

NEW YORK (Reuters Health) - Researchers from Belgium have used computer-aided design (CAD) and three-dimensional (3D) printing to manufacture the first tailor-made ocular prosthesis.

"3D imaging and printing can help us in outlining the anophthalmic cavity in an impression-free fashion, which is an important step in the production of a customized ocular prosthesis," Dr. Ilse Mombaerts from University Hospitals Leuven, Leuven, Belgium, told Reuters Health by email.

Until now, creation of a customized ocular prosthesis involved obtaining an impression mold of the anophthalmic cavity by using dental impression material, which often provides an inaccurate representation of the cavity.

Dr. Mombaerts's team used CAD/computer-aided manufacturing (CAM) along with rapid prototype modeling to create a customized ocular prosthesis based on the 3D printed impression-free mold for a 68-year-old man who underwent evisceration for a long-standing painful blind right eye.

They used the initial printed prototype as a working trial prosthesis and further processed it using standard techniques.

During six months of follow-up, no further changes were required in the prosthesis, because wearing comfort and reconstructive cosmesis had been achieved, according to the April 27 British Journal of Ophthalmology online report.

"Although these are preliminary results in a single case report, we feel that 3D printing has great potential in customizing the ocular prosthesis," the researchers wrote. "This innovational concept will be subjected to further studies such as validating the suggested adjustments in a phantom model."

"The total cost of the production of an ocular prosthesis based on 3D printing is higher than the conventional way," Dr. Mombaerts said. "Such equipment is available in large hospital settings only. The cost of the resin, to print the 3D mold, is comparable to that of conventional molding material, and is very low owing to the small volume."

"The 3D era has reached ophthalmology," she concluded. "Cosmesis and wearing comfort are the two key factors in a patient with an ocular prosthesis, and can only be achieved with a customized prosthesis."

Dr. Ramesh Murthy from Axis Eye Clinic, Pune, Maharashtra, India, who makes custom-made ocular prostheses for his patients, told Reuters Health by email, "It is a good move in the right direction, but cost is prohibitive. I have discussed this with many 3D printers here in India, but I guess most of my patients cannot afford this."

"Experts can match most of the shape and the volume of the socket very well," he said. "The most difficult part is the color matching which can be done manually by an expert ophthalmologist or can be printed."

Dr. Tania Sethi from M.A. Rangoonwala Dental College and Research Centre, Pune, Maharashtra, India, who recently published the details of the fabrication of an ocular prosthesis in one patient, told Reuters Health by email, "This report is a step further in technology, applying CAD/CAM to fabrication of ocular prosthesis. It just brings out awareness that this can be achieved. It's a great alternative to the customized procedure."

"I personally would stick to the conventional technique as the costs, radiation, and time for this new procedure are more than what is necessary," Dr. Sethi concluded.

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