm to 5 × 7 cm, except from the two cases of basal cell carcinoma (BCC), the predominant histologic type was squamous cell carcinoma (SCC). CR was achieved in 10 of 12 cases; the remaining two cases achieved PR. LCT ranged from 4–30 months in the CR + PR group. During the follow-up period, no fatal event occurred, even if the local tumors increased in size in patients with PR.

Being a superficial tumor, skin cancer can be treated easily by electron beam. There were few side effects, too, and the hemostasis effect was found, too. It is important to note that the histopathology of skin cancer varies according to race. In this Japanese population, melanoma was rarely seen, but SCC was common, followed by BCC. For SCC and BCC, radiotherapy may have few side effects.

Nquyen et al. retrospectively reported 15 patients undergoing definitive radiation (11 patients) or postoperative radiation (4 patients) for squamous cell carcinoma (9 patients) and basal cell carcinoma (6 patients) of the head. No patient developed a loco-regional recurrence [7]. Therefore, radical irradiation for skin cancer may be recommended as a minimally invasive therapy for preservation of skin appearance, which has an influence on quality of life.

The results of radiotherapy for the lung cancer patients in this study were similar to those reported by Paul et al. and Hayashi et al. [8,9]. Notably, they also reported that SBRT was safe for elderly patients.

Tongue cancer with cervical lymph node metastasis achieved PR for 14 months in one patient (Case 19). The efficacy of radical irradiation to the head and neck has been reported by many [10,11]. Therefore, radical radiotherapy with curative intent is needed for advanced head and neck cancer. In one patient (Case 21) with hepatocellular carcinoma that invaded the portal vein, 60 Gy radiotherapy reduced the tumor and caused almost CR followed by transarterial chemoembolization and provided eight months of PR and tumor con-

trol. In addition, tumor growth was inhibited without decrease in liver function for eight months.

Based on our experience on good response to irradiation for plasmacytoma, which often has a small field, we recommend only a small but sufficient dose for radical cure. Two patients (Cases 23 and 24) achieved CR.

For esophageal cancer, radical radiotherapy with curative intent, but without prophylactic irradiation of lymph nodes, was reported to achieve response with minimal adverse events, similar that reported in a previous study [12].

In our patient with pancreatic cancer, the disease was locally progressive. Because there were dosage restrictions for surrounding organs, such as the duodenum, irradiation of pancreatic cancer often involves the primary tumor only; as a result, the best possible response was SD, even if a curative intent dose was administered [13]. For such cases, the use of IMRT or proton therapy may have led to a different outcome. In our patient, treatment was carried out using electron beam or three-dimensional conformal photon radiotherapy without IMRT.

In the other sites, the probability of PR was achieved in the majority of the elderly by prescribing 60 Gy, and the side effects were not

different compared with those in adults. In a population of elderly patients more than 90 years old, even those with poor PS at the start of treatment, we believe that radiotherapy may be given safely at a dose similar to that given to adults, as long as there are no underlying diseases, such as decreased respiratory function and cirrhosis. In this retrospective analysis, we did not encounter an adverse event that was worse than grade 3.

For elderly patients with cancer, it may be cumbersome to obtain outpatient treatment, especially when alone. Therefore, hospital admission may be needed. However, administration of radiotherapy at 60 Gy/30 fraction may prolong hospital stay. The use of hypofractionated radiotherapy may shorten the length of hospital stay and reduce possible adverse effects. Also, it is necessary to see effect of treatment while scrambling for cooperation with family doctor when we make such an attempt.

CONCLUSIONS

In conclusion, among 25 elderly cancer patients aged 90 or above, radiotherapy with curative intent provided CR + PR in 24 cases, particularly for those with skin cancer. No adverse events higher than grade 2 were observed.

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