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What is the future of minimally invasive sinus surgery: Computer assisted navigation, marker-based virtual reality simulation or 3D-surgical planner with remote visualization, 3D-navigation and augmented reality in the operating room?

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Do we need a new sinus surgery technique in a daily routine practice? Imagine that the perception system in humans could be deceived, creating an impression of another external world where we can replace the true reality with the simulated reality that enables precise/safer and faster diagnosis/surgery. Of course, we tried to understand the new, visualized virtual world (VW) 3 by creating an impression of virtual perception of the given position of all elements in the patient's head, which does not exist in the real world. This approach was aimed at upgrading diagnostic workup and endoscopic surgery by ensuring a faster and safer operative procedure, and represents a basis for realistic simulations, and can create an impression of immersion of a physician in a non-existing virtual environment. Every ENT specialist will be able to provide VR support in implementing surgical procedures, with additional correct control of all risks, without additional trauma, while having an impression of the presence in VW, navigating through it and manipulating with virtual objects (3DCA-navigation). Furthermore, when the 3D-surface with tissues arranged by objects is obtained, it is possible to derive spatial cross-sections at selected cutting planes, thus providing additional insight into the internal regions observed (osirix/leap motion and NES-3D-volume rendering models). A tele-presence system extends the operator's sensory-motor facilities and problem solving abilities to a remote environment, providing the local operator with necessary sensory information to simulate operator's presence at the remote location (3D-surgical planner with remote visualization). Generally speaking, fly-through techniques, which combine the features of endoscopic viewing and cross-sectional volumetric imaging, provide more effective and safer endoscopic procedures (marker-based VR-simulation), and use the corresponding cross-sectional image or multiplanar reconstructions to evaluate anatomical structures during the operation (3Dnavigation& augmented reality in the OR).

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