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Case report

Awake craniotomy in the COVID-19 era - technical tips and feasibility

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ABSTRACT

There has been a growing anxiety in carrying out awake craniotomy surgeries during the SARS-CoV-2 pandemic, not only due to airway management but also close proximity to the team in theatre. We set out to safely perform the first documented awake craniotomy in the UK since the beginning of lockdown. We performed a thorough workup of the patient with minimal hospital visits, using remote communication wherever possible. We modified our existing awake craniotomy protocol/technique guided by local/national policies.

An asleep-awake-asleep craniotomy for tumour resection was performed successfully without compromising patient and staff safety with excellent post-operative outcome. With appropriate pre- and peri-operative modifications to established protocols, awake craniotomies with functional mapping can be safely carried out. By incorporating novel aspects to our technique, we believe that this service can safely resume in carefully selected patients.

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1. Introduction

The SARS-CoV-2 pandemic has had a global impact on healthcare, in particular on the delivery of surgical operations. Most neurosurgical units, including ours, have continued to carry out urgent tumour surgeries; awake craniotomies have been performed less, due to unique challenges posed.

The use of drills and ultrasonic aspirator during tumour surgery renders it a high risk aerosol generating procedure, as is instrumentation of the airway for a general anaesthetic [1].

Awake craniotomy carries additional concerns including: the safety of the patient in close proximity to multiple staff members, the possibility of transmission of COVID-19 to staff where a pre-operative swab has been falsely negative, as well as the presence of additional staff/equipment in theatre, in order to perform necessary testing.

Furthermore awake surgeries for relatively non-urgent pathologies (e.g. Low grade gliomas) had been deferred as per SBNS/BNOS guidelines [2].

Abbreviations: SARS-CoV-2, Severe Acute Respiratory distress Syndrome Coronavirus 2; COVID-19, Coronavirus Induced Disease – 19; SBNS, Society of British Neurological Surgeons; BNOS, British Neuro-Oncology Society; MDT, Multi-disciplinary Team meeting; PPE, Personal Protective Equipment; NHS, National Health Service.

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We performed the first awake craniotomy since the declaration of the pandemic and introduced a number of safety precautions. To our knowledge this is the first reported case of an awake craniotomy in the COVID-19 era in the United Kingdom and we aim to share a few tips.

2. Case report

Our patient was a 34 year old female with a recurrent low grade glioma with features of transformation on surveillance MRI (Fig. 1). The patient was informed of the possible risks should she acquire COVID peri-operatively [3] and the challenges incurred for testing due to PPE. She underwent preparation for the battery of tests to be carried out intraoperatively (free speech; comprehension and counting; picture naming/object recognition; pyramids and palm trees and gross/fine motor assessments) via a videoconference prior to surgery, and also on the day. Local and national guidelines were taken into consideration and microbiology advice was sought.

Flexman *et al*⁴ recommended that an awake craniotomy should preferably be performed fully awake avoiding the aerosol generation associated with general anaesthesia. Our patient was not keen therefore we planned an asleep-awake-asleep technique. The patient was required to self-isolate for 14 days and underwent SARS-CoV-2 PCR testing 72 h pre-operatively (negative).

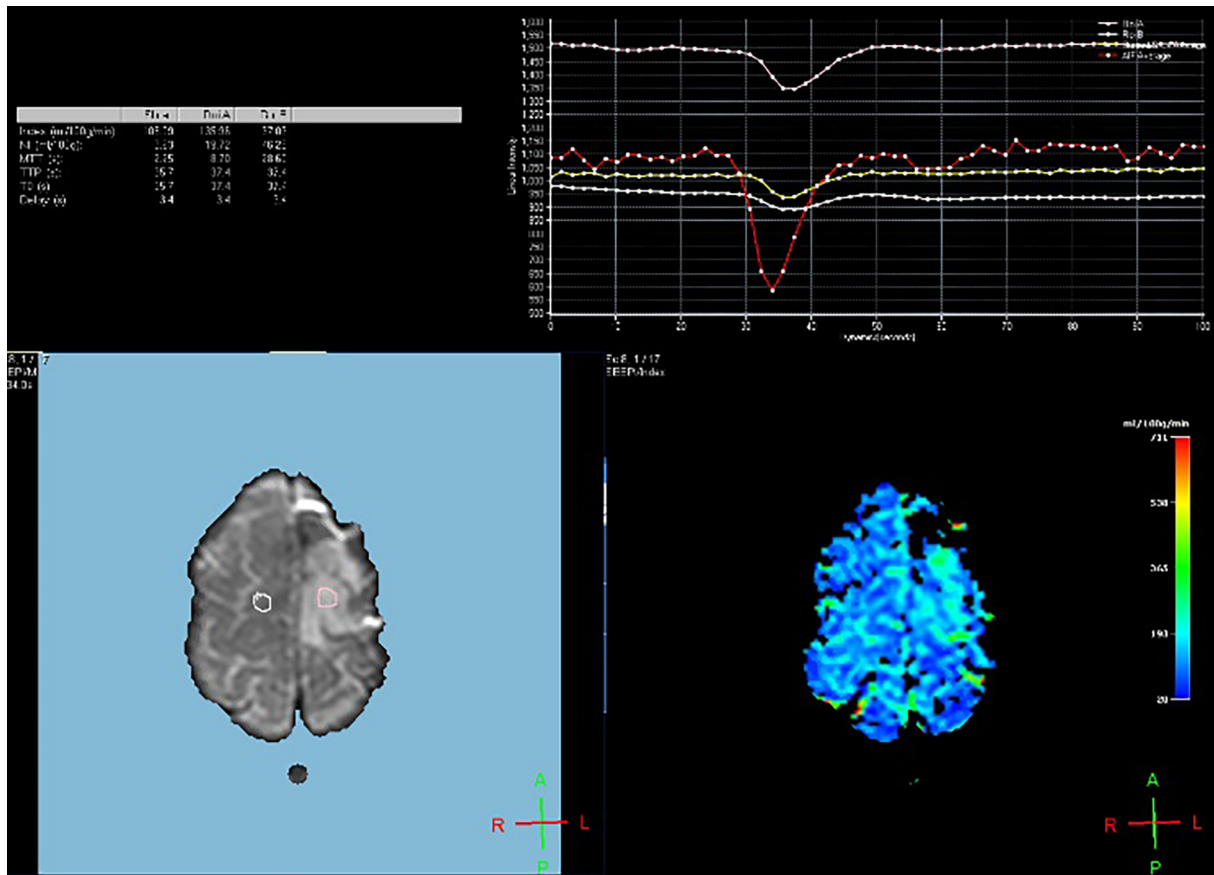


Fig. 1. Pre-op/surveillance MRI showing features suggestive of transformation.

On the day of admission she was kept in a green area of the hospital, wore a surgical mask and appropriate social distancing measures were observed.

Although the patient had tested negative for SARS-CoV-2, all staff members wore full PPE, to allow for the possibility of a false negative test and minimize staff anxieties. It was felt that the patient should wear some facial covering and we improvised a mask (made under aseptic technique) that allowed a clear window to enable lip reading and enhance communication (Fig. 2).

The surgery was performed in a barn style theatre (twin, both with laminar flow systems), with the neighbouring theatre empty. General anaesthesia was induced and a laryngeal mask inserted; regional scalp block was performed. This was done with minimal staff present in theatre during and for 10 min afterwards as this would allow for roughly 3 changes of air. When the patient was allowed to wake up and again following tumour resection for re-anaesthetizing all the surgical team moved into the adjacent theatre under its laminar flow for the duration of the aerosol generating airway procedure, and 10 min thereafter.

The neuropsychologist carried out testing at 1 m distance. The use of our makeshift mask was a positive experience with no impairment in communication while background noise was kept to a minimum. Aside from an episode of intraoperative seizures managed with ice cold saline, the procedure was uneventful. The patient did not experience any postoperative deficit and was discharged after 3 days. The postoperative MRI scan confirmed an excellent resection (Fig. 3). At 14 days following the procedure, neither members of staff, nor the patient developed COVID-19.

3. Discussion

Awake craniotomy with functional mapping is considered the gold standard for tumours in eloquent areas to achieve maximal resection whilst preserving function. COVID-19 has presented unique challenges for those cases as it poses an unquantified risk for teams/patients as well as impacting on the need for clear communication that is vital. At the same time it pushes teams to become more innovative and work together to optimize guidance in previously uncharted territories.



Fig. 2. Improvised mask.

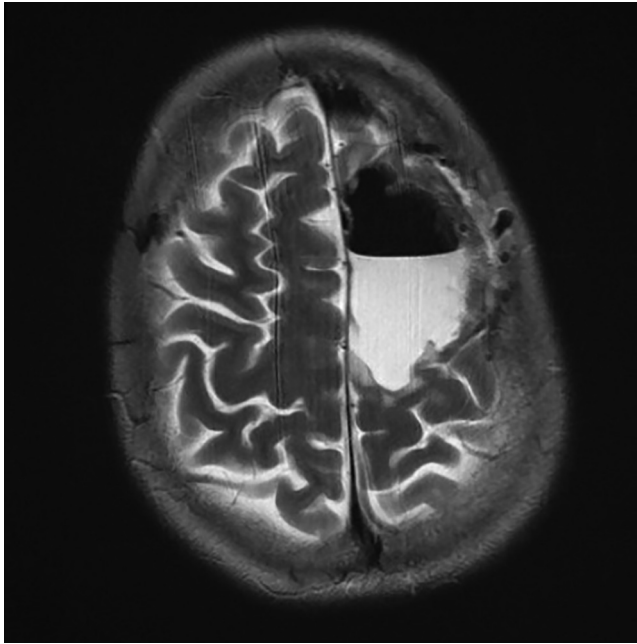


Fig. 3. Post-operative MRI.

We herewith share our experience in carrying out our first awake craniotomy in COVID times. Under normal circumstances we carry out 40–50 awake craniotomies a year; this was the first case carried out after 9 weeks since the lockdown.

The key in the success of the procedure was effective communication amongst the wider team - both in pre-operative planning and on the day of surgery. We ensured that everyone felt that their safety was protected, and that any risk to the patient and staff was minimized.

We used the available technology for preoperative video consultations to reduce unnecessary hospital visits. A period of 14 day of isolation with a negative PCR test 48-72hrs prior to the surgery is paramount. The risk of the patient of contracting COVID-19 should also be thoroughly evaluated. The preference during SARS-CoV-2 pandemic would be for the patient to be awake

throughout however some patients cannot tolerate it and certain situations (e.g. generalized seizures) necessitate securing the airway [1,4].

We used a face covering for the patient intraoperatively, without impairing communication or ability to recognize any speech problems, facial weakness or seizures and we plan to develop this further.

The use of a barn theatre enabled the team to move seamlessly into a safe area during airway procedures, without the need to doff/don while remaining nearby.

In summary, with some novel, albeit simple adaptations to our well established methods, we were able to safely perform an awake craniotomy. We plan to continue to refine this technique in our future cases in the COVID era to mitigate the challenges associated with it and increase confidence in appropriate cases, where deferring surgery could increase risk of deficit or higher grade transformation.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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