What is the future of minimally invasive rhinosurgery: 3D-surgical navigation, augmented reality in the operating room, marker-based VR-simulation with touch free surgeon's commands, or the AI-supported contactless-CAS as a "biomechanics" of the new era?

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This study presents the use of our original contactless interface as a plug-in the application for the OsiriX DICOM-viewer platform, using a hardware (HD) sensor device controller with no hand contacts, or voice navigation, and modification of standard classical surgical parameters per viam on the fly gesture-controlled incisionless surgical interventions. Our original plug-in application (intellectual property protected by copyright) provided different types of gestures for 3D-VR navigation that controls the system without touching any other device, served as an interface for camera positioning in 3D-VE-views. An impression of panoramic 3D-VR-viewing was given by pivoting the camera around a focus fixed on the object. The marked anatomic regions of interest were sorted in a way that makes sense for different operation stages. This novel technique enables surgeons to get a complete and aware orientation in the operative field, where "overlapping" of the real and virtual models is inevitable. Our human mind and understanding of this new surgery works by creating completely new models of human behavior and understanding of anatomical relationships. Any model and/or virtual model of the surgical field is defined as it actually exists in its natural surroundings. We offered an alternative to closed software (SW) systems for visual tracking, and also developed the SW framework that will interface with depth cameras and provide a set of standardized methods for medical applications such as hand gestures and tracking/navigation. This SW should be an open source, approved for medical use and independent of HD. The comparison of previous doctrines in human medicine clearly indicates that manipulation with 3D volume rendering slices of the human anatomy per viam touchless surgical navigation system with simulation of virtual activities has become a reality in the operation room/VR-field, and in the future will be a part of medical decentralized, self-organized "Swarm Intelligence" systems.

Key words: contactless surgery, 3D-VR-navigation rinosurgery, augmented reality, hand gestures and tracking