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Head and neck oncological ablation and reconstruction in the COVID-19 era – our experience to date

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Abstract

The COVID-19 pandemic has caused unprecedented disruption to the routine operations of healthcare services across the world. As the potential duration of the pandemic remains uncertain, the need to develop strategies to continue urgent elective services has received increasing attention. A solution adopted in the Kent, Sussex and Surrey area of England has been to create COVID-19-protected cancer hubs. The Queen Victoria Hospital is the designated hub for head and neck cancer services in the area. We report on the evolution of the head and neck cancer care pathway and standard operating protocols put in place and how these have combined both national guidelines and local problem solving. It is hoped that our experience can help guide other centres as they re-establish head and neck cancer services during the ongoing pandemic.

Keywords: Head and neck cancer; COVID-19; Coronavirus

Introduction

The COVID-19 pandemic has presented a unique challenge to healthcare systems and providers across the world.[1] In response, the vast majority of hospitals cancelled all elective operating in preparation for the predicted influx of patients with COVID-19.

As a result of the change in the clinical focus within many hospitals, all cancer care pathways were significantly impacted. The British Association of Head and Neck Oncologists (BAHNO), in association with ENT UK, produced guidance to help guide the prioritisation of patients with head and neck cancer within a resource-restricted setting.[2] In addition, NHS England (NHSE) produced guidance on March 30th 2020 that provided advice on maintaining cancer treatment during the COVID-19 response.[3] Within this document, particular emphasis was placed on consolidating cancer surgery within COVID-19-free hubs. This was encouraged not simply to improve the chances of elective cancer patients avoiding contracting COVID -19 in the perioperative period but also to allow prioritisation of cases and techniques used in a less resource restricted setting where intensive care facilities were not in competition with COVID-19 treatment.

The Queen Victoria Hospital (QVH) is a specialist surgical centre in South East England that provides head and neck ablative and reconstructive surgery to patients from Kent, Sussex and Surrey (KSS). The QVH does not have an

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accident & emergency department (A&E) and only a minor injuries unit meaning patients with acute COVID-19 presentations were unlikely to present to the hospital. The hospital has five beds capable of delivering level 2/3 intensive care. None of these were dedicated to COVID-19 positive patients and no ventilators were moved from the hospital before the surge. The Unit undertakes, on average, 120 (>4 hour duration) head and neck cancer procedures per annum with, on average, 75 of these patients requiring complex reconstructive surgery as part of their cancer treatment. Head and neck oncological surgery presents a unique challenge, with the reconstructive element often being essential to make tumour ablation a feasible option. As a result, for many patients a prolonged, complex ablative and reconstructive procedure often remains the optimal treatment option in spite of the risks relating to the prolonged operative time.

This article presents the rapidly adapted model developed by the Queen Victoria Hospital (QVH) that has facilitated the continuity of the head and neck cancer surgery service during the COVID-19 pandemic. QVH was the first NHS England and NHS Improvement designated COVID-19-protected cancer site in the South East UK. Similar strategies have been developed elsewhere in the world in response to the unique challenges arising from continuing head and neck cancer surgery during the COVID-19 crisis.[4–7]

Both national and regional cancer alliance guidelines along with local problem solving have helped to develop the pathway put in place. As the UK moves into the recovery and restoration phase of the COVID-19 pandemic, it is hoped that our experience presented will aid clinicians in other Trusts to set-up COVID-19-protected cancer hubs or "green" zones within general hospitals.

Site objectives

In line with NHS England advice,[3] QVH was designated as a COVID-19-protected site to facilitate the continuity of head and neck, skin and breast cancer surgery services for patients within KSS. In addition, measures were taken to provide ablative cancer services to patients presenting to head and neck cancer multi-disciplinary teams (MDT) that would ordinarily have been managed in neighbouring KSS hospitals, but were now focused on treating COVID-19 positive patients. Diagnostic surgical services within this latter group remained the responsibility of the referring hospital. The planned care pathway was carefully documented in a standard operating procedure (SOP) that was distributed to eligible referring hospitals and MDTs. Governance measures were put in place to audit the activity of the Unit during this period and to ensure that the standards of patient care were maintained at those expected in the pre-COVID-19 era. Other governance measures included a revised and enhanced morbidity and mortality meeting and all patients that had a change in treatment plan during the COVID era, or postponed due to active COVID-19 infection were recorded on a hospital "Treatment variation record" and placed on a hospital database. A regional cancer hub prioritisation group was also set up at QVH to ensure equity of services between all cancer cases during the COVID-19 surge period (H&N, skin, and breast cancer). From this, a twice-weekly internal QVH hospital elective cancer scheduling group meeting was conducted to ensure efficient, safe scheduling and that only priority level 2 cases were being listed

Preoperative care

The referral pathway through to the respective MDTs remained unchanged. In line with national guidance,[2,8] MDT meetings remained weekly with the minimum number of people physically present and other MDT members attending via video-link. The role of the anaesthetists in this initial MDT discussion was enhanced to not only inform the meeting on routine comorbidities, but also place particular emphasis on risk stratification during the COVID-19 era and debate the perioperative risks pertinent to the patient. This was aimed at identifying those patients who were not likely to be suitable for surgery due to medical reasons prior to them being brought in for a face-to-face surgical, anaesthetic and preoperative work-up. Evidence continues to emerge of an increased risk of perioperative mortality if COVID-19 is acquired during this period with the COVIDsurg Collaborative study showing a 23.8% mortality rate in those infected with COVID-19 during the perioperative period.[9,10] As such, careful patient selection with the support of the anaesthetic team was essential. It has been our experience that this increased involvement from the anaesthetic team have been an invaluable addition to the MDT process and is something that will become routine practice going forwards.

Wherever possible, the outcome from the MDT meeting was communicated to the patient via teleconsultation soon after. If the primary recommendation was surgery, patients were advised at this earliest stage to begin self-isolation measures or to plan ahead for this. At the time of writing this paper national recommendations had swung from 14 to 7 days and then back to 14 days. This type of frequent, or rapidly disseminated update in national recommendations was not uncommon during the surge period and QVH remained agile and responsive in updating its SOPs to the region.

Once surgery was deemed the optimal treatment option, patients were triaged based upon NHS England's categorisation system (Table 1).[11] As a COVID-19-protected site, QVH aimed at treating those patients classified as priority level 2. This allowed the allocation of resources to those most in need, whilst minimising the potential COVID-19 cross contamination that could occur from providing a service to priority 1 patients requiring emergency oncological procedures within 72 hours. As the hospital doesn't have an A&E, managing priority level 1 cases was unlikely to arise.

For patients meeting the criteria for surgery, a preoperative assessment and theatre date was allocated. In an

Table 1
The NHS England strategy designed to categorise surgical cancer treatment.[4,6]

Priority level	Categorisation
1a	Emergency – operation needed within 24 hours to save life
1b	Urgent – operation needed within 72 hours
2	Elective surgery with expectation of cure, prioritised to: surgery within 4 weeks to save life or prevent progression of disease beyond operability
3	Elective surgery can be delayed for 10–12 weeks with no predicted negative outcome

effort to minimise the number of patient visits to QVH and footfall outside their home, a single preoperative assessment included:

Consultant surgeon review and consenting for surgery
Consultant anaesthetic assessment
Allied health professional assessment (speech and language, dietician, physiotherapy)
Clinical nurse specialist review
Preoperative nurse review
Completion of preoperative blood tests

During a major case consenting process, a discussion about the potential COVID-19 related complications was undertaken given the increased mortality rate if infected during the perioperative period, or the patient had a false negative test on their preadmission screening.[9,10] This discussion was documented on the patient consent form, notes and any written communication arising from the preoperative consultation.

Where possible, the preoperative review was completed more than a week ahead of the planned date of surgery to then allow for 14 days self-isolation. Where this was not possible and they had to be seen within the week, patients were encouraged to be brought in by a member of their household and to minimise any unnecessary contact during the QVH one-stop preassesment visit. For patients travelling from long distances, or without access to transport covered by NHS transport, the QVH worked closely with NHSE and local cancer alliance to look into general and coronavirus registered volunteers support. For those undergoing day case surgery, a telephone preassessment was completed with any preoperative investigations required arranged subsequent to this tele-consultation.

As emphasised in the national guidance from NHSE,[11] British Association of Surgical Oncologists[8] and Royal College of Surgeons of England[12] meticulous attention to preoperative patient screening was required to minimise the risk of COVID-19 propagating within the hospital. Three key measures were put in place to reduce this risk (Fig. 1). Firstly, patients were asked to self-isolate for 14 days prior to surgery. Secondly, COVID-19 PCR swab testing was conducted 48 hours prior to surgery with a temperature check and clinical review on the day of admission. As the QVH and cancer hub catchment area is extensive we moved from

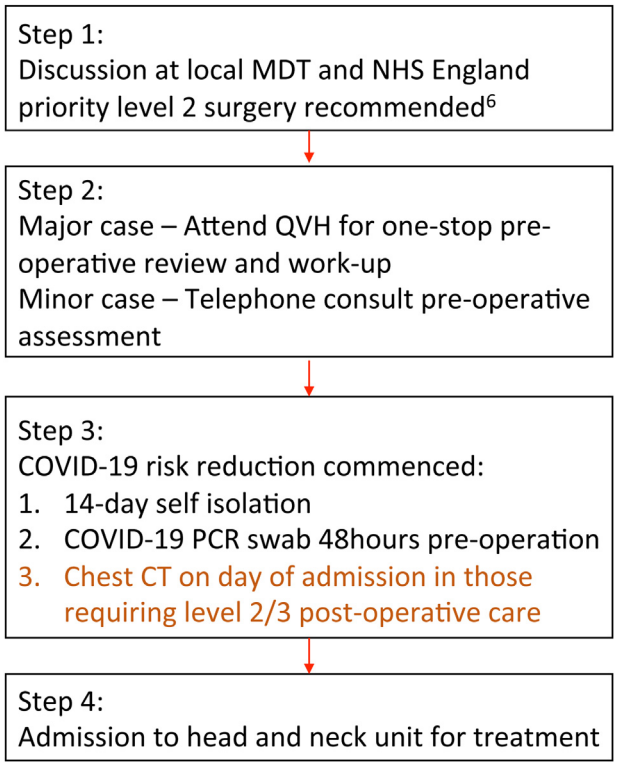

Fig. 1. The sequence of measures taken from multi-disciplinary team decision to admission to hospital for surgery. MDT = Multi-disciplinary team; QVH = Queen Victoria Hospital.

requesting patients to drive through the hospital for their 48hr swab to liaising with hospitals local to the patient or using mobile swab services at the patient's home. Finally, patients requiring level 2 or 3 postoperative care underwent a non-contrast chest CT scan on the day of admission to evaluate for any features consistent with COVID-19 infection. The guidance on the need for a preoperative CT chest is, however, continuing to evolve and it is likely that this screening measure will be removed from the routine preoperative patient work-up.[12,13] If either the PCR swab or the chest CT suggested active COVID-19 infection, then the case was rescheduled and the patient asked to self-isolate for a further 14 days. Once cleared for surgery, patients were admitted to a newly designated head and neck unit within the hospital where strict infection control policies were followed to avoid patient infection from staff members.

Intraoperative care

A key focus at this point in the patient pathway is ensuring staff safety and the efficient use of resources.[14,15] This relates to the both the provision of theatre space in addition to the use of full personal protective equipment (PPE). Theatre list capacity has reduced due to the increased time required to intubate and extubate the patient. Both interventions are aerosol generating and, therefore, require additional

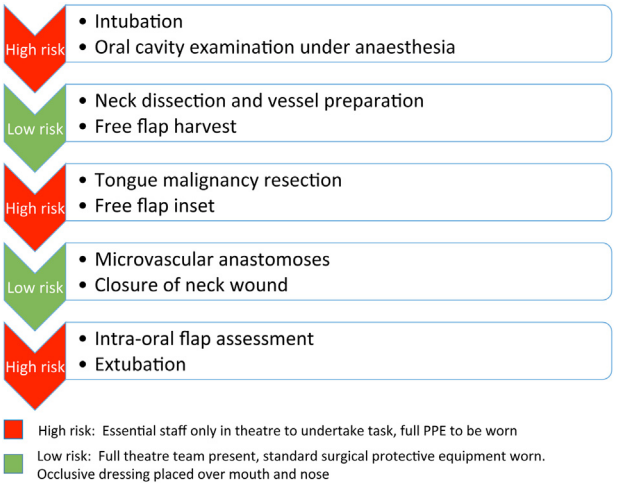

Fig. 2. The sequence adopted during ablation and reconstruction for an oral cavity malignancy aimed at protecting staff members and ensuring the judicious provision of personal protective equipment (PPE).

time to ensure staff and patient safety is maintained. Theatre list planning should consider this change to standard practice.

At any stage that an aerosol generating procedure (AGP) is undertaken, full PPE is worn by those members of staff required to be in theatre at the time in line with national guidelines.[16,17] Working in full PPE for long periods of time is challenging. Consideration has been given to limit the potential duration of time spent in full PPE and to restrict the number of staff members present during the AGPs. It is our experience that operating in full PPE can result in light distortion from the eye protection, a reduced visual field from prominent face masks and presents difficulties in wearing surgical loupes. As a result, we have worked to create a sequence that limits the amount of time spent in full PPE. The following example is relevant to ablation and reconstruction of a tongue malignancy (Fig. 2):

- A more detailed team brief compared to the pre COVID era is performed delineating the steps below
- Intubation is carried out by a minimum number of the anaesthetic team (typically 2 x anaesthetists and 1 x operating department practitioner) in theatres and not in the anaesthetic room.
- After successful intubation the theatre is cleaned and a rest period of 5 minutes minimum is allowed before any other members of the team for the day return or enter theatre
- The consultant surgeon(s) leading the case complete any necessary examination under anaesthesia (EUA) in full PPE with only a single representative from the anaesthetic team in the operating room. This step is for measuring resection size and flap size planning or confirming resectability with only the minimum number of staffing theatres minimising exposure. All other staff members wait outside during this phase.
- Once the EUA is complete, an occlusive dressing is applied over the mouth and nose and the rest of the surgical team return to the room. The neck dissection and vessel preparation are completed at the same time as the flap harvest with all members in standard surgical protective equipment as opposed to full PPE.
- After completion of flap harvest and the neck dissection, full PPE is applied and only the anaesthetist, operating department practitioner, ablative surgeon and assistant, scrub nurse and circulating nurse remain in the operating room to complete the tongue malignancy resection.
- Subsequently, they are joined by the reconstructive surgeon in full PPE who divides the flap pedicle and completes flap inset. After completion of flap inset, the mouth and nose are then covered again with an occlusive dressing and the microvascular work is completed in standard surgical protective equipment unless a large through and through defect with the upper aerodigestive tract (UADT) remains during microvascular phase, in which case full PPE is worn.
- After closure of the neck and completion of surgery, the reconstructive surgeon returns to full PPE and assesses the flap intraorally and then leaves the room to allow the anaesthetic team to complete extubation if suitable.
- A further intraoperative manoeuvre adopted at QVH during the COVID-19 pandemic relates to the routine application of both an arterial and venous implantable Doppler. This has allowed postoperative flap monitoring to be modified and is discussed in the section below on postoperative care.

Finally, every effort is made to extubate the patient immediately postoperatively. This avoids extubation in the critical care unit where the risk to others from an AGP is more challenging to manage than in a sealed operating theatre. Waking the patient the same day also reduces the length of positive pressure ventilation with reduced pulmonary insult and reducing the risk of a ventilator acquired pneumonia. This is of most relevance if one was unknowingly operating on a COVID positive patient who presented asymptomatically and with a false negative swab and CT chest. As a result, the threshold has reduced for a covering tracheostomy in those patients who would normally have been kept sedated and intubated for the first 12–24 hours after the procedure. This was always balanced with inherent AGP associated risk of tracheostomy, although recognised strategies were adopted to minimise this risk.[18–20] This risk was, however, considered in the context of the extensive preadmission screening undergone by the patient.

Postoperative care

Patients are cared for in a dedicated head and neck unit within QVH. This is designed to protect patients from the risk of infection with COVID-19 which, in a vulnerable patient population, and indeed any postoperative population, could carry significant morbidity. The head and neck unit is separate to other patient areas within the hospital. Recognition has

been given to the risk posed to the patients from the staff. To reduce this risk, a number of measures have been put in place. Firstly, on entering the unit staff are required to change into clean surgical scrubs to minimise the potential for the transmission of COVID-19 into the facility. This is in addition to staff temperature checking on arrival to the hospital. Secondly, careful consideration has been made to minimise the number of healthcare professionals entering the patient's bed space. The challenge in achieving this arises from the importance of the daily MDT input during a head and neck ward round and the need for continuity of care between the patient's primary head and neck team and the on call team. This is essential in managing a complex cohort of patients. To circumvent this challenge, a video-conferencing virtual ward round occurs alongside the face-to-face ward round. This has been designed in line with local information governance policies and each patient is verbally consented prior to commencing the virtual ward round. The virtual ward round allows for only the head and neck consultant, senior fellow, on call registrar, one allied health professional representative, the patient's nurse and an intensivist to be present at the face-to-face ward round. The other medical staff, allied health professionals, nurse specialists and patient co-ordinators are able to attend the virtual ward round and receive feedback on the patient's clinical status and plan for the day. The virtual ward round also allows good audio for questions and direct feedback to those at the patient's bedside.

A third alteration to our standard practice, and in line with measures taken intraoperatively, arises from the use of both an arterial and venous implantable doppler in patients who have had a free flap reconstruction. This has allowed the protocol for postoperative flap monitoring to be modified to limit the number of direct hand-held doppler examinations required. Hand-held doppler examination often requires prolonged examination to find the doppler site and requires the staff member to be in close proximity to the patient this time. With the application of both an arterial and venous doppler, the nursing staff are only required to perform a hand held doppler assessment every four hours during the first two days postoperatively. Hourly implantable doppler checks are performed in addition to assessment of flap colour, consistency, temperature and capillary refill time every hour. Although these latter checks require a short period of being in close proximity to the patient, it was felt they were essential parameters to correlate against the findings from the implantable dopplers. It should be noted that the reported false positive rate (loss of doppler signal, but no vascular compromise apparent at surgical re-exploration) associated with the use of implantable dopplers varies from 0.7% to 25%.[21,22] As a result, clinical examination remains essential and the implantable doppler should be considered as an additional adjunct to avoid frequent intraoral doppler examination.

Following discharge, major cases are booked for a direct face-to-face follow-up at QVH with further face-to-face or virtual follow-up arranged accordingly after this initial review and MDT discussion. Non-major cases are followed up virtually wherever possible.

Department activity

Since the QVH standard operating procedure for the continuity of head and neck cancer surgery was introduced on 6th April 2020, a total of 78 priority 2 head and neck cancer cases have been performed at QVH up until 28th May 2020. Within this cohort, 27 major cases were undertaken, 20 patients had flap reconstruction with 15 of these being free flap reconstructions. There were no total or partial flap were losses during this period. One patient had their surgery postponed due to having CT chest changes consistent with COVID-19 infection. No patients have developed COVID-19 infection during their inpatient stay.

The future

It is recognised that in a COVID-light cancer hub, one of the greatest risks to patients may be COVID-19 positive staff transmitting the virus. The hospital is currently working in line with national guidance on staff screening. The frequency and staff groups to be tested is as yet undecided and the method is more likely to be a form of 'point of care' with a quick turnaround time rather than conventional PCR testing

Whilst it is desirable to know whether a patient is being discharged COVID-19 negative, the hospital has to agree and understand the intentions of the test and whether it is in the patients' best interest. A plan and response must be considered by the hospital if and when a patient presents with a positive swab at discharge. Some explanations before testing postoperatively that might be prudent to explain to the patient include the fact that their original preoperative swab may have been a false negative or it was done at a too early stage in their incubation period. Benefits to the patient at large include establishing best practice to offer the patient post-discharge support and monitoring in case they decline or need medical attention. In addition, knowing that a patient is COVID-19 positive allows the hospital to provide guidance on self-isolation for the patient and family members at home who may be negative of COVID-19 infection or classified as vulnerable.

In the long term we aim to report on activity and clinical outcomes during this phase. We expect that the next six months may pose differing challenges during the recovery and restoration phase when all urgent non cancer cases may begin to compete for the same resources, PPE and workforce that we currently freely have in priority level 2 cancer care.

Conclusion

The COVID-19 pandemic has placed enormous pressure on health services around the world. Whilst efforts continue to

develop an effective vaccine, there is growing recognition that the pandemic will not be short-lived. As a result, focus must turn towards ensuring the provision of cancer services during this time to avoid a dramatic increase in patient morbidity and mortality. The creation of COVID-19-clean sites allows this vulnerable patient group to be cared for in an environment where their risk of becoming infected with COVID-19 is kept to a minimum. Although extensive national guidance exists on strategies for site selection and preoperative testing, further consideration must be given at a local level to the nuances required throughout the patient pathway to ensure patient and staff safety is maintained. We hope this report allows the readership to use this as a shared learning experience and provides a skeleton framework to facilitate setting up or modifying some of their own services in the context of managing H&N cancer at this challenging time.

Conflict of interest

We have no conflicts of interest.

Ethics statement/confirmation of patients' permission

Not applicable.

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