Pleomorphic Xanthoastrocytoma Radiotherapy

While surgical resection is the mainstay of treatment, radiotherapy (RT) can play a role in selected cases.

 Radiotherapy in PXA: Indications & Considerations

 When is RT considered?

Incomplete surgical resection:

RT may be considered postoperatively if gross total resection (GTR) is not achieved and the residual tumor is significant or symptomatic.

Anaplastic PXA (WHO grade III):

More aggressive behavior justifies adjuvant therapy.

RT is commonly used post-surgery regardless of resection extent.

Recurrence or progression:

Salvage RT is an option for tumor recurrence, especially if further surgery is not feasible.

Inoperable tumors:

In rare cases where surgery is impossible (e.g., critical location), definitive RT can be considered.

 Radiotherapy Modalities and Dose Conventional fractionated RT:

Typical dose: 50.4–60 Gy in 1.8–2.0 Gy fractions.

Often used postoperatively in anaplastic or incompletely resected tumors.

Stereotactic radiosurgery (SRS):

Can be considered for small recurrences or well-defined lesions.

Not standard in newly diagnosed cases due to larger size or proximity to critical structures.

Proton therapy:

May be considered to spare normal tissue, especially in pediatric patients.

⚠ Caveats and Special Notes Molecular markers: BRAF V600E mutation is common in PXA. Targeted therapies (e.g., BRAF inhibitors) are being explored, especially in recurrent or progressive disease.

Radiation-induced toxicity: Especially relevant in younger patients—requires careful planning.

Surveillance post-RT: MRI follow-up every 3–6 months initially; monitor for pseudoprogression and late effects.

A meta-analysis of 167 patients with grade II Pleomorphic Xanthoastrocytoma did not demonstrate an association between adjuvant therapy with improved oncologic outcomes; the majority of patients (76%) had RT utilized as a salvage treatment upon recurrence [1]. Given the paucity of data, using RT doses in the range of 45–54 Gy for either adjuvant or salvage treatment appears reasonable, with or without concurrent temozolomide. Earlier incorporation of radiation for subtotal resection and/or aPXA may be considered given the poorer outcomes associated with these factors. Craniospinal RT may be warranted for leptomeningeal dissemination on recurrence or at initial diagnosis [2] [3] [4].

Detti et al. did not reveal a strong prognostic or predictive factor able to address pleomorphic xanthoastrocytoma management; however, in selected patients could be considered the addition of adjuvant radiation chemotherapy treatment after adequate neurosurgical primary resection. Furthermore, recurrent disease evidenced a detrimental impact on survival [5].

Pathology is notable for anaplasia in ~15% of PXAs, but there is no consensus regarding any advantage of adjuvant postsurgical therapy [6].

Petruzzellis et al. reported the case of an 8-years-old child with DS that presented to our attention for neurological and endocrinological issues. Brain imaging revealed the presence of a mass that was partially resected revealing a histological diagnosis of Pleomorphic Xanthoastrocytoma (PXA), a rare WHO grade II tumor extending from the diencephalic region into the surrounding brain tissue. These tumors can harbor the BRAF mutation p.V600E, targetable by the specific inhibitor Vemurafenib. After confirming the presence of the mutation in the tumor, the patient was treated with Vemurafenib. The treatment proved to be effective, leading to a partial response and a stabilization of the disease. Usually, in patients with DS a reduction of the dose of chemotherapeutic drugs is necessary. Vemurafenib was instead well-tolerated as the only observed adverse effect was grade I skin toxicity. This is, to our knowledge, the first case of a PXA reported in a child with DS and the first DS patient treated with Vemurafenib [7]

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7)

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