

Early versus Delayed Fractionated Stereotactic Radiotherapy for Recurrent Nonfunctioning Pituitary Adenoma

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Introduction

Radiation therapy is a common modality used to treat residual and progressive pituitary adenomas. Stereotactic radiosurgery (SRS) is frequently used with good control rates. Fractionated stereotactic radiotherapy (FSRT) recently has shown to be a viable alternative with similar outcomes to SRS. It is currently unknown whether radiation should be performed early for residual tumor, or delayed until progression occurs. We compare the role of FSRT in the treatment of residual versus progressive disease.

Methods

A retrospective review was performed of all patients who underwent FSRT for a nonfunctioning pituitary adenoma between January 2004 to November 2016 at Thomas Jefferson University. A subgroup analysis was performed comparing the endocrinologic, ophthalmologic, and radiographic outcomes in residual versus progressive pituitary adenoma.

Results

A total of 66 patients were analyzed, with a mean follow-up of 45.3 months. Cavernous sinus involvement and optic apparatus abutment were present in 63.6% and 43.9% of patients. The median FSRT treatment dosage was 50.4 Gy over 28 fractions, with a mean treatment volume of 12.3 mm³. All patients achieved radiographic control, with 15.2% attaining decrease in tumor size. The incidence of new endocrinopathy was 3.0%, and visual deficit was 1.5%.

FSRT for residual and progressive disease occurred in 34 (mean time to treatment 8.4 months) and 32 (mean time to treatment 55.8 months) patients, respectively. The mean treatment volume was 17.2 versus 6.9 mm³ (p<0.05). Treatment for progressive disease resulted in two new endocrinopathies, whereas one case of visual deficit occurred in the treatment for residual disease. There was no significant difference in tumor control rates with FSRT for residual versus progressive disease.

Table 1: Demographics

	N/Average	%	SD
NFA	66	100	
Age	55		14.4
Months between Surgery and Radiation	31.0		38.4
Duration of Follow-up (Months)	45.3		35.4
Pre-radiation Hypopituitarism			
Hypothyroidism	31	47.0	
Hypogonadism	20	30.3	
Hypocortisolism	24	36.4	

Table 2: Residual versus Progression

	Residual	Progressive	p-value
Number	34	32	N/A
Age	54	55.9	NS
Duration of Follow-up	37.3	53.5	NS
Time to Treatment	8.4	55.8	p < 0.01
Mean Treatment Volume	17.2	6.9	p < 0.05
Cavernous Sinus Invasion	21	21	NS
Optic Abutment	17	11	NS
New Endocrinopathy	0	2	p < 0.01
New Visual Deficit	1	0	p < 0.01
Radiographic Tumor Stability	30	24	NS
Radiographic Improvement	3	7	NS

Conclusions

FSRT is a durable treatment modality for the treatment of progressive and residual pituitary macroadenomas. It results in excellent tumor control rates comparable to SRS with a low risk of developing new endocrinopathies and visual deficits. The delayed treatment for tumors due to progression resulted in a greater likelihood of an endocrinopathy whereas early FSRT postoperatively for residual tumor may increase risk of visual compromise.

Learning Objectives

1. Recognize FSRT as an effective treatment option for residual and progressive pituitary adenomas.
2. Compare the role of FSRT in the treatment of residual versus progressive disease.
3. Understand potential complications that can result from FSRT

References

1. Li, X., et al., *Safety and efficacy of fractionated stereotactic radiotherapy and stereotactic radiosurgery for treatment of pituitary adenomas: A systematic review and meta-analysis.* J Neurol Sci, 2017. **372**:p. 110-116.
2. Minniti, G., et al., *Fractionated stereotactic radiotherapy for large and invasive non-functioning pituitary adenomas: long-term clinical outcomes and volumetric MRI assessment of tumor response.* Eur J Endocrinol, 2015. **172**(4): p. 433-41.
3. Sheehan, J., et al., *Congress of Neurological Surgeons Systematic Review and Evidence-Based Guideline for the Management of Patients With Residual or Recurrent Nonfunctioning Pituitary Adenomas.* Neurosurgery, 2016. **79**(4):p. E539-40.