J Neurooncol. 2022 Jul 9. doi: 10.1007/s11060-022-04079-4. Online ahead of print.

How ten-years of reirradiation for paediatric high-grade glioma may shed light on first line treatment.

Massimino M(#)(1), Vennarini S(#)(2), Barretta F(3), Colombo F(4), Antonelli M(5), Pollo B(6), Pignoli E(7), Pecori E(2), Alessandro O(2), Schiavello E(8), Boschetti L(8), Podda M(8), Puma N(8), Gattuso G(8), Sironi G(8), Barzanò E(8), Nigro O(8), Bergamaschi L(8), Chiaravalli S(8), Luksch R(8), Meazza C(8), Spreafico F(8), Terenziani M(8), Casanova M(8), Ferrari A(8), Chisari M(9), Pellegrini C(9), Clerici CA(8)(10), Modena P(11), Biassoni V(8).

Author information:
(1)Pediatrics (MM, LB, VB, ES, CAC), Fondazione IRCCS Istituto Nazionale Dei Tumori, Milan, Italy. maura.massimino@istitutotumori.mi.it.
(2)Pediatric Radiotherapy (SV, FC, EP, OA), Fondazione IRCCS Istituto Nazionale Dei Tumori, Milan, Italy.
(3)Medical Statistics, Biometry and Bioinformatics (FB), Fondazione IRCCS Istituto Nazionale Dei Tumori, Milan, Italy.
(4), Milan, Italy.
(5)Radiological, Oncological and Anatomo-Pathological Sciences (MA), Department of La Sapienza University, Rome, Italy.
(6)Neuropathology (BP) Unit, Fondazione IRCCS Istituto Neurologico Carlo Besta, Milan, Italy.
(7)Medical Physics (EP), Fondazione IRCCS Istituto Nazionale Dei Tumori, Milan, Italy.
(8)Pediatrics (MM, LB, VB, ES, CAC), Fondazione IRCCS Istituto Nazionale Dei Tumori, Milan, Italy.
(9)Pain Therapy and Rehabilitation Units (MC), Fondazione IRCCS Istituto Nazionale Dei Tumori, Milan, Italy.
(10)Hemato-Oncology Department La Statale University, Milan, Italy.
(11)Laboratory of Genetics (PM), S. Anna General Hospital, Como, Italy.
(#)Contributed equally

PURPOSE: Recurrence incidence for paediatric/adolescent high-grade glioma (HGG) exceeds 80%. Reirradiation (reRT) palliates symptoms and delays further progression. Strategies for reRT are scarce: we retrospectively analysed our series to develop rational future approaches.

METHODS: We re-evaluated MRI + RT plans of 21 relapsed HGG-patients, accrued 2010-2021, aged under 18 years. All underwent surgery and RT + chemotherapy at diagnosis. Pathologic/molecular re-evaluation allowed classification based on WHO 2021 criteria in 20/21 patients. Survival analyses and association with clinical parameters were performed.

RESULTS: Relapse after 1st RT was local in 12 (7 marginal), 4 disseminated, 5 local + disseminated. Re-RT obtained 8 SD, 1 PR, 1PsPD, 1 mixed response, 10 PD; neurological signs/symptoms improved in 8. Local reRT was given to 12, followed again by 6 local (2 marginal) and 4 local + disseminated second relapses in 10/12 re-evaluated. The 4 with dissemination had 1 whole brain, 2 craniospinal irradiation (CSI), 1 spine reRT and further relapsed with dissemination and local + dissemination in 3/four assessed. Five local + disseminated tumours had 3 CSI, 1 spine reRT, further progressing locally (2), disseminated (1), n.a. (1). Three had a third RT; three were alive at 19.4, 29, 50.3 months after diagnosis. Median times to progression/survival after re-RT were 3.7 months (0.6-16.2 months)/6.9 months (0.6-17.9 months), improved for longer interval between 1st RT and re-RT ($P = 0.017$) and for non-PD after reRT ($P < 0.001$). First marginal relapse showed potential association with dissemination after re-RT ($P = 0.081$).

CONCLUSIONS: This is the biggest series of re-RT in paediatric HGG. Considering

the dissemination observed at relapse, our results could prompt the investigation of different first RT fields in a randomized trial.

DOI: 10.1007/s11060-022-04079-4
PMID: 35809148