

World of virtual reality - the changing face of modern prosthodontics



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Presently the Dental World is experiencing a revolution in terms of digitization, computerization, subtractive and additive technologies being influenced to a large extent with the world of virtual reality.

Wikipedia defines Virtual Reality as, immersive multimedia or computer-simulated reality, replicating an environment that simulates a physical presence in places in the real world or an imagined world, allowing the user to interact in that world¹. Virtual realities artificially create sensory experiences, which can include sight, touch, hearing, and smell.

The Virtual World has shown its strong presence in the field of implant planning, surgical guides, CAD CAM prosthesis, maxillofacial prosthodontics and many other areas. Milled prosthesis and surgical guides for implant placement have established themselves in a strong way. The newer vistas added in the field of Virtual Reality are the Virtual Face Bow, Virtual Articulators and Virtual Reality Haptic System.

Looking at the newer advances, the first in discussion comes the Virtual Face Bow. A Face Bow is a very important instrument in rehabilitative dentistry to record the orientation jaw relation. It records the hinge axis and the relation is then transferred to an articulator. Virtual Face bow is an application based software that incorporates patient's photographs, anatomical references, alignment verification and occlusal confirmation for orientation jaw relation. This data can be easily shared and the application is now available on Google play market. Along with the Virtual facebow

app, many peripherals have also been developed to ease in the usage. A patient positioned helps to verify the correct patient orientation. A vertical tablet stand simplifies operation and articulator mount aids towards correct maxillary cast positioning.

Another marked advancement has been the development of Virtual articulator. A 3D Virtual articulator comprises of an input device in the form of 3D scanner, a virtual software for prosthesis modeling with collision detection and an output device in form of rapid prototyping system. The advantage lies in the analysis of mandibular movements, masticatory movements and analysis of force at the points of contact. Further the frequency of these contacts in relation to time can also be analysed². These articulators have a specified programming sequence. The first step towards this is the scanning of tooth/restoration/models. The scanning can be achieved intraorally or by indirect methods (extraoral). The next step is the recording of patient specific motion data of temporomandibular joints. One of the methods to record this, is the Jaw Motion Analyser tool which is based on measuring the velocity of ultrasonic impulses by transmitters attached to mandible and receivers attached to face bow detecting various range of movements. The entire occlusal can be visualized three dimensionally on the computer and the virtual articulator can now be programmed³.

Continuing with these advancements is the development of Virtual Reality Haptic Systems. The

word “Haptics” is derived from a Greek word “haptein” meaning contact or to touch. The Haptic technology is being introduced in Dental simulators to train the dental students in preclinical and dental procedures and increase their skills and coordination⁴. Recently a Haptic based Touch Enabled Articulator has been launched. These state of art virtual articulators allow the technician to feel the fit of the restoration prior to fabrication of the actual prosthesis.

In this changing scenario, a dental professional has to accept the new technological marvels, master them and choose them judiciously. As a scientific community, we should not just blindly rely on the newer technologies. We should await long term results and evidence based studies and then integrate these into our practices.

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