Advanced 3-dimensional planning

During the past decades, medical applications of virtual reality technology have been developing rapidly, ranging from a research curiosity to a commercially and clinically important area of medical informatics and technology. With the aid of new technologies, the user is able to process large amounts of data sets to create accurate and almost realistic reconstructions of anatomic structures and related pathologies. As a result, a 3-dimensional (3-D) representation is obtained, and surgeons can explore the brain for planning or training. Further improvement such as a feedback system increases the interaction between users and models by creating a virtual environment. Its use for advanced 3-D planning in neurosurgery is described. Different systems of medical image volume rendering have been used and analyzed for advanced 3-D planning: 1 is a commercial “ready-to-go” system (Dextroscope, Bracco, Volume Interaction, Singapore), whereas the others are open-source-based software (3-D Slicer, FSL, and FreesSurfer). Different neurosurgeons at our institution experienced how advanced 3-D planning before surgery allowed them to facilitate and increase their understanding of the complex anatomic and pathological relationships of the lesion. They all agreed that the preoperative experience of virtually planning the approach was helpful during the operative procedure. Virtual reality for advanced 3-D planning in neurosurgery has achieved considerable realism as a result of the available processing power of modern computers. Although it has been found useful to facilitate the understanding of complex anatomic relationships, further effort is needed to increase the quality of the interaction between the user and the model [1)].

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