Cureus
Part of SPRINGER NATURE

Open Access
Abstract

Cureus

Role of Integral Dose in Treatment Outcome of Trigeminal Neuralgia Frameless Radiosurgery

Open Access
Abstract
Published 03/05/2025

Copyright
© Copyright 2025
Frassanito et al. This is an open access abstract distributed under the terms of the Creative Commons Attribution License CC-BY 4.0., which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Distributed under
Creative Commons CC-BY 4.0

Maria Cristina Frassanito [1], Bhargava S. Chitti [2], Evan Thomas [3], Pantaleo Romanelli [4]

1. Radiation Oncology, Mater Dei Hospital, CBH- Città di Bari Hospital, Bari, ITA 2. Radiation Oncology, Northwell Health, New York, USA 3. Radiation Oncology, Ohio State University, Columbus, USA 4. Neurosurgery, Cyberknife Center, Centro Diagnostico Italiano, Milano, ITA

Corresponding author: Maria Cristina Frassanito, cristinafrassanito@hotmail.com

Categories: Medical Physics, Radiation Oncology
Keywords: radiosurgery, trigeminal neuralgia

How to cite this abstract
Frassanito M, Chitti B S, Thomas E, et al. (March 05, 2025) Role of Integral Dose in Treatment Outcome of Trigeminal Neuralgia Frameless Radiosurgery. Cureus 17(3): a1492

Abstract

Objectives:

Radiosurgery (RS) is today an established modality to treat Trigeminal Neuralgia (TN). Cyberknife (CK) and dedicated Linear accelerators provide not invasive frameless procedures to treat TN with safety and accuracy. One emerging concept is that the RS radiobiological effect is related more to the energy delivered to the nerve root volume rather than to the maximal dose at a restricted location of the nerve. This work is a systematic review of the published studies of frameless TN RS , aiming to evaluate the correlation between the Integral Dose (ID)to the nerve and treatment outcomes.

Methods:

We performed a bibliographic research of the Pubmed database with the keywords: “CK+Trigeminal” and “Linac+Trigeminal” in “All Fields”. Inclusion criteria were prospective and retrospective studies written in the English Language. Exclusion criteria were papers inclusive of re-treatments and with the same authors describing results on previously published population. 26 distinct studies for CK and 18 for Linac treatments were initially identified. To evaluate the ID, papers including information on prescription doses and nerve volumes irradiated were selected.

Results:

We included 12 studies on CK and 2 on LINAC in the analysis. For each study, we extracted the percentage of patients who obtained pain relief and that suffered side effects after the treatment. The ID was calculated as the product of the delivered dose and target nerve volume. Studies were divided into two groups, each having ID < or > to 2mJ. In Group 1 (973 cases): meanID=(1.64±0.4)mJ, in Group 2 (172cases): meanID= (6.47±6.63)mJ. It was found that mean treatment success percentage was 79% in Group 1 and 84.84% in Group 2 and mean dysfunction percentage was 33% in Group 1 and 27.57% in Group 2.

Conclusion(s):

This study shows that higher ID provides better pain control without an increase of the incidence of trigeminal dysfunction. For Linac based, non isocentric treatments, the trigeminal nerve target volume can be modulated to fit individual anatomy and ID can therefore be tailored to reach a clinical objective. Limit of the work is that number of cases and follow up duration varies among the different papers. A prospective study investigating the relationship of integral dose and treatment success is needed to validate this thesis.