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Frameless Radiosurgery Is a Safe and Effective Treatment for Medically-Refractory Trigeminal Neuralgia in Elderly Patients

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Abstract

Objectives:

Trigeminal Neuralgia(TN) is a devastating pain disorder often affecting elder patients. Medical therapy failure is common, either due to drug intolerance or refractoriness . Surgical treatment options in very old patients can be restricted by a variety of health issues . Frameless radiosurgery provides the least invasive treatment today available for TN . Radiosurgery is a widely proven treatment for TN with an exceedingly rare complication rate (aside from sensory dysfunction). This paper aims to investigate the safety and efficacy of frameless radiosurgery for TN in the elderly population.

Methods:

A cohort of 503 TN patients treated with frameless Cyberknife radiosurgery from 2013 to 2023 was restrospectively analyzed to extract outcome data regarding patients older than 80 years.Pain intensity was assessed using the Barrow Neurological Institute Pain Scale (BNI-PS) and the Visual Analogue Score(VAS) . Facial numbness was evaluated using the BNI Numbness Scale (BNI-NS). Pre- and post-treatment scores have been assessed,respectively, immediately before undergoing treatment and 3,6,9 and 12 months after. The post-treatment scores after 12 months are reported. Treatment protocol has been previously described: in short, a 6 mm segment of the nerve in retrogasserian/midcisternal location typically receives a prescribed dose of 60 Gy. Prescription isodose is usually set at the 80%. Maximum dose does not exceed 75 Gy.Treatment volume is typically around 30 mm^3. In case of retreatment due to failure of the first treatment or relapse, the dose typically prescribed is 40 Gy. Treatment is tailored to patient anatomy, so that lenght of the nerve treated, prescribed dose and prescription isodose, maximum dose and treatment volume may change substantially from case to case.

Results:

This cohort of 503 patients included 298 patients younger than 70 year old (59%) and 205 patients older than 70(41%). Patients older than 70 included 134 patients aged 70-79 (27%), 62 patients aged 80-89 (12%) and 9 patients aged 90-100 (2%). Clinical outcomes of 71 patients aged 80 to 100 years (14 % of the entire cohort, median age 83 y) are reported. The median age of the 90-100 year old group was 92 y. The median age of the 80-89 year old group was 82 y. The median prescribed dose in both groups was 60 Gy (range 40-65 Gy). 5 patients out of 71(7%) underwent retreatment after previous CK radiosurgery receinving 45 Gy(2) or 40 Gy(3), all achieved stable pain pain control.
BNI-PS pre-treatment score was V in 39 patients, IV in 25, III in 7, II and I in 0. No patients had post-treatment BNI-PS scores of V and IV. Scores of III,II, and I have been found, respectively, in 9, 27 and 35 patients.

Pre-treatment VAS score was 7-10 in 64 patients, 4-6 in 7 and < 4 in 0. Post-treatment VAS score was 7-10 in 0, 4-6 in 12 and < 4 in 59.

BNI-NS pre-treatment score was I in 62 patients, II in 9, III and IV in 0. BNI-NS post-treatment score was I in 54, 15 in 9, III in 2 and IV in 0.

In summary, pain disappeared or improved in respectively 59 (83%) and 5 (7%) patients while only 2 out of 71 (3%) developed hypoesthesia associated with bothering paresthesias(grade III BNI-NS).

Conclusion(s):

Frameless radiosurgery provides excellent outcomes in the treatment of TN in the elderly population. No major medical or neurological complication was found .Pain improved or disappeared in 90% of the patients while only 3% developed bothering paresthesias. These data not only show remarkable efficacy and safety of frameless TN radiosurgery in the elderly population but also support the notion that radiosurgery should be considered as the elective treatment for elderly patients with medically-refractory TN. Further study is needed .