

3D SLICER AS A RESEARCH TOOL IN DEPICTING IMAGE DEFINED RISK FACTORS IN PEDIATRIC NEUROGENIC TUMORS

**Marantos Aggelos¹, Antonopoulou Panagiota², Doganis Dimitrios³,
Dionysis Theodoros¹, Sfakiotaki Rodanthi⁴, Servitzoglou Marina³,
Sklavos Michail¹**

¹ P&A Kyriakou General Children's Hospital of Athens, 1st Surgical Department

² Agia Sofia General Children's Hospital of Athens, Radiology Department

³ P&A Kyriakou General Children's Hospital of Athens, Oncology Department

⁴ P&A Kyriakou General Children's Hospital of Athens, Radiology Department

Background: Neurogenic tumors in children especially neuroblastomas, are usually presented with major vessels encasement which among other features makes them very problematic for total surgical resection. Major vessel encasement is one of the key features that consists Image Define Risk Factors (IDRF) system, which in turn is crucial for the staging and operability of the tumor.

The cooperation of radiologist, oncologist and surgeon is very important for the optimal decision-making regarding operational plan.

Material and method: We present 2 cases of neurogenic tumors, one 5 years old boy with stage M giant abdominal neuroblastoma and one 7 years old girl with diffused ganglioneuroblastoma intermixed, in which among others an open-source computer software for 3D reconstruction was used as a research tool to depict the tumor and adjacent vascular and other structures. The 3D Slicer software is available freely to everyone on the internet.

First patient underwent initially an open biopsy, chemotherapy subsequently and resection of residual tumor. The second patient had tru-cut biopsies under US guidance, removal of a cervical mass for decompression of trachea and further sampling, as well as partial abdominal tumor resection for further biopsies and decompression of ureter.

Results: We used 3D-Slicer in all these phases of the two patients as a research tool to better understand the IDRFs and creating images that every clinician can understand independently radiologic knowledge. In a third patient with neuroblastoma the attempt was unsuccessful mainly because of the noise produced by Hickman catheter on CT. We were able to depict IDRFs with much clarity (images are attached), to measure volumes of the tumors and monitor the outcome besides ordinary follow up methods. Preoperatively we had a quite clear idea as to what to expect in operating room. It has also been a great teaching tool for trainees.

Conclusion: 3D Slicer as of 2021 has been downloaded more than a million times and has been referenced in about 12,000 academic publications This is the first time to our knowledge the software is used as research tool in pediatric neurogenic tumors, especially by surgeons in order to achieve better tumor

depiction. Although its use is time consuming and requires some special training, these cons are outweighed by excellent results.