This middle-aged woman presented for the first time to ENT clinic with a complaint of nasal stuffiness.

Computed Tomography (CT) of the paranasal sinuses was performed following clinical review that revealed a left intranasal mass.

Due to a radiological suspicion of an inverted papilloma, Magnetic Resonance Imaging (MRI) of the paranasal sinuses was performed.
This, combined with endoscopic biopsy confirmed an inverted papilloma.

Following referral to oral maxillofacial surgery (OMF), 3D modelling was performed using the original CT data to aid surgical planning.

In this illustrative case a mass occupies the left ethmoidal and frontal sinuses with destruction of the floor of the anterior cranial fossa (Figure 1 A,B) with further delineation on MRI (Figure 2 A,B). This case of an inverted papilloma illustrates the tremendous assistance that 3D modelling offers to the surgeon in examining the anatomical extent of the tumor, visualising their surgical approach and planning the operative procedure. (Figure 3) For example, in this case a combined procedure between the OMF and the neurosurgery departments was undertaken with a bifrontal craniotomy and maxillectomy. Operating times have also been shown to improve following the use of 3D models as preparation prior to surgery is more robust.3

Figure 3. 3D Stereolithographic Model: The papilloma (shaded) is exquisitely illustrated on a 1:1 scale model (Materialise, Belgium) with destruction of the left medial orbital, anterior cranial fossa and detailing its extension across the midline.

DISCUSSION

Dramatic technological advancements in the fields of medical imaging and computer aided design (CAD) in the past decade have enabled stereolithographic 3D modelling to evolve from a research aspiration to everyday reality.

The widespread availability of high-resolution volumetric data sets, providing isotropic imaging from cross-sectional imaging studies allows for exquisite 3D model production using rapid prototyping techniques.1

Although its domains are ever widening, its use is most established in the fields of oral maxillofacial (OMF) surgery and otolaryngology enabling surgical planning in anatomically complex areas which often require lengthy and complex surgery.2 Similarly, in these fields the 3D modelling assists in prosthesis design and production with additional professional advantages such as teaching aids and aiding patient consent.

REFERENCES