Using 3D Models for Patient Education: Preliminary Results

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INTRODUCTION

Modern patient portals are powerful tools that foster communication between medical providers and patients, increasing patient access to their medical records. However, these patient portals often only provide patients with radiology reports and are not user-friendly. At the neurointerventional radiology and neurosurgery clinics at Michigan Medicine, we aim to use interactive 3D models to facilitate patient understanding of their head and neck anatomy and pathology during informed consent discussions prior to treatment.

MATERIAL AND METHODS

Subjects were recruited from our clinics at UM and provided virtual consent for enrollment. Subjects were randomized to standard clinic discussion (control arm) or clinic discussion utilizing 3D models as a visual aid (3D model arm). All subjects received pre- and post-clinic surveys regarding general health literacy using a modified AHRQ health literacy patient survey. For subjects randomized to 3D models, 3D models were created from segmentation of their clinical angiographic and cross-sectional imaging imported onto an online 3D visualization platforms easily accessible to patients using standard modern personal devices (Figure 3). The 3D models were used as a visual aid during the clinic visit and provided to the patient via email.

RESULTS

To date, 49 subjects have been enrolled into our study, with 29 subjects who completed post-clinic surveys (13 subjects were lost to follow up or withdrew from the study, 7 pending follow up survey). 13 subjects were randomized to 3D model arm and 16 were randomized to the control arm. In the control arm, 9/16 (56.3%) of subjects were not shown images or visual aids during the clinic visit, comparatively all subjects in the 3D arm had the 3D model available during the clinic visit (Figure 1). 7/13 (53.8%) of subjects in 3D model arm were able to access the images at home, compared to 3/16 (18.8%) in the control arm. When asked how clearly the risks/benefits of treatments were explained, 11/13 (84.6%) of subjects in the 3D arm felt the explanations were "clear" or "very clear" compared to 11/16 (68.8%) in the control arm (Figure 2).

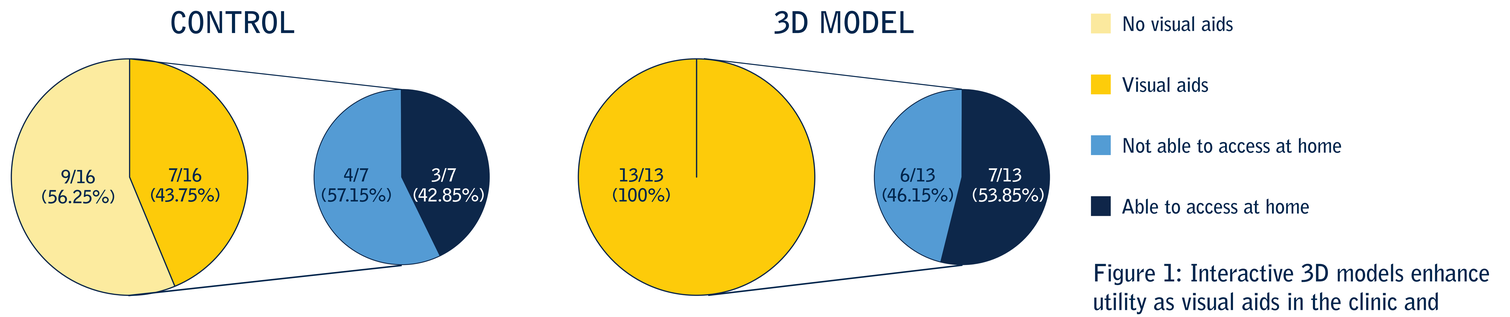

Figure 1: Interactive 3D models enhance utility as visual aids in the clinic and increase access for patients at home.

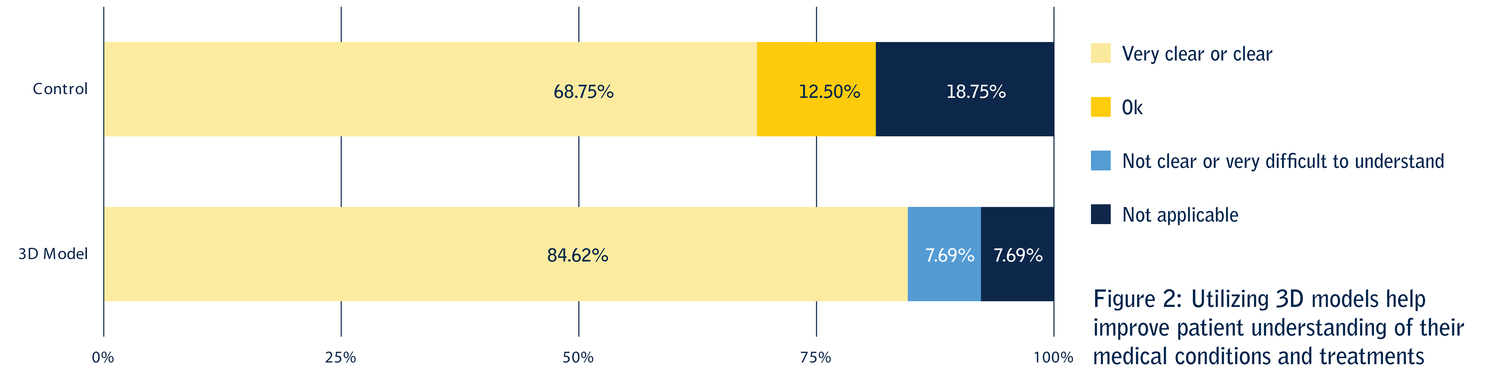

Figure 2: Utilizing 3D models help improve patient understanding of their medical conditions and treatments

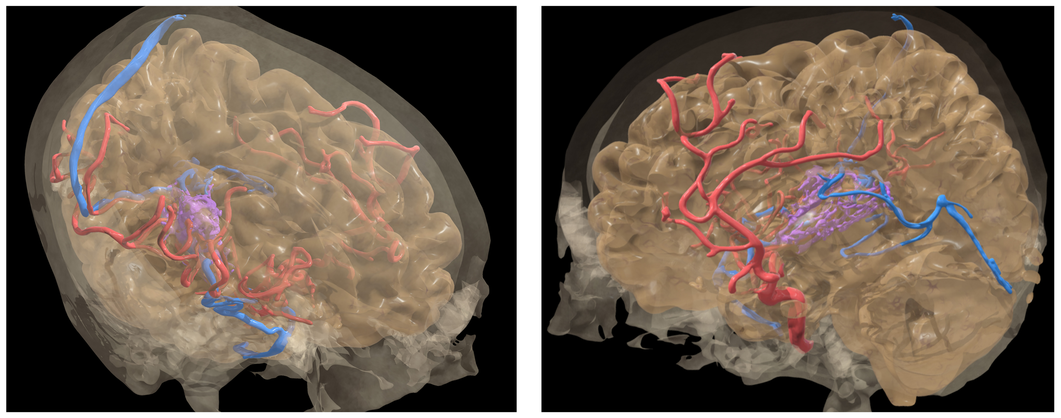

Figure 3: Multiple views of the Spetzler Martin grade 3 3D model, which had undergone diagnostic angiography for evaluation. The angiographic data was co-registered to the MRI and CT so the vessels can be visualized with brain surface and calvarium.

Scan the QR code or access this link for full interactive 3D model: qr.codes/dpm96r

CONCLUSIONS

Interactive 3D models offer easily understandable and readily accessible imaging for patients to help them understand their medical conditions and proposed treatments. While traditional patient portals predominantly offer text-based medical records, patients persistently face challenges in accessing and interpreting radiological images. Leveraging 3D models, these platforms can present images in a format that is easily understandable. The capabilities to render these 3D models already exist in many modern personal computers and smartphones without the need for specialized software. This project aims to bridge the gap between radiological images and accessible 3D models on personal devices and thereby empower patients with deeper insights into their conditions and facilitate informed decision-making processes.

DISCLOSURES

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