Treatment outcome of hypofractionated radiotherapy in post mastectomy breast cancer in Ubonratchathani cancer hospital

ผลการรักษามะเร็งเต้านมที่ได้รับการผ่าตัดเต้าออกทั้งหมด ด้วยวิธีการฉายรังสีแบบสั้นภายในโรงพยาบาลมะเร็งอุบลราชธานี

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Abstract

Background: Hypofractionated radiotherapy has been used in breast-conservative surgery. However, information regarding its application in the adjuvant setting after mastectomy in breast cancer patients is still under long-term studies to determine its effectiveness and potential side effects.

Objectives: This study aimed to assess the efficacy of post-mastectomy hypofractionated radiotherapy as regards 5-year locoregional recurrence-free survival (LRRFS), 5-year disease-free survival (DFS) and 5-year overall survival (OS) compared with conventional fractionated radiotherapy

Materials & methods: We retrospectively reviewed the record of post-mastectomy breast cancer patients who received complete adjuvant radiotherapy at Ubonratchatani Cancer Hospital between January 2016 and December 2020. Kaplan-Meier and Log-rank test were used for survival analysis. Cox regression was used for univariate and multivariate analysis to identify the prognostic factors. P-value < 0.05 was considered statistically significant.

Results: The median follow-up time was 46.5 months (range 24-61 months). A total of 552 post-mastectomy breast cancer patients who underwent complete adjuvant radiotherapy were included. Among them, 361 patients received conventional fractionated radiotherapy (CFRT) 50 Gy in 25 Fractions while 191 received hypofractionated radiotherapy (HFRT) 40-42.56 Gy in 15-16 fractions. There was no statistical difference between both groups regarding the 5-year LRRFS and 5-year DFS. The 5-year LRRFS rates for CFRT versus HFRT were 87.37 % and 86.60% (p-value = 0.642). The 5-year DFS rates for CFRT versus HFRT were 65.14% and 73.38% (p-value = 0.058). However, the 5-year OS rate was higher in HFRT group than CFRT group; 80.29% and 70.38%, respectively (p=0.015). Tumor stage and triple negative subtype were significant prognostic factors for locoregional recurrence and overall survival.

Conclusion: Post-mastectomy hypofractionated radiotherapy was comparably effective in terms of LRRFS and DFS with reduced overall treatment time and cost.

Keywords: disease free survival, hypofractionated radiotherapy, locoregional recurrence, overall survival, postmastectomy radiotherapy

บทคัดย่อ

หลักการและเหตุผล: การฉายรังสีแบบสั้นถูกนำมาใช้ภายหลังการผ่าตัดแบบสงวนเต้าในมะเร็งเต้านม แต่ข้อมูลเกี่ยวกับการนำมาใช้ภายหลังการผ่าตัดเต้าออกทั้งหมดในผู้ป่วยมะเร็งเต้านม ยังคงอยู่ในระหว่างการศึกษาระยะยาวเพื่อประเมินประสิทธิภาพและผลข้างเคียงที่อาจเกิดขึ้น

วัตถุประสงค์: ศึกษาผลการรักษามะเร็งเต้านมที่ผ่าตัดเต้าออกทั้งหมดด้วยวิธีการฉายรังสีแบบสั้นเปรียบเทียบกับการฉายรังสีแบบปกติภายในโรงพยาบาลมะเร็งอุบลราชธานี

วัสดุและวิธีการ: ศึกษาข้อมูลย้อนหลังของผู้ป่วยมะเร็งเต้านมที่ได้รับการรักษาด้วยการผ่าตัดเต้าออกทั้งหมดตามด้วยการฉายรังสี ภายในเดือนมกราคม พ.ศ.2559 ถึงธันวาคม พศ.2563 ในโรงพยาบาลมะเร็งอุบลราชธานี โดยแบ่งออกเป็น 2 กลุ่มคือ กลุ่มที่ฉายรังสีแบบปกติ (50 Gy/25 ครั้ง) และกลุ่มที่ฉายรังสีแบบสั้น (40-42.56 Gy/15-16 ครั้ง) เพื่อเปรียบเทียบ อัตราการกลับเป็นซ้ำเฉพาะที่ อัตราการปลอดโรค และอัตราการรอดชีพโดยรวมที่ 5 ปี วิเคราะห์ข้อมูลโดย Kaplan-Meier method และ Log rank test วิเคราะห์ตัวแปรที่มีผลต่อการรักษาโดย Cox regression analysis

ผลการศึกษา: จากผู้ป่วยจำนวน 552 คน ได้รับการฉายรังสีแบบปกติ 361 คน และฉายรังสีแบบสั้น 191 คน ค่ามัธยฐานการติดตามผลการรักษา 46 เดือน พบว่า ไม่มีความแตกต่างอย่างมีนัยยะสำคัญของอัตราการกลับเป็นซ้ำเฉพาะที่ใน 5 ปี (87.37 % ในการฉายรังสีแบบปกติและ 86.60% ในการฉายรังสีแบบสั้น (p-value = 0.642)) และอัตราการปลอดโรคที่ 5 ปี (65.14% ในการฉายรังสีแบบปกติและ 73.38% ในการฉายรังสีแบบสั้น (p-value = 0.058)) แต่การฉายรังสีแบบสั้นมีอัตราการรอดชีพโดยรวมที่ 5 ปี สูงกว่าการฉายรังสีแบบปกติอย่างมีนัยสำคัญทางสถิติ 80.29% และ 70.38% ตามลำดับ (p-value=0.015) ระยะของก้อนมะเร็งและtriple negative subtype ถือเป็นปัจจัยพยากรณ์สำคัญที่มีผลต่ออัตราการกลับเป็นซ้ำเฉพาะที่ และอัตราการรอดชีพ

ข้อสรุป: การฉายรังสีแบบสั้นให้ผลการรักษาไม่แตกต่างกับการฉายรังสีแบบปกติในเรื่องการกลับเป็นซ้ำของโรคและระยะรอดชีพโดยปราศจากโรค อีกทั้งยังช่วยลดระยะเวลาการรักษา และค่าใช้จ่ายของคนไข้

คำสำคัญ: การกลับเป็นซ้ำ, มะเร็งเต้านมผ่าตัดเต้าทั้งหมด, ฉายรังสีแบบสั้น, อัตราการปลอดโรค, อัตราการรอดชีพโดยรวม

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Introduction

After mastectomy and axillary dissection, radiotherapy reduced both recurrence and breast cancer mortality in locally advanced breast cancer[1,2]. Based on radiobiological data breast cancer has a low ratio of alpha/beta, encouraging hypofractionated radiotherapy regimens for breast cancer[3].

Long-term results of large randomized trials from the United Kingdom and Canada have confirmed that appropriately dosed hypofractionated radiotherapy is safe and effective for patients with early breast cancer after breast conservation surgery[4,5]. However, information regarding its application in the adjuvant setting after mastectomy in breast cancer patients is still under long-term studies to determine its effectiveness and potential side effects.

In 2019, A large randomized trial from China found that postmastectomy hypofractionated radiotherapy was non-inferior to and had similar toxicities to conventional fractionated radiotherapy in patients with high-risk breast cancer [6]. Recently published trials also support the safety and efficacy of a hypofractionated approach in post-mastectomy breast cancer [7-10].

In our department, hypofractionated radiotherapy has been applied since 2008. We aimed to determine treatment outcomes of postmastectomy hypofractionated radiotherapy in patients with locally advanced breast cancer in Ubonratchathani cancer hospital.

Material and methods

Patients selection

We retrospectively reviewed the medical records of post-mastectomy breast cancer patients who received complete adjuvant radiotherapy at Ubonratchatani Cancer Hospital between January 2016 and December 2020. Inclusion criteria included females who were older than 18 years of age with breast cancer stage II or III, according to anatomical stage group 8th edition of AJCC Cancer Staging, and had a histologically proven invasive carcinoma. Exclusion criteria included those who have immediate reconstruction after mastectomy, incomplete medical record, or history of systemic lupus erythematosus, scleroderma, or previous breast/chest irradiation.

Parameters Assessed

Patient demographic and clinicopathological data including age, body mass index (BMI), cancer stage, histopathology, hormonal status, chemotherapy, hormonal treatment, radiotherapy field and dose were collected. This study was approved by the Ethical Committee of Ubonratchathani Cancer Hospital.

Radiotherapy protocol

Patients were planned in the supine position over a breast board with a vacuum bag using either two dimensions (2D), 3 dimensions conformal radiotherapy (3DCRT) or intensity-modulated radiotherapy (IMRT) treatment

planning. For 2D and 3DCRT techniques, standard two tangential fields were used to treat the chest wall (CW field). Anterior supraclavicular field (SPC field) was added when there was any number of positive dissected axillary lymph nodes, with prescribed to a depth of 3-4 cm beneath the skin to cover supraclavicular lymph node, axillary lymph node level II and III. When there were nodal dissection of less than 10 lymph nodes, massive axillary node extension (Nodal stage 2 and 3) or extracapsular nodal extension, an axillary field (AX field) was allowed to treat axillary lymph node level I. The photon energy used in both groups was 6 MV. A bolus of 1 cm was used over the chest wall field daily for the first half of the radiotherapy course.

The conventional fractionated radiotherapy (CFRT) is the standard approach for post-mastectomy radiotherapy at our department. However, hypofractionated radiotherapy (HFRT) has been used for some patients with financial or travel difficulties and has become more common during the COVID-19 era to reduce treatment duration. Conventional fractionated radiotherapy group was given 5000 cGy/25 fractions. Hypofractionated radiotherapy group was given 4000 cGy/15 fractions or 4256 cGy/16 fractions.

A tumor bed boost of 1000 cGy/5 fractions was applied to the chest wall scar using an en-face electron beam with a 2 cm expansion if the surgical margin was positive. A whole chest wall boost was used in some cases of inflammatory breast cancer. Additionally, a posterior axilla field was created using a conventional dose of 400–1000 cGy when extracapsular nodal extension was presented.

Endpoints

Locoregional recurrence-free survival (LRRFS) was calculated from the date of surgery until the date of local recurrence (ipsilateral chest wall, supra/infraclavicular regions, axilla, and internal mammary region).

Disease-free survival (DFS) was calculated from the date of surgery until the date of local recurrence or distant metastasis which were diagnosed by a physical examination or imaging. Pathological examination for recurrent disease was performed in some cases.

Overall survival (OS) was calculated as the period of time from the date of surgery to the date of death from any cause or the date of the last follow-up. In all the analyses, the data were censored at the date of the last follow-up. The status of the patients and the date of death were obtained by the mortality data from the National Registration Department.

Statistical analysis

Descriptive statistics was used to analyze clinicopathological and treatment data, which were demonstrated as numbers and percentages. Median with interquartile range and mean with standard deviation were used for continuous data. To test the normality of data distribution,

the Shapiro-Wilk normal test was done. All categorical data were analyzed using Fisher's exact test. Student's t-test or Wilcoxon Rank Sum test was used for the analysis of continuous data. P-value less than 0.05 was considered significant. Five-year overall survival, disease free survival and locoregional recurrence free survival were estimated using Kaplan-Meier analysis. Log-rank test was used to test the equality of Kaplan-Meier curves. The Cox proportional hazards model was applied to adjust all important prognostic factors. Prognostic factors with a p-value < 0.25 from univariate analysis and significant factors identified in the literature review were included as covariates in the multivariate model. The backward elimination method was used for selecting significant prognostic factors with p-to-remove > 0.10. A two-sided p-value < 0.05 was considered statistically significant. Calculations were performed using STATA 18 for windows.

Results

Patient characteristics

In the study conducted at Ubonratchatani Cancer Hospital, a total of 552 post-mastectomy breast cancer patients who underwent complete adjuvant radiotherapy between January 2016 and December 2020 were included. Among them, 361 patients received conventional fractionated radiotherapy (CFRT) while 191 received hypofractionated radiotherapy (HFRT). The characteristics of the patients are presented in **Table 1**. The analysis revealed no significant differences between the two groups, except for the radiotherapy technique and radiation boost. The HFRT group had significantly more patients utilizing 3DCRT and fewer using radiation boost compared to the CFRT group (p-value = 0.002 and <0.001, respectively).

Disease's status

The median follow-up time was 46.5 months (range 24.3 - 61.4 months). Locoregional recurrence (LRR) was the initial event in 19 patients (3.44%), with 12 patients (3.32%) in the conventional fractionated radiotherapy (CFRT) group and 7 patients (3.66%) in the hypofractionated radiotherapy (HFRT) group. Additionally, 85 patients (15.40%) experienced distant metastasis as initial event (DM), comprising 64 patients (11.73%) in the CFRT group and 21 patients (10.99%) in the HFRT group. Furthermore, 32 patients (5.80%) had both LRR and DM simultaneously, with 23 patients (6.37%) in the CFRT group and 9 patients (4.71%) in the HFRT group. There was no statistical difference between both groups regarding the 5-year LRRFS and 5-year DFS. The 5-year LRRFS rates for CFRT versus HFRT were 87.37 % (95%CI 82.70-90.85) and 86.60% (95%CI 78.49-91.80) with a p-value of 0.642 (**Figure 1**). The 5-year DFS rates for CFRT versus HFRT were 65.14% (95%CI 58.91-70.67) and 73.38% (95%CI 64.67-80.26) with a p-value of

Table 1. Patient characteristics

Characteristics		Overall n(%) N = 552	CFRT n(%) N = 361	HFRT n(%) N = 191	p-value
Age (years)	Mean (SD)	53.17(10.44)	53.11(9.90)	53.27(11.41)	0.863*
BMI	Median (IQR)	24(21.80,27)	24.20(21.90,27.30)	23.70(21,26.60)	0.167**
Tumor side	Left	268(48.55)	181(50.14)	87(45.55)	0.383
	Right	278(50.36)	175(48.48)	103(53.93)	
	Both	6(1.09)	5(1.39)	1(0.52)	
Histopathology	IDC	525(95.11)	346(95.84)	179(93.72)	0.530
	ILC	10(1.81)	6(1.66)	4(2.09)	
	mixed	12(2.17)	7(1.94)	5(2.62)	
	other	5(0.91)	2(0.55)	3(1.57)	
Cancer stage	II	154(27.90)	95(26.32)	59(30.89)	0.273
	III	398(72.10)	266(73.68)	132(69.11)	
Tumor grade	1	15(2.72)	10(2.77)	5(2.62)	0.559
	2	285(51.63)	181(50.14)	104(54.45)	
	3	233(42.21)	155(42.94)	78(40.84)	
	Unknown	19(3.44)	15(4.16)	4(2.09)	
Tumor stage	T1	51(9.24)	35(9.70)	16(8.38)	0.953
	T2	266(48.19)	172(47.65)	94(49.21)	
	T3	159(28.80)	105(29.09)	54(28.27)	
	T4	76(13.77)	49(13.57)	27(14.14)	
Nodal stage	N0	54(9.78)	35(9.70)	19(9.95)	0.811
	N1	195(35.33)	125(34.63)	70(36.65)	
	N2	180(32.61)	116(32.13)	64(33.51)	
	N3	123(22.28)	85(23.55)	38(19.90)	
Margin status	Free	533(95.56)	352(97.51)	181(94.76)	0.138
	Positive	19(3.44)	9(2.49)	10(5.24)	

Characteristics		Overall n(%) N = 552	CFRT n(%) N = 361	HFRT n(%) N = 191	p-value
Lymphovascular invasion	Not present	200(36.23)	129(35.73)	71(37.17)	0.780
	Present	352(63.77)	232(64.27)	120(62.83)	
Number of node dissection	0-9	67(12.14)	51(14.13)	16(8.38)	0.055
	≥10	485(87.86)	310(85.87)	175(91.62)	
Extracapsular nodal extension	Not present	155(28.08)	98(27.15)	57(29.84)	0.103
	Present	194(35.14)	119(32.96)	75(39.27)	
	Unknown	203(36.78)	144(39.89)	59(30.89)	
ER	Negative	197(35.69)	131(36.29)	66(34.55)	0.710
	Positive	355(64.31)	230(63.71)	125(65.45)	
PR	Negative	247(44.75)	166(45.98)	81(42.41)	0.472
	Positive	305(55.25)	195(54.02)	110(57.59)	
HER2	Negative(0/1+/2+)	367(66.49)	239(66.20)	128(67.02)	0.925
	Positive(3+)	185(33.51)	122(33.80)	63(32.98)	
Triple negative		89(16.12)	58(16.07)	31(16.23)	1
Unknown subtype		1(0.18)	1(0.28)	0	1
Chemotherapy	No	1(0.18)	1(0.28)	0	0.852
	Adjuvant	445(80.62)	288(79.78)	157(82.20)	
	Neoadjuvant	25(4.53)	18(4.99)	7(3.66)	
	Both	81(14.67)	54(14.96)	27(14.14)	
CMT regimen	Taxane based	457(82.79)	295(81.72)	162(84.82)	0.407
	Anthracycline based	70(12.68)	49(13.57)	21(10.99)	0.422
	Other	25(4.53)	17(4.71)	8(4.19)	0.834
Hormonal therapy	No	180(32.61)	121(33.52)	59(30.89)	0.567
	Yes	372(67.39)	240(66.48)	132(69.11)	

Characteristics		Overall n(%) N = 552	CFRT n(%) N = 361	HFRT n(%) N = 191	p-value
Anti-HER2 therapy	No	406(73.55)	268(74.24)	138(72.25)	0.614
	Yes	146(26.45)	93(25.76)	53(27.75)	
RT technique	2D	300(54.35)	214(59.28)	86(45.03)	0.002
	3D	251(45.47)	146(40.44)	105(54.97)	
	IMRT	1(0.18)	1(0.28)	0	
RT field	CW	51(9.24)	34(9.44)	17(8.90)	0.955
	CW+SPC	264(47.83)	171(47.37)	93(48.69)	
	CW+SPC+AX	237(42.93)	156(43.21)	81(42.41)	
RT boost	No	475(86.05)	294(81.44)	181(94.76)	<0.001
	Yes	77(13.95)	67(18.56)	10(5.24)	
Median follow up time(months)	Median (IQR)	46 (23,61)	48(24,62)	44(23,59)	0.514

Abbreviations: AJCC=American Joint Committee on Cancer, AX=axillary lymph node, BMI=body mass index, CFRT=Conventional fractionated radiotherapy, CMT= chemotherapy, CW= chest wall, ER= Estrogen receptor, HER2=Human epidermal growth factor receptor, HFRT=Hypofractionated radiotherapy, IDC =invasive ductal carcinoma, ILC= invasive lobular carcinoma, IQR= Inter Quartile Range, N= number, PR=Progesterone receptor, SPC= supraclavicular. P-value for Fisher's exact except for *student T-test and **Wilcoxon rank-sum test

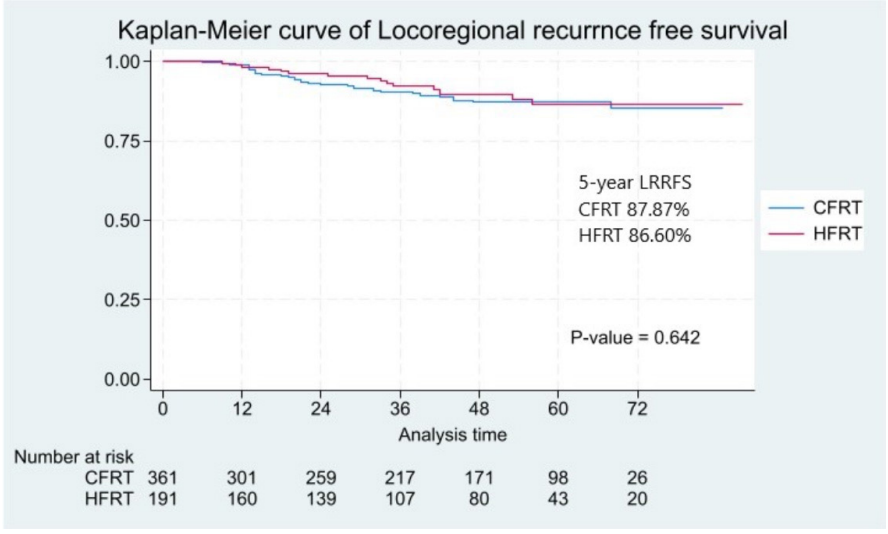


Figure 1. Kaplan-Meier curves of Locoregional recurrence-free survival

0.058 (**Figure 2**). However, the 5-year OS rate was higher in HFRT group than CFRT group; 80.29% (95%CI 73.63-85.44) and 70.38% (95%CI 65.26-74.89), respectively with a p-value of 0.015 (**Figure 3**). When stratified by radiation technique, there was no significant difference between CFRT and HFRT. The 5-year OS when using 2D in CFRT was 69% (95%CI 62.4-74.9) and 75% (95%CI 64.8-83.2) in HFRT with p-value = 0.236 (**Figure 4**); while utilizing 3DCRT, it was 72% (95%CI 64-79) in CFRT and 84.4% (95%CI 75-90) in HFRT with p-value = 0.051 (**Figure 5**).

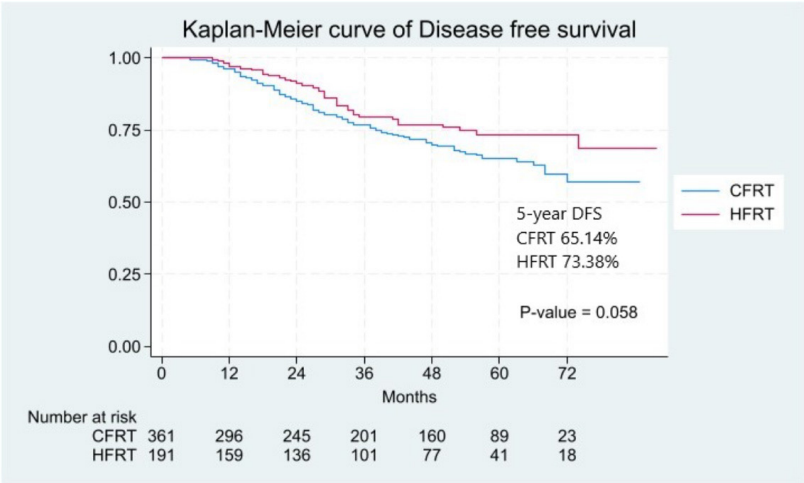


Figure 2. Kaplan-Meier curves of Disease-free survival

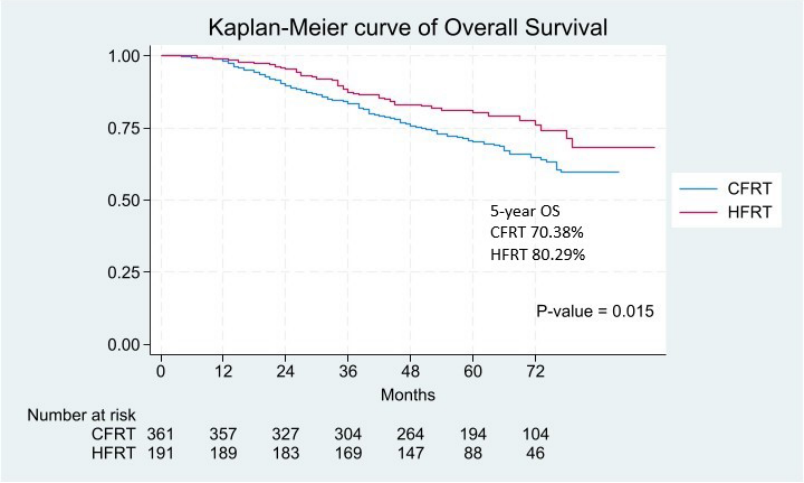


Figure 3. Kaplan-Meier curves of Overall survival

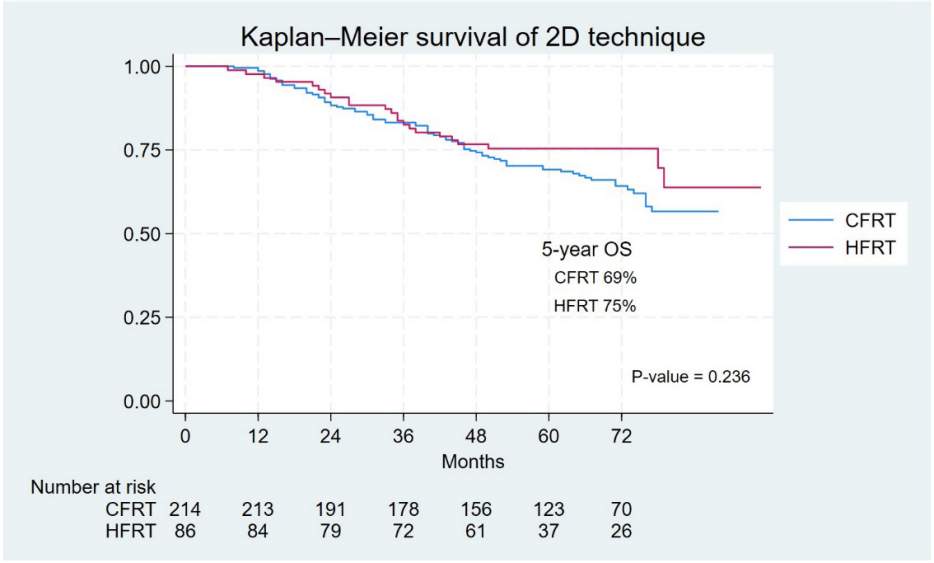


Figure 4. Kaplan-Meier curves of Overall survival when using 2D technique

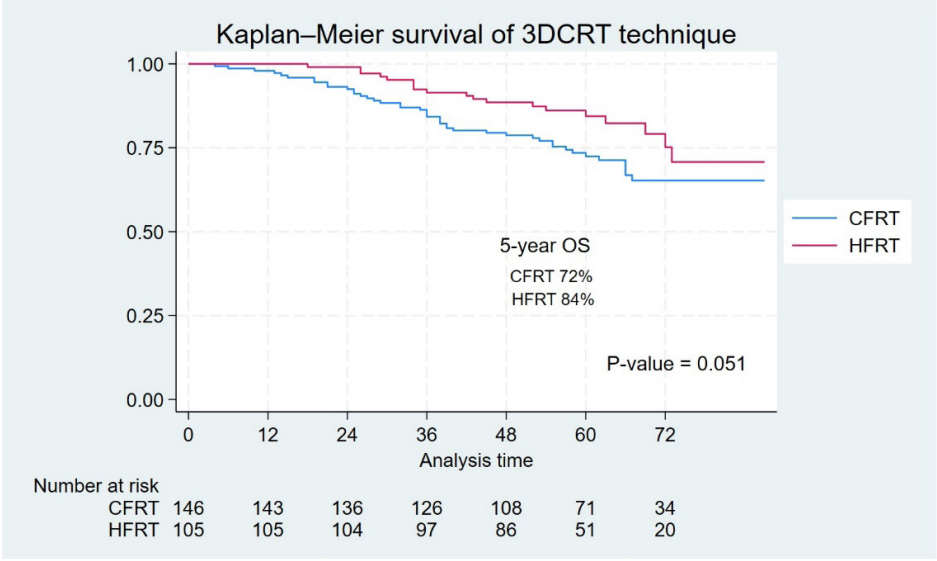


Figure 5. Kaplan-Meier curves of Overall survival when using 3DCRT technique

Adverse effects were recorded in some cases. Acute grade 1-2 skin reactions were reported in 159 cases (140 in the CFRT and 19 in the HFRT). Regarding late toxicity, there were reports of 10 cases of arm lymphedema (4 in the CFRT and 6 in the HFRT), 1 case of deep vein thrombosis in the irradiated arm in the CFRT, and 1 case of death due to congestive heart failure in the HFRT (with a history of prior use of taxane based chemotherapy and anti-HER2 therapy).

Prognostic factors predictive for survival

The univariate analysis revealed that tumor stage, nodal stage, lymphovascular invasion, number of lymph nodes dissection, triple negative subtype, and radiotherapy regimen were significant prognostic factors for survival, and these factors remained significant in the multivariate analysis (**Table 2**).

Prognostic factors predictive for locoregional recurrence

The univariate analysis revealed that tumor stage, triple negative subtype and chemotherapy regimen were significant prognostic factors for locoregional recurrence. However, multivariate analysis finally indicated that tumor stage, triple negative subtype and receiving taxane based chemotherapy regimen were significant prognostic factors (**Table 3**).

Discussion

The National Comprehensive Cancer Network (NCCN) Panel recommends a dose of 40-42.5 Gy in 15 to 16 fractions for all patients getting whole breast radiation without regional nodal radiation after breast conservative surgery. In the postmastectomy setting, conventional fractionation still remains standard of care. A randomized trial from China found that HFRT was as effective as CFRT in terms of disease-free survival (DFS) and overall survival (OS), with comparable toxicity[6]. However, there are some limitations to consider, such as the use of an electron field and omission of axillary lymph node levels I and II while treating the patients.

Our study revealed that the 5-year LRRFS between CFRT and HFRT was comparable (87.37% and 86.60%, respectively (p-value= 0.642)). This is consistent with the results of other retrospective studies about 94-96% in CFRT and 93.9-96.1% in HFRT[8-10]. Our study seems to have a lower 5-year LRRFS, which could be attributed to the higher proportion of unfavorable prognostic factors, such as T3-T4 and N2-N3, which increase the risk of local recurrence.

The 5-year DFS of HFRT (73.38%) trend to be higher than CFRT (65.14%), but this difference was not statistically significant. (p-value=0.058).

Table 2. Univariate and Multivariate Analysis of correlated to overall survival

Variables		univariate		multivariate	
		HR (95% CI)	p-value	HR (95% CI)	p-value
Age group	<40	1	0.974	1	
	≥40	0.99(0.60-1.63)		-	
Tumor stage	T1-2	1	0.001	1	0.001
	T3-4	1.69(1.24-2.29)		1.73(1.26-2.36)	
Nodal stage	N0-1	1	0.004	1	0.001
	N2-3	1.60(1.16-2.20)		1.72(01.24-2.39)	
Lymphovascular invasion	Not present	1	0.003	1	0.003
	Present	1.69(1.19-2.40)		1.73(1.21-2.48)	
Number of lymph node dissection	0-9	1	0.023	1	0.006
	≥10	0.62(0.42-0.94)		0.58(0.37-0.90)	
Triple negative subtype	No	1	<0.001	1	<0.001
	Yes	1.89(1.32-2.72)		2.01(1.42-2.93)	
Taxane based Chemotherapy	No	1	0.341	1	
	Yes	0.83(0.57-1.22)		-	
Anthracycline based chemotherapy	No	1	0.878	1	
	Yes	1.04(0.66-1.62)		-	
RT technique	2D	1	0.148	1	
	3DCRT	0.77(0.57-1.06)		-	
RT regimen	CFRT	1	0.016	1	0.036
	HFRT	0.65(0.46-0.92)		0.68(0.47-0.96)	

Abbreviations: 2D=2-dimensions, 3DCRT= 3-dimensions conformal radiotherapy, CFRT=conventional fractionated radiotherapy, HFRT=hypofractionated radiotherapy, RT=radiotherapy

Table 3. Univariate and Multivariate Analysis of correlated to locoregional recurrence

Variables		univariate		multivariate	
		HR (95% CI)	p-value	HR (95% CI)	p-value
Age group	<40	1	0.093	1	
	≥40	0.54(0.26-1.10)		-	
Tumor stage	T1-2	1	0.002	1	0.001
	T3-4	2.41(1.36-4.25)		2.65(1.49-4.71)	
Nodal stage	N0-1	1	0.203	1	0.053
	N2-3	1.44(0.82-2.55)		1.79(0.99-3.23)	
Lymphovascular invasion	Not present	1	0.117	1	0.081
	Present	1.66(0.88-3.11)		1.77(0.93-3.38)	
Number of lymph node dissection	0-9	1	0.147	1	
	≥10	0.59(0.29-1.21)		-	
Triple negative subtype	No	1	<0.001	1	<0.001
	Yes	3.42(1.92-6.06)		3.42(1.31-6.12)	
Taxane based Chemotherapy	No	1	0.005	1	0.006
	Yes	0.44(0.24-0.78)		0.43(0.24-0.79)	
Anthracycline based chemotherapy	No	1	0.018	1	0.984
	Yes	2.14(1.14-4.03)		0.99(0.32-3.07)	
RT technique	2D	1	0.592	1	
	3DCRT	0.86(0.49-1.49)		-	
RT regimen	CFRT	1	0.643	1	
	HFRT	0.87(0.48-1.57)		-	

Abbreviations: 2D=2-dimensions, 3DCRT= 3-dimensions conformal radiotherapy, CFRT=conventional fractionated radiotherapy, HFRT=hypofractionated radiotherapy, RT=radiotherapy

Similar to other studies reported no statistical difference in 5-year DFS of both RT groups (68.8-91 % in CFRT and 63.5-89.9% in HFRT) [6,8-10]. The HFRT group showed a significantly higher 5-year OS than the CFRT group (80.29% vs. 70.38%, p=0.016), possibly due to more frequent use of the 3DCRT technique (54.97% in HFRT vs. 40.44% in CFRT). Computed tomography treatment planning enhances 3D target visualization, improves dose distribution, and supports better local control and survival. Greenbaum et al. reported better 5-year LRR (3.0% vs. 11.5%, p=0.0004) and overall survival (79.2% vs. 70.6%, p=0.0012) for 2.5D + 3D patients compared to 2D patients[11]. However, stratification by radiation technique showed no significant difference in 5-year OS between CFRT and HFRT. Additionally, the smaller sample size in the HFRT group (nearly half of CFRT) and relatively short follow-up duration compared to other studies[6,9,10] may have influenced the findings.

Multivariate analysis found that tumor stage, nodal stage, lymphovascular invasion were significant prognostic factors for survival consistent with Tovanabutra et al.[10]. Furthermore, this study revealed that hypofractionated radiotherapy positively impacts patient survival. Additionally, taxane based chemotherapy regimen was a significant favorable prognostic factor for reducing local recurrence. This finding can be used as a guideline for selecting the appropriate chemotherapy for the patient.

Limitations

Ubonractchathani Cancer Hospital is the only government hospital in Thailand's northeastern region that offers radiation therapy. Patients from other provinces, including those in remote areas, are often referred back to their primary hospitals, resulting in relatively short follow-up periods. Although this is a retrospective study in single center, we collected data from recent years which 3D planning is currently and widely used, to compare treatment outcomes. Further research in larger samples, longer follow up and treatment toxicity may have provided more informative results, which play an important role in treatment decision-making.

Conclusions

Post-mastectomy hypofractionated radiotherapy achieved comparable LRRFS and DFS to the conventionally fractionated radiotherapy with the advantage of reducing overall treatment time, treatment burden and cost.

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