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Orthognathic surgery in COVID-19 times, is it safe?

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Abstract

COVID-19 has impacted the provision of orthognathic surgery globally. Uncertainty around its effects and transmission in aerosol generating procedures (AGP's) has led to disagreement within maxillofacial surgeons into the safety of orthognathic surgery during the pandemic. We present a local case series of orthognathic surgery undertaken during the COVID-19 pandemic. To our knowledge no such similar study has been reported worldwide. Data was collected from the 1st June to 30th November 2020 for all patients undergoing orthognathic surgery by a single consultant. All procedures and inpatient stays were performed 'off site' at the local Spire Healthcare Group plc© facility. A strict preoperative two-week self-isolation period and negative COVID-19 testing was mandatory. All procedures were classified as AGP's and personal protective equipment (PPE) was worn in line with local guidelines. The primary outcome was 30-day COVID-19 infection among patients, with day 0 the date of surgery. Secondary outcome measures included duration of stay, return to theatre and complications. A total of 59 patients were identified. 42/59 had bimaxillary procedures and 17/59 single jaw. 9/17 had maxillary and 8/17 had mandibular procedures. A total of 3/59 had simultaneous genioplasty. Median duration of stay was one night (range 1-3). Immediate and late complications were seen in 3% (2/59) and 3% (2/59) respectively. Only 1% (1/59) returned to theatre. Zero patients tested positive in the 30-day postoperative period. No staff members tested positive for the duration of the study. Adopting strict safety protocols, orthognathic surgery can be safely delivered during the pandemic without detriment to the patient or staff.

Keywords: Orthognathic; Osteotomies; Surgery; Covid-19; Coronavirus

Introduction

The outbreak of COVID-19 has had a profound impact on the delivery of orthognathic services across the United Kingdom (UK). Towards the beginning of the year as the pandemic took a grip across UK hospitals, hospital managers were advised to reduce all non-essential operating in order to increase capacity for anticipated COVID-19 related admissions. This culminated in a letter written by NHS England's chief executive Simon Stevens and NHS chief operating officer Amanda Pritchard on the 17 March 2020, to all NHS England hospital chief executives', to suspend all non-essential surgery for at least three months from the 15 April 2020.[1,2] The purpose of this radical move aimed to free up around 30,000 acute beds to provide essential additional capacity. At the bequest of NHS England at the start of the pandemic, the Federation of Surgical Speciality Associations (FSSA) produced a clinical guideline to help differentiate essential from non-essential conditions.[3] This document comprised of a tiered level of surgical procedures for all surgical specialities, ranging from emergency procedures (priority 1a, <24h) to routine procedures (priority 4, >3 months). Owing to the elective nature of dentofacial disproportional surgery, all orthognathic surgery was considered priority 4.

As the infection rates slowed health leaders looked at measures to increase routine operations and treatment. This

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restructuring required careful planning and reorganisation within local NHS teams, ensuring the continued safety of staff and patients, whilst limiting the spread of the disease. Regional variation in the available resources along with local infection rates has had a major impact on how this was achieved. Additionally, orthognathic surgery is complicated in its multidisciplinary approach requiring both surgical planning clinics and regular orthodontic face to face follow up. The dental speciality as a whole has been significantly affected by the pandemic, but as advice on aerosol generating procedures (AGP's) and personal protective equipment (PPE) recommendations have become clearer, the reinstating of orthodontic clinics has paved a pathway for the resumption of orthognathic activity.

Nevertheless, the impact of COVID-19 on postoperative recovery has led to disagreement within the speciality as to whether elective orthognathic procedures should be offered. Patients undergoing orthognathic surgery are at an increased risk of COVID-19 exposure within the hospital setting and may be susceptible to pulmonary complications associated to mechanical ventilation.[4] As part of NHS England's response plan, temporary contracts were negotiated with the independent hospitals to increase capacity. This facilitated operative capacity by using such independent sector units as 'Covid Free Hubs' for elective 'off site' operating.

We present a local case series to review the safety of elective orthognathic surgery following the reintroduction of routine operating during the COVID-19 pandemic.

Material and methods

We describe a case series of all patients undergoing elective orthognathic surgery within a single regional unit, by a single consultant surgeon during the COVID-19 pandemic. Data was collected over a six-month period from 1 June 2020 to 30^{t} November 2020. All operative procedures and inpatient stays were performed 'off site' to the main hub unit and undertaken at the local Spire Healthcare Group plc© facility. On site medical cover was provided by the local resident medical officer (RMO). Off site consultant and registrar surgical cover were provided by the operating consultant and the on call maxillofacial registrar. Consultant anaesthetic cover was provided by the anaesthetist performing the list that day.

Patients were identified by the local orthognathic surgical waiting list. Priority was given to the longest waiters. Only patients of American Society of Anesthesiologists (ASA) grade 1-2 were eligible for surgery. Patients were initially contacted by the booking office to offer a provisional date for surgery and that it would be performed away from the main hospital. Patients' willing for surgery attended an outpatient clinic at least two weeks prior to surgery for planning and consent.

A strict self-isolation policy of two weeks prior to surgery was required. Patients failing to comply with self-isolation regulations would have their surgery postponed. A negative COVID-19 test was mandatory 48-72 hours prior to admission. All staff were required to have negative weekly testing. Surgical pre-assessment clinics were performed via telephone. Preoperative pulmonary radiology was not required. Postoperative surgical and orthodontic clinics were undertaken face to face utilising local PPE guidelines to include surgical face mask, gloves, and apron.

Osteotomies were conducted by a single surgeon and consisted of single or bimaxillary procedures (with or without genioplasty), segmental surgery, and surgically assisted rapid palatal expansion (SARPE). Consultant led anaesthesia was delivered using a standard induction of general anaesthesia with opioid, propofol, and muscle relaxant. Patients were intubated with a north facing nasal tube. Hypotensive anaesthesia was provided intraoperatively. At induction patients were infiltrated with 20-30mls bupivacaine 0.5% with adrenalin 1:200,000 according to weight, in addition to perioperative intravenous tranexamic acid, dexamethasone, and antibiotics. Patients were extubated smoothly sitting up. Surgery was performed according to standard techniques using reciprocating saws for bone cuts and chisels and spreaders for completing osteotomies. Miniplates with drill and screws were used for fixation. Full PPE including FFP3 respirator masks and eye protection were used initially but stepped down to standard surgical PPE as local guidelines adapted to government advice. Two postoperative doses of dexamethasone and antibiotics were provided.

Data were collected prospectively at the time of admission, discharge and subsequent follow up. Surgical follow up lasted six weeks on a face to face basis at weeks one, two, four, and six. Orthodontic follow up was planned as per clinical need. Data were collected using Microsoft Excel. Demographic variables included age and sex of patient. Operative variables included duration of admission, postoperative complications, return to theatre, transfer to hub hospital, readmission to hospital within 30 days and COVID-19 symptoms or infection within 30 days. The primary outcome measure was 30-day COVID-19 infection, with the day of surgery defined as day 0. Secondary outcome measures assessed the rate of immediate and late postoperative complications, readmission rate and length of hospital stay.

Results

Patients were analysed between 1 June 2020 and the 30 November 2020. A total of 59 patients were identified and none were excluded. Thirty-four were female and 25 were male. The average age was 25 years (range 18-51). 75% (44/59) were ASA grade 1 with the remaining 25% (15/59) being ASA grade 2. All patients had surgical follow up at least six weeks after surgery and no patients were lost to follow up.

Bimaxillary surgery was performed for 42/59 patients. Only 1/42 was performed as a maxillary segmental procedure and 1/42 underwent simultaneous advancement genioplasty.

A total of 17/59 had single jaw surgery, 9/17 had a maxillary Le Fort I osteotomy with 2/9 performed as a SARPE procedures, 8/17 had mandibular bilateral sagittal split osteotomies, with 2/8 having simultaneous advancement genioplasty.

Median inpatient stay was one night (range 1-3 nights). Immediate postoperative complications were recorded in 3% (2/59) of the patients. One patient required simple nasal packing in recovery. The other required a return to theatre for examination under anaesthesia, with no bleeding source being identified and required nasal packing alone. Both were transferred to the hub unit for observation. 2/59 were readmitted to the hub unit on days 3 and 19 for postoperative infection requiring treatment with intravenous antibiotics alone.

COVID-19 infection was not diagnosed in any patients preoperatively. One patient (1/59) had their surgery postponed due to inadequate self-isolation. There were no cases (0/59) of COVID-19 infection within 30 days of surgery.

No members from the surgical or anaesthetic teams tested positive during routine screening tests. Data regarding the scrub teams and wider nursing staff were not available.

Discussion

The outbreak of COVID-19 has had a large impact on the delivery of elective surgery internationally. A global expert response study conducted by the COVIDSurg collaborative estimated that 28.4 million operations worldwide would be cancelled or postponed during the peak 12 weeks of disruption due to COVID-19, most of which would be for benign conditions (approximately 90%). Within the UK alone, over half a million operations were cancelled over the peak 12 weeks with the vast majority (93%, 480000/516000) being non-cancer related cases.[5]

The risks of postoperative complications related to COVID-19 are not completely understood. The COVIDSurg collaborative also undertook a single large, international, multicentre cohort study (1,128 patients, 235 hospitals in 24 countries) to measure postoperative mortality and pulmonary complications in patients undergoing surgery with COVID-19 infection. They reported an overall increased 30-day mortality of 23.8% in patients undergoing surgery who had COVID-19 infection confirmed within seven days before or 30 days after surgery. Important factors found to be associated with an increased mortality included male sex, age over of 70 years, and poorer ASA grade (3-4).[6] In addition to this, a study investigating pulmonary complications and deaths in patients with previous positive COVID-19 swabs, undergoing surgery that were not suspected to have active infection at the time of surgery has been recently been published. The authors demonstrated an increased risk in pulmonary complications in surgical patients with a recent previous positive swab compared to no infection (10.7% [12/122] versus 3.6% [16/448], adjusted odds ratio 3.84, 95% CI 1.51 to 9.74, $p = 0.004$). Interestingly, both pulmonary complications and death were lowest at least four weeks after a positive result, and the authors advise where possible surgery should be delayed for at least four weeks following a positive swab.[7] However, the cohort group for this study were patients undergoing curative elective cancer surgery, which in general terms, usually represents an older population with comorbidities not seen within the orthognathic group.

This has therefore led to uncertainty within the profession as to whether it would be safe, or even ethical to be offering major elective surgery to patients during the pandemic. Orthognathic surgery as previously described, was classified as a low priority by the FSSA. However, there are clear psychological impacts to patients undergoing protracted waiting times for orthognathic surgery. Takasuji et al explored both the preoperative and postoperative psychological statuses of patients undergoing jaw surgery. They demonstrated significantly higher depression and social introversion scores in the preoperative group.[8] As a necessity for successful surgery, patients are generally required to spend a number of years in active orthodontic treatment prior to surgery. Although, once orthodontically ready for surgery, it is not uncommon for a patient to endure a prolonged waiting time whilst in a decompensated state. Increased delays will therefore clearly have a negative impact to the mental wellbeing of patients and supports a valid reason to offer such surgery during the pandemic.

An important factor to note from the COVIDSurg collaborative was that mortality significantly affected the older population with poorer ASA grades. Orthognathic patients are typically younger in their late teens and twenties and represent a healthy and well-motivated cohort of patients. As of the 29 November 2020, only 0.06% (23/40,405) and 0.8% (276/33,637) of the 0-19 and 20-39 year age groups respectively had died in hospitals in England and Wales after testing positive for COVID-19.[9] Although it is not possible to comment whether these patients had underlying comorbidities or the actual cause of death, the low all cause mortality helps suggests patients aged 0 to 39 years are at low risk dying in hospital with COVID-19.

Regional variation has been an interesting development in the spread of COVID-19. The south west of England on the whole has been considerably less affected than other parts of the UK. We would expect that the risk of viral transmission in regions with a lower prevalence of COVID-19, is lower and arguably safer to undertake surgery than regions with a higher prevalence. Whether this can be proven is questionable though. The UK endured a second wave between the months of October and November 2020 again with regional differences in infection rates. At this time Bristol had a significantly high daily infection rate (Fig. 1). The peak Bristol incidence in this wave was recorded on the 8 November 2020. The positive COVID-19 test rate per 100,000 population in a seven-day period was 505.2, more than double to the national average of 239.6 on the same date.[10] These figures demonstrate that the case series was safely performed at time when local infections rates were rising, and a high prevalence of dis-

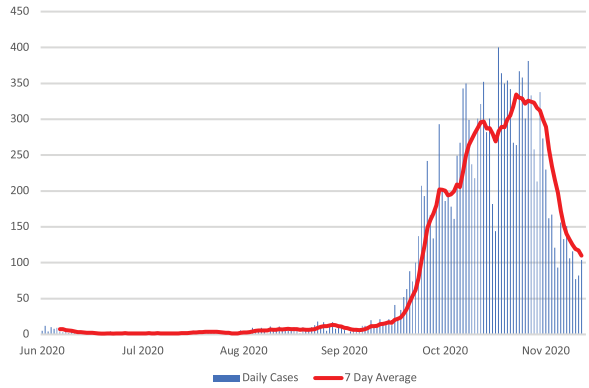

Fig. 1. Daily positive COVID-19 infection rate with 7 day average within the City of Bristol over the study period, 1 June 2020 to 30 November 2020.[10]

ease should not act as a deterrent when offering orthognathic surgery.

The UK has recently commenced a National mass vaccination programme, however at the same time, a more virulent strain of the virus has become abundantly prevalent within the general population. Furthermore, questions over the availability of the vaccine and the ability to deliver en masse have been raised. It is likely to be many months until we see the effects of this treatment and until then, the risk of COVID-19 is likely to remain within the general population for some time.

Conclusion

This study demonstrates that with strict preoperative isolating, preadmission, and regular staff viral PCR testing, orthognathic surgery can be performed in a safe environment without detriment to the patient or staff. Nevertheless, it is fundamental to provide comprehensive information and reasonable risk to the patient as part of the informed consent process. There are increased risks of postoperative complications when undergoing surgery following a positive COVID-19 swab preoperatively, and such patients should have their surgery delayed for at least four weeks following a positive test whilst research is ongoing.[7]

The authors believe that orthognathic surgery is safe within the typical, young, ASA 1-2 orthognathic population group when strict protocols described are applied.

Conflict of interest

We have no conflicts of interest.

Ethics statement/confirmation of patients' permission

Ethics approval was not required as there was no variation in treatment and data were collected observationally. No patient information or identifiable information is disclosed.

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