

## Mandible reconstruction with virtual 3-D planning in COVID patient

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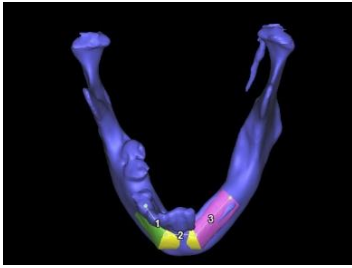
A 45 years old male patient reported with a large cancerous growth in the floor of his mouth destroying mandible, the lower jaw bone (*Fig 1*).



**Fig 1**

He was detected to be COVID positive 2 weeks prior to reporting to us at another private cancer centre and refused surgery there. He was asymptomatic for COVID and the CT chest did not show ground glass opacities or any other COVID related lung changes. He was re-tested at our centre after a week, was reported negative and planned for surgery – removal of the cancer in the floor of the mouth along with the central segment of the mandible and excision of lymph nodes on both sides of his upper neck. Since removal of the central arch of the mandible would result in debilitating effects on cosmesis, speech and swallowing, mandible reconstruction was planned using a vascularised segment of bone harvested from the fibula, one of the minor bones in the leg.

Fibula being a straight bone, using specialized computer software, 3-D virtual planning was done to aid in contouring it to the shape of the jaw. CT scans of the affected jaw and the fibula were fed into the computer and acrylic models and surgical guides were prepared which were then used in the operation theatre to provide a precise match (*Figs 2-4*).



**Fig 2** 3-D CT of mandible



**Fig 3** Fibula segment with guide



**Fig 4** Acrylic models

In the operation theatre following the removal of the cancer and adjoining central part of the mandible, the remodelled segment of fibula was fixed to the remaining portion of the jaw bone with titanium plates and screws (*Figs 5-7*)



**Fig 5** Resected Mandible



**Fig 6** Fibula with blood supply



**Fig 7** Fibula guide positioned

The blood supply to the transplanted bone was restored by micro vascular technique (suturing the artery and vein supplying the fibula to blood vessels in the neck using very fine 10-0 nylon sutures under a microscope). The entire procedure lasted around 10 hours.

The patient recovered from the surgery with no major complications, was discharged with good cosmetic and functional outcome (*Figs 8 & 9*).



**Fig 8** Immediate post-surgery



**Fig 9** Three weeks after surgery

The challenges in this case were not only related to the advanced stage of the cancer, and the resulting disturbances in form and function, but also the timing of the surgery taking into consideration the COVID status of the patient. Prolonged surgery in COVID patients can often lead to major complications and a 3-week waiting period is generally recommended from the time patient has tested positive or shows the first signs of infection. Virtual surgical planning provided precise contouring of the anterior mandibular arch, and also reduced operating time significantly.

This is the first time that mandible reconstruction using 3-D virtual computer technology has been performed in our state and to our knowledge may probably be the first case in the country in a recently COVID recovered patient, underlying the safety of major cancer surgery in such patients, provided proper care and safety precautions are followed.