

# A Comparison in Cosmetic Results of Cobalt 60 and Photon 9 Mega Volt for the Whole Breast Radiotherapy in Breast Cancer Patients with Breast Conserving Surgery

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## Abstract

**Background:** To compare the cosmetic results of whole breast radiotherapy between cobalt 60 and photon 9MegaVolt in patients underwent breast conserving surgery.

**Methods:** The patients with breast saving surgery who were treated by whole breast radiotherapy with either cobalt 60 or photon 9MV between 2001-2006 in Sayed-al-Shohada hospital entered the study. The cosmetic results were evaluated by an expert radiation oncologist with definite criteria.

**Results:** Frothy patients in cobalt 60 group and 43 patients in photon group were compared, with median follow up of 40.5 months. The patients in photon group had less telangectasia and discoloration ( $p=0.018$  and  $p=0.01$ , respectively). The consistency of breast in photon group was better ( $p=0.019$ ), but for fibrosis the difference was not statistically significant ( $p=0.055$ ). Overall cosmetic results in photon group was much better rather than cobalt 60 group ( $p=0.005$ ). No recurrences were observed in both groups.

**Conclusion:** Cosmetic results in group with photon 9MV were superior to cobalt group, but the effect of these two beam energy on disease free survival (DFS) and /or overall survival (OS) should be in more consideration.

**Keywords:** Breast neoplasm; Breast conserving surgery; Adjuvant radiotherapy; Cosmetic effect

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## Introduction

Breast cancer is the first incidental cancer and 5<sup>th</sup> cause of death due to cancer in Iranian ladies. There are around 8040 new cases annually with 5 year prevalence of 29000[1].

Based on the results of well conducted randomized controlled trials, breast-conserving treatment has become a widely accepted management for the majority of women with early stage invasive breast cancer [2]. During the last two decades the number of breast cancer patients undergoing breast conservative therapy has increased substantially [3]. Dr Akbari and coworkers here in Iran focused on a retrospective study comparing overall survival in breast preserved and mastectomized cases. There

were no significant differences between 2 groups and even a better status in breast cancer treatment groups. There was 54.5 percent of early stage breast cancer (Stage 1, 2) in this study [4], in all cases radiation therapy was an integral part of treatment.

Radiotherapy plays a critical role in the management of early stage breast cancer. Numerous studies have shown that radiotherapy significantly decreases the rate of loco regional recurrence after breast conservation [2, 3] and its role in reducing mortality has been addressed by some researchers [5-7].

Currently, whole breast radiotherapy is considered the standard of care after breast conservation surgery [5].

An important issue in the setting of breast conserving treatment is cosmesis, which its impact on the patients' psychosocial status and quality of life has been well understood [8-10]. Several studies have evaluated the cosmetic results of breast conserving surgery plus radiotherapy and the effect of different tumor-, patient- and treatment-related factors on cosmetic outcome [2,11-21]. The influence of the beam quality and beam energy used for radiotherapy has been reported by some of these studies [16, 18, 22].

Although the linear accelerator is the preferred equipment for breast radiotherapy, telecobalt machines are considered as an acceptable alternative in low- and middle-income countries [23]. The first linear accelerators installed in Iran were applied in Sayed-al-Shohada hospital, Isfahan and the lowest photon energy of the Neptun 10PC linear accelerator which was used for breast radiation therapy was 9 Mega Volt (9MV).

The aim of this study was to compare the cosmetic results of whole breast radiotherapy between cobalt 60 and photon 9MV.

## Materials and Methods

This was a retrospective descriptive-analytic study implemented in Sayed-al-Shohada hospital, Isfahan, Iran. All the patients with pathologically proven invasive ductal carcinoma of breast and breast conserving surgery who were treated with whole breast radiotherapy in radiation-oncology department of Sayed-al-shohada hospital, Isfahan between 2001-2005 and had received systemic chemotherapy entered the study. We reviewed the medical records of patients and extracted the necessary information such as age, radiation dose and beam quality (cobalt 60 or photon 9MV), primary tumor size, Nodal status stage, histopathologic grade, estrogen/progesterone receptor status. All the patients were treated with a total dose of 50 Gray to the whole breast in 2 Gray fractions and a boost of 12-16 Gray to the tumor bed with electrons.

The patients who met the inclusion criteria were asked to come and the cosmetic results were evaluated by an expert radiation oncologist with definite criteria who was blind to the beam energy used for the radiation therapy. Meanwhile the patients were photographed. For consistency, fibrosis, telangectasia and discoloration a three-point scoring system was used and overall cosmetic results

were evaluated using the four-point global cosmetic scoring system developed by Harvard group [17]. All the data entered the SPSS software (version15) and were analyzed using independent t-test, chi-square and Mann-Whitney tests by the analyst who was blind to the treatment method.

## Results

Eighty-three patients (40 patients in cobalt 60 group and 43 patients in photon group) were included in the study. The mean of patients' age was  $45.5 \pm 11.9$  years in cobalt 60 group and  $46.2 \pm 9.2$  years in photon group ( $p=0.76$ ). There wasn't any statistical difference between two groups in terms of tumor size, Nodal status pathological stage, histopatologic grade, Estrogen Receptor (ER) and Progesterone Receptor (PR) positivity (all P-values were much greater than 0.05 (Table 1).

The median follow up of patients was 40.5 months with minimum of 24 months and maximum of 95 months.

Using Man-Whitney test the consistency of treated breast was better in photon group ( $p=0.019$ ). Telangectasia and discoloration were less common in photon group than in cobalt 60 group (both p-value= 0.018), but for fibrosis the analysis showed only borderline significance ( $p= 0.055$ ) (Table 2).

According to the 4-point global cosmetic scoring system, the final cosmetic results in the photon group was significantly better than cobalt 60 group ( $p=0.005$ ).

With minimum follow-up of 2 years, no recurrence was observed in either group.

## Discussion

In our study 72.5% of patients in cobalt 60 group and 90.7% of patients in photon group were evaluated to have acceptable (excellent or good) cosmetic results. Our results are consistent with the other studies on breast conserving surgery and radiotherapy in which the reported rates of acceptable cosmetic results from the physicians' view are in the range between 70 and 90%; 71% (25), 72% (26), 73% (27), 77% (3), 79% (20), 82%(28), 84% (14), 88% (18), 89.3% (16) and 90% (12). Hoeller [28] reported that patients' satisfaction with cosmetic effect is greater than the doctors', but other studies have shown a good correlation between patients' self-assessment of cosmesis and physicians' evaluation [24, 25, 29]. Cardoso has postulated in his study that physician's experience in breast cancer conservative treatment should be considered a prerequisite for the evaluation of the aesthetic results [30].

**Table 1.** Comparison of some variables between cobalt 60 and photon groups. Name of test was Mann-whitney and p-value: P= 0.63

		Cobalt 60(%)	Photon 9MV(%)
T stage	in situ	0	1(2.3)
	T1	17(42.5)	14(32.6)
	T2	19(47.5)	24(55.8)
	T3	3(7.5)	3(7.5)
	T4	1(2.5)	1(2.3)
N stage	N1	35(87.5)	38(88.4)
	N2	5(12.5)	5(11.6)
	N3	0	0
Grade	G1	8(20)	9(20.9)
	G2	22(5)	27(62.5)
	G3	10(25)	7(16.3)
Laterality	left	24(60)	20(46.5)
	right	16(40)	23(53.5%)
ER	positive	25(62.5)	29(67.4)
	negative	15(37.5)	14(32.6)
PR	positive	29(72.5)	30(69.8)
	negative	11(27.5)	13(30.2)

We found better cosmetic results in photon group. A study on breast conserving patients treated at the department of radio-oncology of Heidelberg University from 1984 through 1992 concluded that quality of beam (cobalt 60 or photon 6MV) didn't had influence on cosmetic result [16]. It's necessary to emphasize that they compare cobalt 60 to photon 6MV. Palazzi [18] in a study on 1176 patients treated in 8 different centers (63% with linear accelerator and 37% with cobalt 60 machine) reported that Use of less sophisticated treatment technique was associated with a less favorable cosmetic outcome.

In our study, the fibrosis in photon group was lower, but this difference reached only a borderline significance. This must be due to skin-sparing characteristics of photons which in turn can reduce the subcutaneous fibrosis. Collete [22] concluded that the risk of fibrosis in 10 year decreased if whole breast irradiation was given with photon energies higher than 6 MV.

There are some studies that evaluated the effect of age [12, 13], systemic chemotherapy [12, 14, 25] and boost to the tumor bed [2, 14, 20, 25], but in our study all the patients had received systemic chemotherapy and electron boost. We wanted to focus on the evaluation of beam energy, so we decided to make no differences between two groups in terms of above mentioned variables.

Although there are reports that cosmetic results remain stable for at least 7 years[11], some other studies postulated worsening of these results with the

time[12,16]. Longer follow up of our patients will help us to determine this issue.

Finally, the major concern in using photon energies higher than 4-6MV is that skin-sparing characteristic of photons may under dose the subcutaneous tissue of the breast which ultimately will increase the loco regional recurrence rate of breast cancer. No recurrences were observed in our study, but it is obvious that long term follow up is necessary to compare the loco regional recurrence rate between two arms.

Finally for better determination of contributing factors of cosmetic results prospective studies with greater number of patients, better control of confounding factors and long time follow up is recommended. We emphasize on the fact that the best results for breast conserving patients for endpoints such as loco regional and distant control, quality of life and cosmetic results can be obtained by a multidisciplinary and patient-oriented approach.

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### Conflict of Interest

The authors have no conflict of interests in this article.

**Table 2.** Comparison of some cosmetic variables after whole breast radiotherapy between cobalt 60 and photon9MV groups

	Cobalt 60(%)	Photon (%)	P-value
Consistency			
Good	10(25)	20(46.5)	0.019
Fair	23(57.5)	19(44.2)	
Poor	7(17.5)	4(9.3)	
Telangectasia			
Not seen	29(72.5)	39(90.7)	0.018
Fair	10(25)	3(7)	
Severe	1(2.5)	1(2.3)	
Discoloration			
Not seen	21(52.5)	33(76.7)	0.018
Fair	16(40)	9(20.9)	
Severe	3(7.5)	1(2.3)	
Fibrosis			
Not seen	12(30)	20(46.5)	0.055
Fair	22(55)	19(44.2)	
Severe	6(15)	4(9.3)	

**Table 3.** Final cosmetic results of whole breast radiotherapy in cobalt 60 and photon9MV groups according to global cosmetic scoring system

	Cobalt 60(%)	Photon (%)
Excellent	10(25)	20(46.5)
Good	19(47.5)	19(44.2)
Fair	3(7.5)	2(4.7)
Bad	8(20)	2(4.7)

### Authors' Contribution

EH designed the study and contributed in the data entry, BS designed the study and collected the major part of the data, AA analyzed the data and wrote the paper, RM contributed in data collection, HA contributed in data analysis and AkA supervised and reviewed the results.

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