Intra-Arterial Chemotherapy for Rhabdomyosarcoma: Case Report

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Case Diagnosis

parameningeal embryonal rhabdomyosarcoma

Case Description

- The patient is a boy born in 1999 who developed stage III parameningeal embryonal rhabdomyosarcoma initially diagnosed in July 2010, at the age of 10 years.
- He underwent treatment on the VAC-VI arm of Children's Oncology Group's (COG) ARST0531 which included proton radiation to the primary site and cervical lymph nodes.
- He was randomized to receive temsirolimus along with the backbone of vinorelbine and cyclophosphamide on Arm B of COG ARST0921 and underwent proton radiation to the primary site in the nasopharynx.
- With second local recurrence treatment was considered palliative, with goals to extend high quality of life by inducing a prolonged treatment response, and to decrease facial pain from nerve impingement. IA chemotherapy was considered.
- Multi-agent chemotherapy, was determined to be too toxic given the goals of care. Radiation and surgery were also not considered good options for the tumor due to location and prior treatment.

Figure 1a-1b

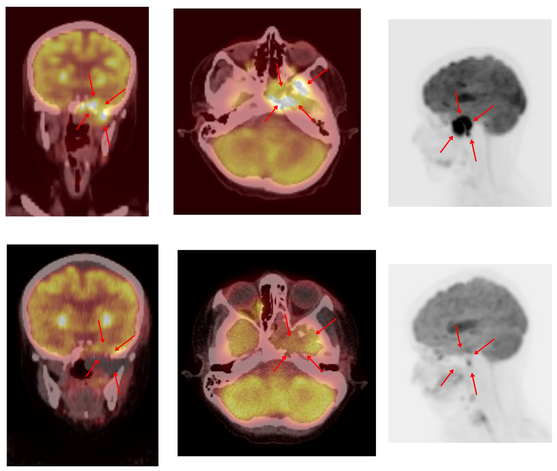

Figure 1: (a) PET-CT of tumor prior to IA chemo; (b) Tumor post 2 rounds IA chemo (cisplatin/doxorubicin)

Novel Treatment

- Melphalan was chosen as the initial agent.
- The left internal maxillary artery supplied the tumor.
- After two cycles of melphalan patient had increased facial pain, ptosis in the left eye, decreased appetite, lethargy, and blood-tinged nasal secretions. Tumor increased in size.
- Treatment transitioned to novel IA therapy with cisplatin, doxorubicin, and oral etoposide. IA treatment with cisplatin 100 mg/m^2 (in 1 mg/ml D5 ½ NS over 60 minutes) and doxorubicin 4.5 mg/m^2 (in 25 ml D5 ½ NS over 15 minutes) was planned for every two weeks.
- Administration criteria for each cycle: GFR $\geq$ 70 ml/min/1.73 m^2, or a normal serum creatinine based on age/gender, and adequate liver function.
- After two cycles of of cisplatin/doxorubicin: the pain and ptosis improved, but patient experienced tinnitus. Labs showed: leukopenia, thrombocytopenia, and neutropenia.
- PET-CT of the head and neck showed evidence of tumor necrosis (Figures 1a-b).
- IA chemotherapy treatments spaced to every 3 weeks and decrease cisplatin dose by 50% to decrease toxicity, held etoposide to improve cell counts.
- When the patient was due for his 3rd IA cycle it was discovered on angiogram that the left internal maxillary artery was no longer visible (Figures 2a-b).
- Oral chemotherapy was continued. Repeat imaging 3 weeks after discontinuing IA therapy showed progression of the tumor
- The patient, family, and team decided to redirect care toward comfort measures only, and he died in August 2014.

Figure 2a-2b

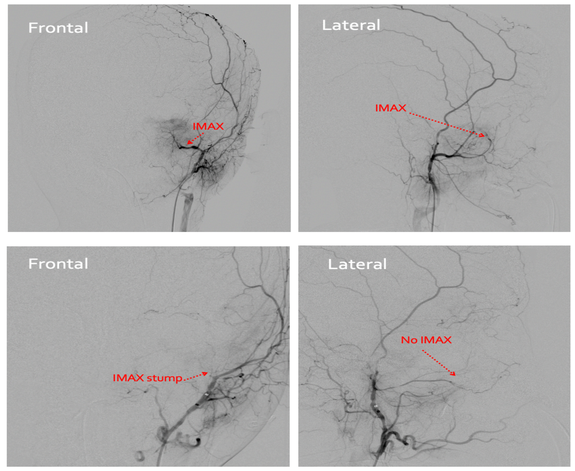

Figure 2: (a) Internal maxillary artery (IMAX) pre-treatment; (b) Internal maxillary artery post 2 rounds IA chemo (cisplatin/doxorubicin)

Discussion

- One of the main benefits of IA chemotherapy is a more efficient delivery of chemotherapeutic agents, leading to higher intratumoral concentrations. More precise delivery also limits potential systemic effects of chemotherapy.
- Systemic chemotherapy is less direct and is associated with toxicities such as hair loss, nausea, vomiting, increased risk of infection, increased bleeding and bruising, and fatigue.
- During delivery to local tissue, the feeding artery is subject to damage. Various studies have documented vascular insult such as stenosis or obstruction can occur.
- The mechanism of destruction of the left internal maxillary artery in our patient remains uncertain, though local endothelial toxicity from the intra-arterial infusion is the likeliest explanation.
- There are clear potential advantages of IA chemotherapy in terms of maximizing intratumoral chemotherapy concentration while minimizing systemic toxicity.

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