PERSONALIZED SURGICAL PLANNING – THE USE OF 3D PRINTING IN ONCOLOGICAL PATHOLOGY

doi: 10.2478/rojost-2018-0051

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Introduction. Among the cases of malignant tumors, gathering 30% of them, the most frequent is the osteosarcoma. It occurs especially in children and young adults, the mean age being 14 years old. The treatment consists initially in neoadjuvant chemotherapy, followed by the surgical removal of the tumor. Due to aggressive malignant features (rapid increase in size, tendency to invade surrounding tissues, variable location), in multiple cases, the surgical treatment of osteosarcoma becomes a true challenge.

Materials and methods. Nowadays, it is possible to create 3D printed models, by using CT and MRI, which are superior to the 3D graphical reconstructions. The 3D printing technique facilitates the production of these 1:1 scale printed models that faithfully embody the patient's particular features concerning the anatomic pathology. The benefits gained from using such a modern tool allow the orthopedic surgeons to establish the measurements of a precise resection and to simulate the surgical maneuvers, as part of an elaborated modern surgical planning.

Results. In this article, we presented the case of a 10-year-old patient diagnosed with femoral osteosarcoma and treated with neoadjuvant chemotherapy followed by GMRS surgical approach based on a preoperative planning involving a 3D printed model. This piece was used to provide precise information regarding the tumor, to allow preoperative measurements and a surgical simulation.

Conclusion. The surgical accuracy can be increased by using a personalized preoperative planning based on a 3D printed model, leading to a lower rate of long/short-term complications, recurrences, or metastases.

Keywords: 3D printing, oncology, osteosarcoma, personalized preoperative planning