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SHORT COMMUNICATION NEUROANESTHESIA

Pioneering experience with awake craniotomy in a resource constrained environment

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ABSTRACT

Awake craniotomy (AC) enables maximal tumor resection near eloquent cortex, but its implementation in resource-limited settings presents distinct anesthetic challenges. We describe the establishment of an AC program in a low-resource neurosurgical center, emphasizing constraints related to team inexperience, limited patient literacy, absence of neuronavigation and cortical mapping, and restricted availability of short-acting anesthetic agents. Adaptive strategies included multidisciplinary training, simplified patient education materials, use of dexmedetomidine and ropivacaine for conscious sedation and scalp block, continuous intraoperative communication to compensate for lack of neurophysiologic monitoring, and dose conversions compatible with older infusion pumps. Despite these limitations, five ACs were successfully completed with stable sedation, adequate analgesia, and favorable patient cooperation. This article provides practical insights for anesthesiologists working in similar environments to help ensure successful and safe awake craniotomy practices in resource-constrained settings.

Keywords: Awake craniotomy; Neuronavigation; Neurosurgical center

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1. INTRODUCTION

Awake craniotomy (AC) with brain mapping aims to maximize resection of gliomas located within eloquent regions while minimizing the risk of postoperative deficits.[1] However, establishing awake craniotomy procedures in settings with limited resources is especially challenging when undertaken for the first time. In this article, we would be sharing the key challenges that we faced in creating a pioneering center in AC and focus on the solutions in introducing this new practice in the context of a health system with significant financial constraints.

2. REPORT

While the surgeons had prior experience with AC during their training, this was the surgeon's first independent attempt, and coordination between the surgical and anesthesia teams proved to be a major challenge. On the other hand, there was a limited familiarity with the procedure among operating room (OR) staff, including OT and anesthesia technicians, as well as our trainees. This concern was resolved through joint planning, shared protocols, videos and open communication about the procedure.

Given the low literacy levels among patient population coming to our institution, introducing and explaining the concept of awake craniotomy posed a significant challenge. The presence of heightened anxiety, limited awareness, and prevalent needle phobia within this patient population significantly complicated the administration of scalp block. This challenge was addressed through the use of international patient education videos, informational brochures, and reading materials presented in a language and format accessible to the target population.

We incorporated the approach of continuous communication and active engagement with patients throughout the procedure. Techniques such as presenting images for identification, assessing motor responses

through purposeful movement, and asking patients to recognize various objects not only facilitate intraoperative neurological monitoring but also help alleviate patient discomfort and anxiety as we lack intraoperative neurological monitoring in our hospital. These interactions foster a sense of involvement and reassurance, contributing to an overall positive patient experience.[2]

In our operating room, we lack the facility of neuronavigation and cortical mapping which helps a surgeon in giving a real-time assessment of a more accurate incision and precise excision of tumors. These advanced techniques assist in placing smaller incisions, reducing the resection time and more precise incision planning. Moreover, non-availability of short acting opioids (e.g., fentanyl and remifentanil), ropivacaine and dexmedetomidine in some of the hospitals is one of the major limitations in tailoring conscious sedation. However, we were fortunate to have ropivacaine and dexmedetomidine in our hospital setting.

Positioning the awake patient's head on the Mayfield head clamp can cause significant discomfort due to lack of neck support. To mitigate this issue, we placed a large cotton roll paddings beneath the neck, providing additional support and enhancing patient comfort.

The limited options available of microinfusions in older infusion pumps pose significant constraints for anesthesiologists in maintaining conscious sedation and ensuring a pain-free environment for patients by titrating the desired infusion rates. To overcome this limitation, we converted the dosing units of dexmedetomidine from µg/kg/hour to ml/hour, enabling successful administration using the available equipment. Dexmedetomidine is particularly effective in achieving conscious sedation during awake neurosurgical procedures, attenuating the patient's awareness of aversive auditory stimuli such as drilling and background conversations.[3]

3. CONCLUSION

Despite these limitations, we successfully conducted a series of five awake craniotomies at our institution. While the task was undoubtedly challenging, it proved to be achievable with careful planning and execution. In resource-limited settings, successful execution of awake craniotomy requires clinical adaptability, creative use of available equipment, and effective multidisciplinary collaboration. Future practitioners should prioritise patient engagement for intraoperative monitoring and comfort, structured team training, and safe, ethical practice tailored to local constraints. Documenting and sharing these adapted protocols can support wider adoption and improve outcomes in similarly challenged environments.

4. Conflict of interest

All authors declare that there was no conflict of interest.

5. Ethical considerations

Written consent was obtained from the patient to publish this report in academic interest..

6. Authors' contribution

Sheema Siraj was the sole author of this paper.

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