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Use of Stereotactic Radiosurgery for Stellate Ganglion Block - Feasibility and the First Outcomes

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Abstract
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Abstract

Objective: Stellate ganglion block (SGB) is used for the treatment of many medical conditions such as hyperhidrosis, hand blood flow disturbances and face flushing. When permanent surgical sympactectomy is contraindicated, there are temporary options using of fenol or radiofrequency energy.
High efficacy of the"functional radiosurgery" has been proven in the past what led us to perform the first radiosurgery ablation of stellate ganglion for a patient with refractory angina pectoris (AP).

Methods: A 66-old male with ischemic heart disease unsuitable for the cardiac sympathetic denervation for comorbidities with verified responsiveness for ultrasound- navigated anesthetic blockade of the left stellate ganglion (SG) with only temporary effect (14 days). The patient was irradiated with 40Gy in one fraction to ganglion area. We used CyberKnife system and XsightSpine tracking due to the close proximity of the target to spine structures. The clinical target volume was stellate ganglion (0,4cm3) without additional margin to reduce possible toxicity in surrounding organ at risk (OAR). The influence of the right SG was verified with another 2 anesthetic blockades applied to the right 10 months after the left SG radiosurgery with temporary remission of AP symptoms. 11 months after the left SG irradiation, we repeated the procedure for the right SG what caused disappearance of AP symptoms.

Results: Altogether 109 and 88 nonisocentric beams for respective site were used for the left and right SG radiosurgery with relatively high conformity index (1.43; 1.48) due to small PTV volume and OARs protection (esophagus, carotid arteries), and mean doses to PTV of 45.4 and 45.9 Gy. Dose of 40Gy was prescribed to 78 and 77% isodose line with maximum dose of 51.3 and 51.9Gy for the left and right SG, respectively. All OAR met standard dose constraints for SBRT.
4 months after the left SG radiosurgery the patient reported reduction of AP episodes and 50% reduction in nitrate use. 6 months after treatment we reported worsening symptoms but additional anesthetic blockade was without effect indicating elimination of the left SG.
2 months after the right SG radiosurgery patient reported complete remission of AP but worsening of dyspnea and overall performance. Atrial fibrillation was newly detected on ECG but the relationship to radiosurgery is unlikely.
No side effects or radiation related toxicity was found after 10 months since the 2nd radiosurgery. Patient reported complete remission of AP and discontinuation of nitrate use.

Conclusion: Stereotactic radiosurgery for stellate ganglion block seems to be feasible as a bail-out procedure for patients unsuitable for permanent surgical sympactectomy and has a potential to become a noninvasive option for sympactectomy. Further research on this topic is highly warranted.