

Comparative study between hypo-fractionated simultaneous integrated boost-intensity modulated radiotherapy combined with Temozolomide versus 3D conformal radiotherapy combined with Temozolomide in treatment of Glioblastoma Multiforme

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Tab. 1. Comparison between the two studied groups according to demographic data

	Treatment (A)		Control (B)		Test of Sig.	p
	(n=20)		(n=20)			
	No.	%	No.	%		
Sex						
Male	12	60	10	50	$\chi^2=0.404$	0.525
Female	8	40	10	50		
Age (years)						
Min. – Max.	25.0–65.0		19.0 – 65.0		t=0.403	0.689
Mean \pm SD.	50.30 \pm 11.31		51.85 \pm 12.96			
Median (IQR)	52.5 (43.0 – 59.0)		55.5 (49.0 – 61.0)			
Performance status						
0	2	10	0	0	$\chi^2=1.985$	^{MC} p=0.504
1	13	65	13	65		
2	5	25	7	35		
Comorbidity						
No comorbidity	10	50	9	45	$\chi^2=0.100$	0.752
DM	5	25	3	15	$\chi^2=0.6252=5.938$	^{FE} p=0.695
Cardiac	2	10	2	10	$\chi^2=0.000$	^{FE} p=1.000
HTN	5	25	10	50	$\chi^2=2.667$	0.102
Surgery						
No	1	5	0	0	χ	^{MC} p=0.173
Partial	8	40	4	20		
Subtotal	3	15	9	45		
Biopsy	4	20	2	10		
Gross total	4	20	5	25		

Tab. 2. Dosimetric (OARs parameters) comparison between groups

	Group A (n=20)	Group B (n=20)	Test of Sig.	p
Brain stem (GY)				
Min. – Max.	37.60–51.60	41.0–55.20	t=4.417*	<0.001*
Mean \pm SD.	46.02 \pm 4.15	51.60 \pm 3.83		
Median (IQR)	46.35 (42.40–49.35)	52.75 (50.65–54.05)		
Optic chiasm GY)				
Min. – Max.	33.30–51.40	40.0–55.0	t=4.786*	<0.001*
Mean \pm SD.	42.64 \pm 5.88	50.36 \pm 4.18		

	Median (IQR)	40.90 (38.60–48.35)	52.0 (48.15–53.05)		
Eye (GY)	RT				
	Min. – Max.	2.30–25.0	12.80–45.0	U=36.500*	<0.001*
	Mean ± SD.	10.72 ± 7.83	28.98 ± 11.96		
	Median (IQR)	10.45 (4.50–15.80)	26.65 (16.90–42.35)		
	LT				
	Min. – Max.	6.0–35.0	7.50–45.0	U=83.500*	0.001*
	Mean ± SD.	18.42 ± 9.83	31.34 ± 12.93		
	Median (IQR)	14.80 (10.90–30.65)	34.40 (19.35–42.65)		
Lens (GY)	RT				
	Min. – Max.	1.50–9.20	2.70–10.10	U=137.50	0.091
	Mean ± SD.	5.29 ± 2.61	6.75 ± 2.14		
	Median (IQR)	5.35 (2.75–7.50)	7.10 (5.75–8.30)		
	LT				
	Min. – Max.	2.20–8.60	2.40–12.0	U=127.00*	0.049*
	Mean ± SD.	4.83 ± 2.10	6.73 ± 3.05		
	Median (IQR)	4.0 (3.50–5.80)	6.95 (4.0–9.20)		
Optic nerve (GY)	RT				
	Min. – Max.	6.30–48.0	17.90–55.20	U=54.000*	<0.001*
	Mean ± SD.	23.83 ± 14.78	44.92 ± 12.60		
	Median (IQR)	20.70 (13.25–34.65)	52.05 (38.80–53.80)		
	LT				
	Min. – Max.	10.0–43.80	28.40–55.20	U=17.000*	<0.001*
	Mean ± SD.	18.91 ± 11.32	46.16 ± 7.67		
	Median (IQR)	12.80 (10.60–26.75)	47.35 (42.05–52.80)		
Cochlea(GY)	RT				
	Min. – Max.	2.40–36.10	16.70–47.10	U=93.500*	0.003*
	Mean ± SD.	20.46 ± 11.49	33.02 ± 10.91		
	Median (IQR)	23.20 (10.50–31.50)	33.75 (21.80–43.55)		
	LT				
	Min. – Max.	2.70 – 44.80	7.20–45.0	U=85.000*	0.001*
	Mean ± SD.	17.11 ± 11.23	31.47 ± 12.33		
	Median (IQR)	16.65 (11.0–20.40)	36.55 (21.10–42.45)		

Tab. 3. Comparison between the two studied groups according to homogeneity index and confirmatory index

	Group A (n=20)	Group B (n=20)	U	p
Homogeneity index				
Min. – Max.	0.02–0.32	0.03–0.50	87.500*	0.002*
Mean ± SD.	0.08 ± 0.08	0.17 ± 0.12		
Median (IQR)	0.06 (0.03–0.09)	0.10 (0.09–0.22)		
Conformity index				
Min. – Max.	0.92–2.01	0.0–2.69	130	0.06
Mean ± SD.	1.27 ± 0.37	1.49 ± 0.60		
Median (IQR)	1.17 (1.02–1.27)	1.47 (1.20–1.90)		

Tab. 4. Comparison between the two studied groups according to response

Response	Group A (n=20)		Group B (n=20)	
	No.	%	No.	%
CR	2	10	0	0
PR	9	45	8	40
SD	6	30	8	40
PD	3	15	4	20
OAR (CR+PR)	11	55.00%	8	40.00%
DCR (CR+PR+SD)	17	85.00%	16	80.00%

χ^2 : Chi square test
 FE: Fisher Exact
 p: p value for comparing between the two studied groups

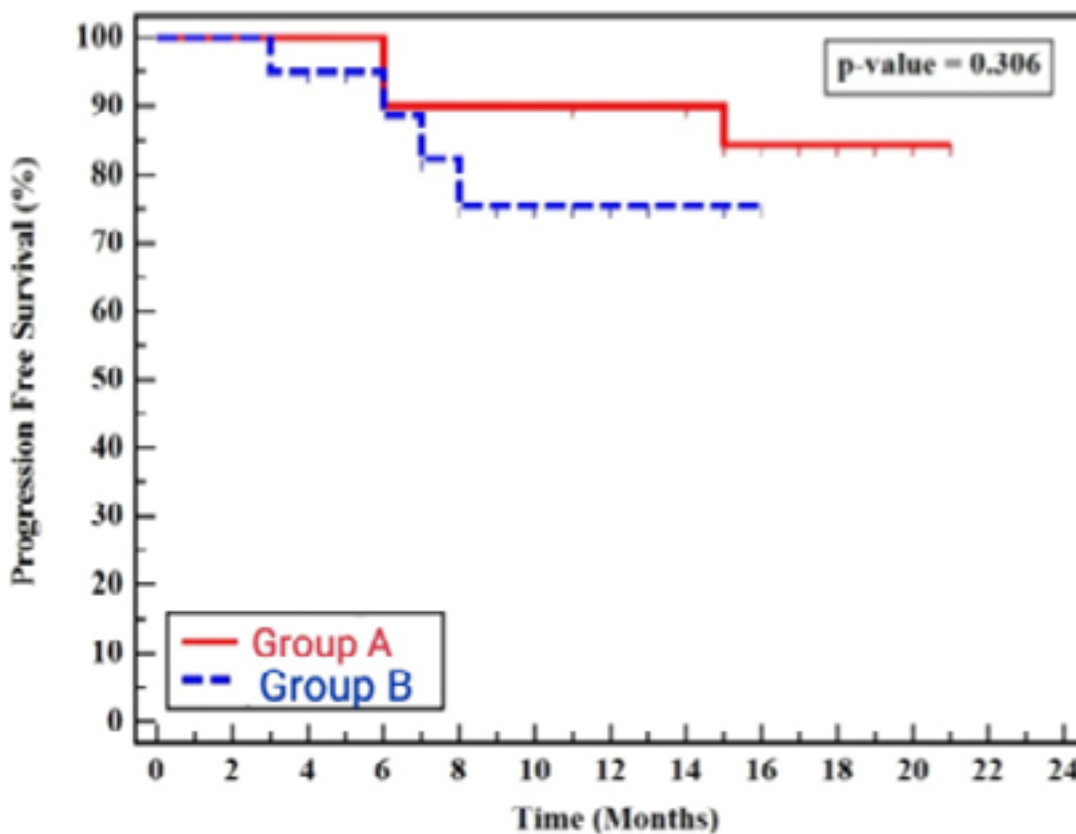


Fig. 1. Kaplan-Meier survival curve for (A): Progression free survival; (B): Overall survival with groups; (C): Overall survival with response in group A; (D): Group B.

Tab. 5. Kaplan-Meier survival curve for overall survival with groups

Groups	Mean	Median	% 1 year	% 2 years	Log rank	
					χ^2	p
Group A	20.854	20	95.00%	38.60%	9.898*	0.002*
Group B	15.289	16	70.00%	12.10%		

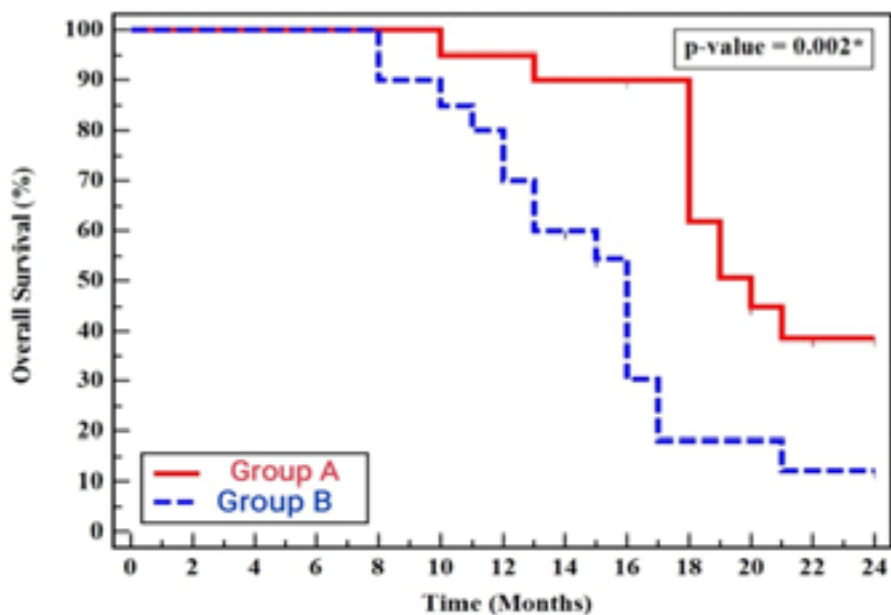


Fig. 2. Kaplan-Meier survival curve for overall survival with groups

Tab. 6. Kaplan-Meier survival curve for overall survival with response in group A

Response	Mean	Median	% 1 year	Log rank	
				χ^2	p
Non-Responsive	20.185	21	88.90%	0.047	0.828
Responsive	21.5	19	100.00%		

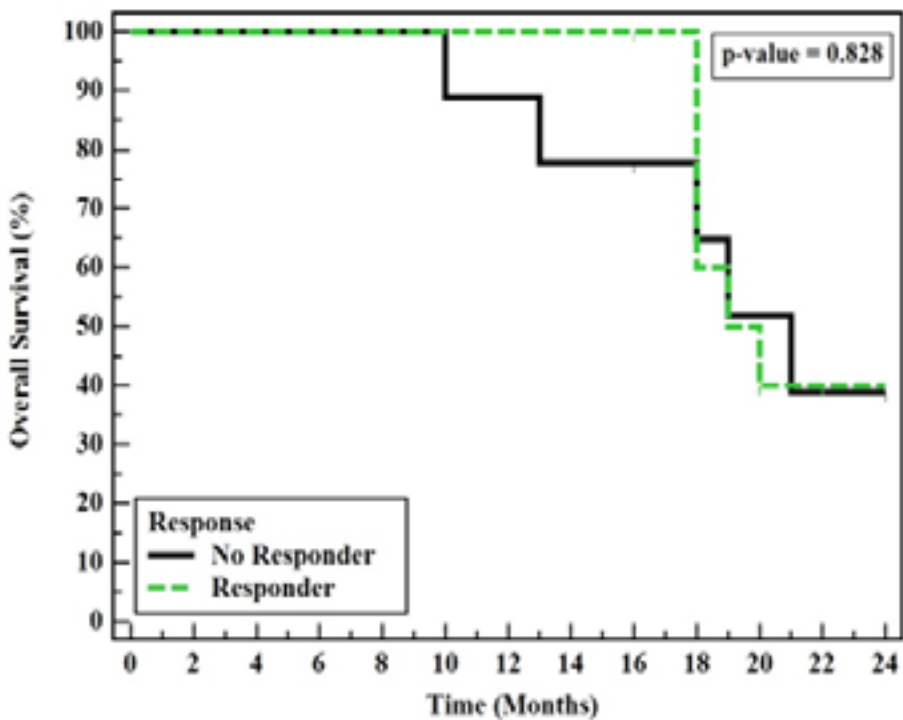


Fig. 3. Kaplan-Meier survival curve for overall survival with response in group A

Tab. 7. Kaplan-Meier survival curve for overall survival with response in group B

Response	Mean	Median	% 1 year	Log rank	
				χ^2	p
No Responsive	16.556	16.000	83.3%	1.890	0.169
Responsive	13.292	12.000	50.0%		

No statistical significance in OS between responsive and non-responsive patients (P=0.169) in group B.

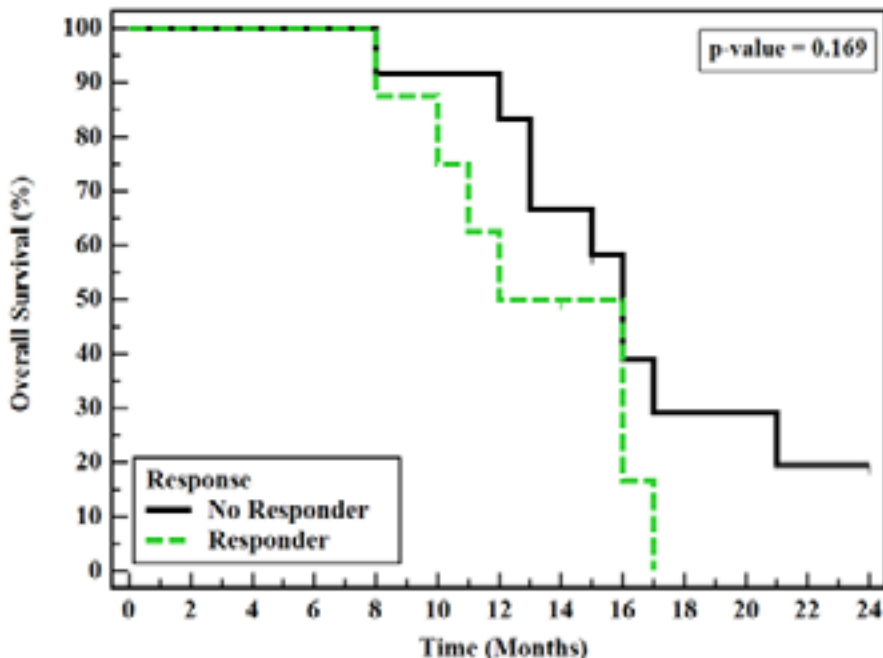


Fig. 4. Kaplan-Meier survival curve for overall survival with response in group B.

Tab. 8. Univariate COX regression analysis for the parameters affecting progression free survival in total sample

	Univariate	
	p	HR (LL-UL 95%CI)
Treatment groups		
Group A	0.323	0.454 (0.095-2.176)
Group B		1
Age (years)		
<50		1
≥50	0.323	0.454 (0.095-2.176)
Sex		
Male		1
Female	0.124	0.189 (0.023-1.578)
Surgery		
No Gross total		1
Gross total	0.528	0.505 (0.061-4.201)
Performance status		
0		1
1	0.432	0.413 (0.046-3.739)
2	0.5	0.436 (0.039-4.864)
HR: Hazard ratio, C.I: Confidence interval, LL: Lower limit, UL: Upper Limit		

Tab. 9. Univariate COX regression analysis for the parameters affecting overall survival in total sample

	Univariate	
	p	HR (LL-UL 95%C. I)
Treatment Groups		
Group A	0.004*	0.308 (0.139-0.685)
Group B		1.000
Age (years)		
<50		1.000
≥50	0.831	1.091 (0.489-2.434)
Sex		
Male		1.000
Female	0.965	0.983 (0.460-2.102)
Surgery		
No Gross total		1.000
Gross total	0.132	0.438 (0.150-1.281)
Performance status		
0		1.000
1	0.380	2.466 (0.329-18.500)
2	0.512	2.019 (0.247-16.508)
HR: Hazard ratio, UL: Upper Limit, *: Statistically significant at p ≤ 0.05, C.I: Confidence interval, LL: Lower limit, UL: Upper Limit, *: Statistically significant at p ≤ 0.05		

Toxicity:

Tab. 10. Comparison between the two studied groups according to toxicity

	Group A		Group B		χ ²	p
	(n=20)		(n=20)			
	No.	%	No.	%		
Hematological						
Anemia						
No	16	80	14	70	2.065	MCp=0.842
G1	4	20	4	20		
G2	0	0	1	5		
G3	0	0	1	5		
G4	0	0	0	0		
Neutropenia						
No	19	95	13	65	5.36	MCp=0.071
G1	1	5	4	20		
G2	0	0	0	0		
G3	0	0	3	15		
G4	0	0	0	0		
Thrombocyto-penia						
No	15	75	14	70	2.89	MCp=0.565
G1	3	15	2	10		

G2	1	5	0	0		
G3	1	5	4	20		
G4	0	0	0	0		
Non hematological						
Neurological						
Cerebral edema						
No	19	95	17	85	1.111	^F p=0.605
G1	0	0	0	0		
G2	0	0	0	0		
G3	1	5	3	15		
G4	0	0	0	0		
Altered consciousness						
No	19	95	17	85	3.607	^{Mc} p=0.359
G1	1	5	0	0		
G2	0	0	2	10		
G3	0	0	1	5		
G4	0	0	0	0		
	Group (A)		Group (B)		χ²	^{Mc}p
	(n=20)		(n=20)			
	No.	%	No.	%		
Concentration disorders						
No	18	90	16	80	3.137	0.409
G1	2	10	1	5		
G2	0	0	3	15		
G3	0	0	0	0		
G4	0	0	0	0		
Skin desquamation						
No	13	65	10	50	4.371	0.268
G1	5	25	4	20		
G2	2	10	2	10		
G3	0	0	4	20		
G4	0	0	0	0		
Pigmentation						
No	11	55	7	35	1.659	0.55
G1	7	35	10	50		
G2	2	10	3	15		
G3	0	0	0	0		
G4	0	0	0	0		
Alopecia						
No	9	45	7	35	0.735	0.802
G1	10	50	11	55		
G2	1	5	2	10		
G3	0	0	0	0		
G4	0	0	0	0		
Others fatigue						

No	13	65	10	50	3.196	0.406
G1	4	20	3	15		
G2	1	5	5	25		
G3	2	10	2	10		
G4	0	0	0	0		
Headache						
No	14	70	12	60	1.944	0.714
G1	2	10	4	20		
G2	3	15	4	20		
G3	1	5	0	0		
G4	0	0	0	0		
Nausea					1.899	^{MC} p=0.603
No	18	90	17	85		
G1	1	5	0	0		
G2	1	5.5	3	15		
G3	0	0	0	0		
G4	0	0	0	0		
Vomiting					2.744	^{MC} p=0.445
No	13	65	11	55		
G1	4	20	2	10		
G2	1	5	4	20		
G3	2	10	3	5		
G4	0	0	0	0		
χ ² : Chi square test, MC: Monte Carlo, FE: Fisher Exact, p: p value for comparing between the two studied groups						