RADIOSURGERY(RS) OPTIONS FOR BENIGN TUMORS IN THE ELDERLY

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The incidence of primary brain tumors is highest in elderly patients, and advanced age often is a negative prognostic factor for presence of multiple comorbidities, polypharmacy therapy and a potential increased risk for radiation-induced neurotoxicity . Also, large randomized prospective studies in this population are scarce. In this context is of primary importance a Comprehensive Geriatric Assessment (CGA), that takes into account comorbidities and life expectancy to define the best treatment approach. In the recent years the development of new technologies in radiation therapy allowed us to treat a greater number of elderly patients. In particular radiosurgery that can be performed with Gamma Knife, Linear Accelerator or proton beam techniques permiting the delivery of ablative doses of radiation therapy, in a single or few fraction, focused selectively to the tumor with maximum sparing of surrounding normal structures, has taken to a reduction of the burden of care with minimum toxicity. RS is widely used in the treatment of Central Nervous System disease and it is performed in about 30% of Benign Brain Tumors: 45% of meningiomas, 30% of vestibular schwannomas and 15% of pituitary adenomas.

Meningiomas account for approximately 30% of all primary brain tumors and are most common in older adults. Surgical resection is still the treatment of choice for meningiomas. Radiosurgery is indicated in patients unsuitable for surgery, in cases of subtotal resection or recurrent meningioma. In most of series the local control rate is major than 90% with toxicity inferior to 5%.

Vestibular Schwannoma is a benign neoplasm originating from the epineural schwann cells of the vestibular portion of the eighth cranial nerve and represents about 10% of all benign brain tumors. Most cases are unilateral and sporadic. Although these tumors are rarely fatal, symptoms such as hearing loss, tinnitus, imbalance, and cranial nerve deficits can significantly impair the quality of life. With improved MRI availability, vestibular schwannoma are increasingly diagnosed at earlier stages. The natural history of vestibular schwannoma is typically characterized by gradually progressive growth with gradual sensorineural hearing loss and potentially other cranial nerve deficits. A subset of patients can present with sudden hearing loss. Less than 5% of tumors may regress slightly with surveillance. Surveillance may be the best option for elderly patients or those with significant other medical comorbidities and can be considered for patients with small, asymptomatic tumors. Contraindications include brainstem compression, hydrocephalus, and, arguably, the desire to preserve hearing. Microsurgery or Radiosurgery are indicated in case of small tumors up to 3 cm and/or symptomatic patients while surgery is indicated in case of tumor major than 3 cm. When RS is chosen as the treatment option, the recommended dose is 12 to 13 Gy in a single fraction. Initial experiences with doses in the range of 16 to 20 Gy resulted in a higher rate of treatment-related toxicity. The risk of sensorineural hearing loss is related to the dose of radiation delivered to cranial nerve VIII, the cochlea, and the ventral cochlear nucleus.

When Marginal dose ≤ 13 Gy, Cochlear dose 4.2-4.75 Gy, Coclear nucleus dose ≤ 10 Gy, Brain stem dose (0.1cm) ≤ 12 Gy are respected the risk of treatment related toxicity is very low <5%. The local control rate is greater than 90% comparable with those of surgery with better facial nerve function and hearing preservation. Because of the minimally invasive nature and excellent clinical outcomes achieved with SRS practice patterns at some institutions are shifting to favor of SRS over resection. For Pituitary Adenoma, given the different clinical presentations of these tumors along with their complex anatomic locations and proximity to critical structures such as the optic apparatus, cranial nerves, and internal carotid arteries, a multidisciplinary approach is needed for optimal patient care. The primary objectives of therapy include preservation or restoration of normal hormonal function, reversal of endocrine dysfunction, removal or control of the tumor mass effect, and reversal of neurologic symptoms. Modern surgical approaches, medical management, and innovative radiation techniques have improved the likelihood of accomplishing these goals. About 80% of pituitary adenomas in elderly patients are non-secreting, requiring careful differential diagnosis with non-adenomatous sellar lesions. No consensus guidelines are available about the use of radiation therapy in elderly patients with PAs, but limited experience indicates that conventional radiotherapy is feasible in this age group with excellent local control. About Radiosurgery it is generally believed that lower doses (14 to 18 Gy) are sufficient for nonfunctioning adenomas, whereas higher doses (18 to 35 Gy) are needed for functioning pituitary tumors. Because the efficacy of SRS for functioning pituitary adenomas may be compromised by the concomitant use of hormone-suppressing medical therapies, these drugs are typically stopped 6 to 8 weeks before and after SRS. Given the proximity of the pituitary tumor to adjacent critical structures, particularly the optic nerves and chiasm, appropriate selection of patients for SRS is needed. Local control is 92-100% with tumor volume decresed in > 50% of patients on MRI. Concluding, in elderly patients with benign brain tumor is essential an approach "patient based" in a multidisciplinary context where all specialists are involved, recommending a careful geriatric assessment in order to define the best therapeutic strategy.

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