# Head and neck reconstruction in the SARS-CoV-2 pandemic era: outcomes and lessons learned

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**Abstract:** The COVID-19 pandemic is having a significant impact on the provision of non-COVID-19 related clinical services. Early recommendations for head and neck reconstructive surgery were based on guidance from expert groups, advocating de-intensification of surgery. Since then, patient outcomes derived data has suggested that the continued practice of head and neck reconstructive surgery based upon pre-pandemic standard of care is safe if appropriate measures are in place for appropriate screening and segregation of care pathways for patients. In addition, adequate levels of personal protective equipment (PPE) are vital for both patients and the healthcare team. We present the current practice guidance within the UK National Health Service (NHS) for head and neck reconstructive surgery in the COVID-19 pandemic era in the following areas: COVID-19 testing/screening, care pathways for patients, the potential future role of immunisation against SARS-CoV-2, airway management, selection of the type of reconstruction, post-operative care and rehabilitation. The guidance produced reflect the evolving nature of the response of NHS to the COVID-19 pandemic, some of the suggested practice protocols could differ from local policies in various parts of the world however the principles which underlie these standards are the results of regular review of the needs of the patients and health service, balanced against the background of the ebb and flow of the prevalence of COVID-19 infection within the community and healthcare settings.

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### Introduction

The COVID-19 pandemic is having a significant impact on the provision of non-COVID-19 related clinical services. During the initial stages of the pandemic in the western world, broad recommendations to de-escalate reconstructive surgery [i.e., avoidance of free tissue transfer, suggesting utility of local and/or regional flaps (1,2)], were published by specialty associations and expert groups alike, each relying heavily on opinion in the absence of any evidence base. Recommendations were based upon considerations of the complexity, cost, and healthcare resource requirements in the face of a rapidly evolving SARS-CoV-2 pandemic with the very real prospect that healthcare systems would be overwhelmed.

At the time of writing, there have been several published case series from institutions which have produced clinical outcome data indicating that head and neck (cancer) and reconstructive surgery is safe within the COVID-19 pandemic period, including microvascular free tissue transfer (3,4). The largest collaborative head and neck study published to date by the COVIDSurg Collaborative Group (5) reported that reconstructive surgery for head and neck cancer is safe in the COVID-19 era with acceptably low rates of infection transmission, irrespective of the complexity and duration of surgery. An international collaborative group of 850 Head and Neck Surgeons from 26 countries collaborated freely through this unprecedented initiative. This study developed from the concept of a Head and Neck arm to COVIDSurg on 24 March 2020, to funding promise on the same day, with regulatory approvals and greenlight to recruitment on 3 April 2020.

Despite non-COVID-19 related clinical activities being deprioritized and the emergence of expert opinion discouraging complex surgery in the management of head and neck cancer, e.g., avoidance of free tissue transfer reconstruction, as well as de-escalation of the management of oral cancer, this collaborative community of head and neck surgeons collected high quality data of the surgical management of head and neck cancer within their respective institutions over the period from March to June 2020.

Initial analysis of the treatment outcomes of 1,137 patients enrolled in the study has provided evidence that (5):

 Head and neck surgery is safe for patients during the COVID-19 pandemic even when lengthy and complex. This is significant, as those concerns over patient safety raised in many guidelines appear not to have been reflected by these outcomes, even for those with other serious illnesses or who require complex reconstructions;

- Although acquisition of COVID-19 within 30 days of surgery was relatively low, the consequences were significant; encouraging steps to mitigate transmission;
- The overlap between patients and surgeons testing positive for the SARS-CoV-2 virus is notable, and emphasizes the need for fastidious cross infection controls and effective personal protective equipment (PPE), and
- Owing to the perceived or actual sub-optimal or non-standard treatments, a call is made for patients to be carefully followed up to better understand their functional and cancer (survival) outcomes.

Importantly, for the small proportion of patients who developed post-operative COVID-19, the consequences were severe (pneumonia 45%, death 11%), highlighting the need for stringent COVID-free care pathways and universal pre-operative testing (6).

This highlights the need for healthcare policies to be evidence based, especially during an era when the pace of change has been almost unrelentless. The published article sends across the important message that Head and Neck Cancer Surgery is safe in the COVID-19 pandemic environment. This is crucial information as we observe more late presentation of head and neck cancer patients, which will unfortunately have an adverse impact on treatment outcomes for this group of patients.

A larger collaborative study by the same collaborative group highlighted the importance of adherence to strict PPE use amongst the clinical teams and segregation of clinical pathways to allow provision of elective cancer surgical services within a COVID-19 free pathway (7).

We present here a series of major considerations in head and neck reconstructive surgery during the COVID-19 pandemic era, highlighting key areas of potential for controversy and significant importance in ensuring the best possible outcome for patients receiving treatment. Whilst the recommendations presented are based on the UK National Health Service (NHS) surgical practice, most if not all of these should be applicable to the international setting depending on local resource availability and health policies.

### **COVID-19 testing for adult patients before** surgery/treatment/attendance and whilst in hospital, and segregation of care into hot, cold and super-cold pathways (8)

All patient testing for SARS-CoV-2 utilises the PCR swab test. Whilst patients may be offered an antibody test if we are already taking a blood sample, this does not form part of the COVID-19 risk reduction measures.

### Swabbing on admission

All elective and non-elective in-patients (IP) should be swabbed on admission.

This protocol applies to all elective IP, day surgery and diagnostic procedures:

Normal pre-assessment checks should still be completed by existing surgical teams, including referral to preassessment teams at the point of decision to treat, cessation/ commencement of relevant medications, bed information and confirmation from wards/intensive care unit (ICU)/ high dependency unit (HDU) of availability. Patients should also be consented specifically for COVID-19 risks.

The chest computed tomography (CT) previously indicated for elective surgical patients has now been removed for all following updated guidance from the Joint Royal Colleges (updated advice issued 13 May 2020 and 21 May 2020 for Cardiac surgery) (9). There are no new indications for additional chest X-ray as part of the SARS-CoV-2 screening process.

### Before care

There should be shared decision making when arranging care and reasonable adjustments should be made to ensure information is accessible for all. For further advice on supporting people to make their own decisions, seek guidance on decision making and mental capacity. This decision-making discussion should include:

- Benefits of going ahead vs. risks from delaying treatment;
- Expected outcomes (oncological, reconstructive and in relation to COVID-19 acquisition in the perioperative period);
- Confirmation of consent, including discussion of individual COVID-19 risks factors (such as older age, sex, and whether the patient is from a black, Asian or other minority ethnic group, or has any underlying conditions);

- Any alternative options to the proposed care;
- ✤ Admission, discharge and follow-up plans.

Patients should be made aware that their care may be postponed if:

- They test positive for SARS-CoV-2 or have COVID-19 symptoms. The ideal and/or minimum period of delay for treatment from the date of diagnosis of COVID-19 infection is still unclear. The COVIDSurg Collaborative Group has recently completed data collection for the COVIDSurg Week study (10), which involved collaborators from 116 countries, 1,644 hospitals and captured surgical activities in excess of 137,000 patients. The results of this study should hopefully inform the international surgical community better regarding this aspect of patient care;
- They are not clinically well enough for the planned care procedure to proceed;
- They need to self-isolate after exposure to someone with COVID-19.

All patients should be given health and wellbeing advice (exercise, avoiding alcohol and stopping smoking) to aid recovery (e.g., patient resources from the Centre for Perioperative Care).

Acute non-elective patients should be swabbed for SARS-CoV-2 on decision to admit (alongside all usual preadmission checks) and a decision made to proceed with/ without swab result based on patient condition/level of urgency to proceed.

### For all planned procedures needing anaesthesia or involving aerosol generating procedures (AGPs) sedation (most of head and neck/upper aerodigestive tract reconstructive surgery)

The treating team should advise patients on when and where SARS-CoV-2 testing is available and that they should:

- Patients (and their household members) should be advised to isolate (for up to 14 days in the UK at the time of writing) prior to procedure (this may vary depending on the incidence of COVID-19 within each locality and implications on socioeconomic circumstances of patients/relatives);
- Have a swab test for SARS-CoV-2 within 3 days of procedure date, and ensure the results are available before they attend;
- Continue to self-isolate from the day of the test

until admission;

 Be able to confirm they are COVID-19 symptom free for 10 days pre-procedure.

### Inpatient 5-day testing

All patients with a length of 5 days hospital stay should have a single PCR retest for SARS-CoV-2 (in line with NHS England guidance).

### Cases that do not meet the defined criteria

Where patients do not fulfil the criteria regarding isolation, social distancing or pre-procedure swabbing they cannot be admitted via our COVID-negative/super-cold pathways/areas.

If the clinical team deem that the patient's treatment must go ahead and cannot be delayed in order to achieve the required pre-treatment isolation/swabbing, then any admission/surgery must be via the suspected COVID areas.

#### Preventing nosocomial transmission

As the SARS-CoV-2 pandemic has evolved it has become apparent that transmission of infection is most efficient when social contact occurs in confined spaces with care homes and hospitals implicated. The failure to consider the consequences of discharging elderly patients with COVID-19 infection from hospitals to care facilities in the early part of the UK pandemic is now recognised to be an egregious error. Nosocomial infection with COVID-19 has emerged as a significant problem when rates of community transmission are high. Rigorous self-isolation and testing of symptomatic members of the healthcare team remains an important cornerstone risk reduction but so to might asymptomatic healthcare worker testing (11). As part of 'cohorting' healthcare teams providing care for patients on a 'COVID-19 cold pathway' should, wherever possible, be removed from the care of patients with SARS-CoV-2 infection (12). An important part of the perioperative management of patients undergoing major head and neck surgery is pulmonary care and practical steps to minimise risk of nosocomial transmission should be applied (13).

### SARS-CoV-2 immunisation for patients and head and neck surgical team

In the UK, North America and Europe, at the time of writing, the vaccination programme against the SARS-

CoV-2 virus has received local regulatory approval in several countries (14). It is foreseeable that in time to come, patients who are being worked up for treatment of head and neck cancer could be given priority in receiving these vaccines before surgery. This would be consistent with current guidance in the UK for patients due to have elective surgery in the winter months to have their seasonal influenza immunisation prior to treatment (if feasible) as it reduces the risk of postoperative pneumonia and mortality in the elderly (>66 years old) (15). Perhaps consideration should be given to the head and neck surgical team (surgeons, anaesthetist, operating theatre personnel and nursing team) as well, given the direct involvement and/or proximity of the operative site to the upper aerodigestive tract which carries an increased risk of COVID-19 transmission.

### **Airway management**

A surgical airway (temporary tracheostomy or laryngectomy) can sometimes be required in reconstructive surgery in the upper aerodigestive tract (or oral cavity) especially in cases where ablative surgery has been carried out for late-stage disease, in surgical salvage of patient treated by primary non-surgical modalities and in the management of osteoradionecrosis. If feasible, management of the airway by means of extubation at the end of the primary procedure or elective delayed extubation following a period of sedated intubation might be preferable as these approaches can potentially reduce the time required for speech and swallowing rehabilitation which in turns leads to a reduction in the length of hospital stay (16,17). The latter helps reduce the demand on hospital bed space and staffing resources and potentially could reduce the risk of nosocomial COVID-19 infection. In terms of the risk of a surgical airway to that of a patient developing pulmonary complications, this has not been found to have had a significant impact in the initial analysis of an international cohort of patients (5). However, a surgical airway has been associated with an increased incidence of healthcare workers associated COVID-19 infection, which may relate to failure of adequate levels of PPE (more pertinent during the initial period of the first wave of COVID-19 infection in the western world) (5). Overall, the management of airway in head and neck reconstruction will vary depending on the experience and facilities available in each institution to ensure that this aspect of patient care is safe and optimised. In units where there is a preference for a surgical airway, the utility of appropriate levels of PPE is

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crucial for safety of patients and the health care team, with adherence to good surgical procedures to reduce the burden of aerosol generation (18,19).

### Reconstruction

One of the major dilemmas in the selection of reconstruction for patients in the COVID-19 era is the choice between a free flap vs. pedicled flap. At the outset, the latter can appear more attractive to the surgical and anaesthetic teams due to the shorter duration of surgery and perceived reduction in risks of intraoperative and/or postoperative complications (20). However, pedicled flaps have a lower success rate and potential for a longer length of hospital stay (21). Furthermore, the duration of surgery has not been observed to have had an impact on the risk of pulmonary complications in patients (5). Therefore, the surgical and anaesthetic team should take into consideration factors such as patient demographics, comorbidities, performance status, extent of defect and requirements of reconstruction in the shared decision-making process with patients in reaching the optimal reconstructive choice. In the appropriate patient, an operative procedure which may appear more complex and time consuming, to reconstruct an extensive head and neck defect, might well be indicated as it will be the most reliable means of ensuring wound healing whilst providing optimal function, especially when adjuvant treatment is required in late-stage malignant disease. A simpler procedure with pedicled flap reconstruction if indicated inappropriately may lead to more post-operative complications, morbidity, adverse patient experience and outcomes. Reconstructive teams should therefore aim to provide patients the most appropriate treatment personalised to each individual's holistic needs and support systems available in hospital and following discharge to the community.

### **Rehabilitation and follow-up**

During the COVID-19 era, there often can be the need to support patients for early discharge. This may necessitate optimisation of the prehabilitation and preparation process, e.g., physiotherapy, speech and language therapy, and presurgical gastrostomy feeding tube placement, as these can potentially reduce the period of inpatient rehabilitation required following surgery. Post-surgical follow-up can be managed by a combination of virtual and face-to-face consultations with the support of the allied health and specialist nursing teams, and utility of community derived photography where indicated, e.g., wound checks, in order to reduce the need for additional unplanned hospital outpatient visits. When see face-to-face in the outpatient clinics, designated cold/super cold sites/pathways would be preferred to reduce the risk of COVID-19 transmission due to the impact of major surgery on the patients' immune system in the initial weeks following surgery.

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### References

1. Mehanna H, Hardman JC, Shenson JA, et al.

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Recommendations for head and neck surgical oncology practice in a setting of acute severe resource constraint during the COVID-19 pandemic: an international consensus. Lancet Oncol 2020;21:e350-9.

- Kerawala C. BAHNO Statement on Covid-19 2020 [24/12/2020]. Available online: https://bahno.org.uk/ bahno\_statement\_on\_covid-19.aspx
- Wai KC, Xu MJ, Lee RH, et al. Head and neck surgery during the coronavirus-19 pandemic: The University of California San Francisco experience. Head Neck 2021;43:622-9.
- Butler D, Davies-Husband C, Dhanda J, et al. Head and neck oncological ablation and reconstruction in the COVID-19 era - our experience to date. Br J Oral Maxillofac Surg 2020;58:1008-13.
- COVIDSurg Collaborative. Head and neck cancer surgery during the COVID-19 pandemic: An international, multicenter, observational cohort study. Cancer 2021;127:2476-88.
- 6. COVIDSurg Collaborative. Mortality and pulmonary complications in patients undergoing surgery with perioperative SARS-CoV-2 infection: an international cohort study. Lancet 2020;396:27-38.
- Glasbey JC, Nepogodiev D, Simoes JFF, et al. Elective Cancer Surgery in COVID-19-Free Surgical Pathways During the SARS-CoV-2 Pandemic: An International, Multicenter, Comparative Cohort Study. J Clin Oncol 2021;39:66-78.
- The Leeds Teaching Hospitals NHSTrust. COVID-19 testing for adult patients before surgery/treatment/ attendance at LTHT SOP. 2020. Available online: https:// www.leedsth.nhs.uk/covid19/clinical-guidelines/#SOPS19
- Royal College of Surgeons of England. Updated Intercollegiate General Surgery Guidance on COVID-19. 2020. Available online: https://www.rcseng.ac.uk/ coronavirus/joint-guidance-for-surgeons-v2/
- NIHR Global Health Research Unit on Global Surgery.
  2020. Available online: https://globalsurg.org/surgweek/
- 11. Black JRM, Bailey C, Przewrocka J, et al. COVID-19: the

doi: 10.21037/fomm-21-4

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case for health-care worker screening to prevent hospital transmission. Lancet 2020;395:1418-20.

- Garry S, Abdelmagid N, Baxter L, et al. Considerations for planning COVID-19 treatment services in humanitarian responses. Confl Health 2020;14:80.
- Kaur R, Weiss TT, Perez A, et al. Practical strategies to reduce nosocomial transmission to healthcare professionals providing respiratory care to patients with COVID-19. Crit Care 2020;24:571.
- Walsh EE, Frenck RW Jr, Falsey AR, et al. Safety and Immunogenicity of Two RNA-Based Covid-19 Vaccine Candidates. N Engl J Med 2020;383:2439-50.
- 15. Liu WC, Lin CS, Yeh CC, et al. Effect of Influenza Vaccination Against Postoperative Pneumonia and Mortality for Geriatric Patients Receiving Major Surgery: A Nationwide Matched Study. J Infect Dis 2018;217:816-26.
- Coyle MJ, Main B, Godden D. Re: Patients' experience of temporary tracheostomy after microvascular reconstruction for cancer of the head and neck. Br J Oral Maxillofac Surg 2017;55:568.
- Singh T, Sankla P, Smith G. Tracheostomy or delayed extubation after maxillofacial free-flap reconstruction? Br J Oral Maxillofac Surg 2016;54:878-82.
- Broderick D, Kyzas P, Sanders K, et al. Surgical tracheostomies in Covid-19 patients: important considerations and the "5Ts" of safety. Br J Oral Maxillofac Surg 2020;58:585-9.
- David AP, Russell MD, El-Sayed IH, et al. Tracheostomy guidelines developed at a large academic medical center during the COVID-19 pandemic. Head Neck 2020;42:1291-6.
- McCrory AL, Magnuson JS. Free tissue transfer versus pedicled flap in head and neck reconstruction. Laryngoscope 2002;112:2161-5.
- 21. Mallet Y, El Bedoui S, Penel N, et al. The free vascularized flap and the pectoralis major pedicled flap options: comparative results of reconstruction of the tongue. Oral Oncol 2009;45:1028-31.