Assessment of Humeral Head Fracture Risk after Radiation Therapy

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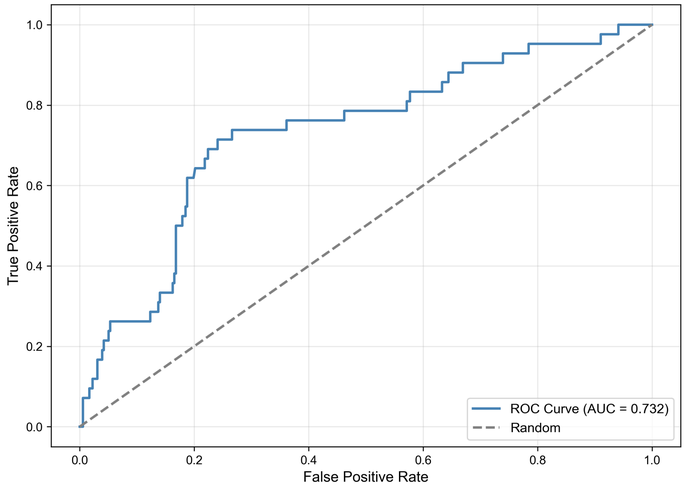
Introduction

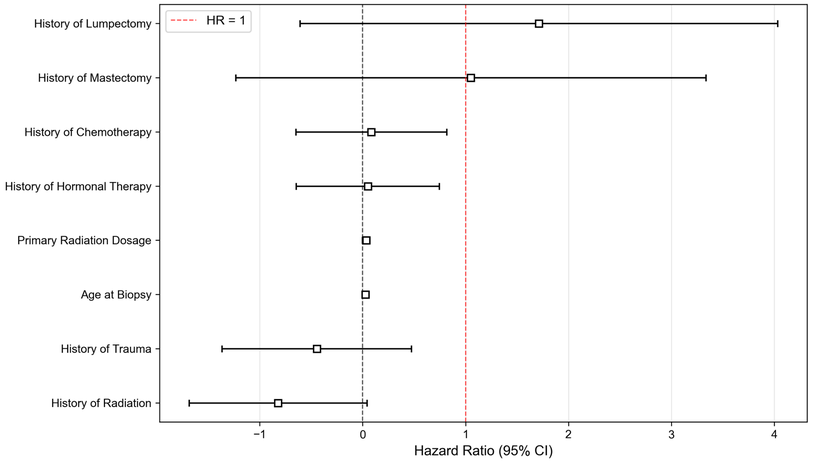
As 1 in 8 American women are diagnosed with invasive breast cancer in their lifetime and with the shift toward breast-conserving surgery, radiation therapy plays a critical role in breast cancer treatment. However, the humerus often receives off-target radiation, and post-radiation humeral head fractures are a rare but serious adverse effect of treatment, as surgical repair of hypovascularized bone is difficult. In addition, aromatase inhibitors increase the risk of fracture. A previous study of 159 patients estimated that 6.06% of patients develop humeral head fractures ipsilateral to the treated breast.

Methods

- Our single-center study included patients with a diagnosis of *in situ* carcinoma or invasive breast cancer. The primary endpoint was development of humeral head fracture ipsilateral to the treated breast.
- We used logistic regression to elucidate associations between development of humeral head fractures and radiation exposure, usage of boost radiation, and hormonal therapy among other studied variables.
- In addition, we used Cox proportional hazards regression to temporally study the development of humeral head fractures.

Results





Variable	Odds Ratio	95% CI	P-value
Age at Biopsy	0.649	[0.000, 10238.210]	0.93
Length of Follow-up	0.855	[0.558, 1.310]	0.471
Dosage (Gy)	0.96	[0.918, 1.005]	0.082
Exposures:			
Chemotherapy	1.148	[0.535, 2.464]	0.723
Hormonal Therapy	0.339	[0.169, 0.679]	0.002
Lumpectomy	0.925	[0.103, 8.344]	0.945
Mastectomy	2.149	[0.213, 21.661]	0.516
Trauma	5.294	[1.765, 15.879]	0.003

Variable	Hazard Ratio	95% CI	P-value
Age at Biopsy	1.027	[0.993, 1.062]	0.119
Primary Radiation Dosage	1.034	[0.997, 1.071]	0.069
Primary Radiation Dosage	1.034	[0.997, 1.071]	0.069
Exposures:			
Chemotherapy	1.086	[0.521, 2.263]	0.825
Hormonal Therapy	1.05	[0.523, 2.107]	0.892
Lumpectomy	5.535	[0.543, 56.415]	0.149
Mastectomy	2.857	[0.291, 28.070]	0.368
Trauma	0.64	[0.255, 1.607]	0.342

Demographics

			Count
Race			
	White		254
	Black		38
	American Indian		26
	Hispanic		20
	Asian		3
Staging			
	T	**In Situ**	18
		1	198
		2	87
		3	26
		4	10
	N	**0**	237
		1	87
		2	14
		3	3
	M	**0**	332
		1	9
Type			
	IDC		251
	ILC		27
	DCIS		23
	Other		40
Receptor Status			
	HER2+		41
	ER/PR+; HER2-		236
	Triple Positive		33
	Triple Negative		27
	Other		45
Therapies			
	Chemotherapy		142
	Hormonal Therapy		287
	Nodal Boost		36
	Fractures		10

Conclusion

- Trauma history was strongest risk factor of fracture
- Hormonal therapy significantly is associated with lower odds of fracture (OR 0.339, p=0.002

Contact

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References

Belaidi L, Loap P, Kirova Y. Do We Need to Delineate the Humeral Head in Breast Cancer Patients? Cancers (Basel). 2022 Jan 19;14(3):496. doi: 10.3390/cancers14030496. PMID: 35158764; PMCID: PMC8833338.

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