श्री चित्रा तिरुनाल आयुर्विज्ञान और प्रौद्योगिकी संस्थान, त्रिवेंद्रम, तिरुवनन्तपुरम - 695 011, केरल, भारत
SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES AND TECHNOLOGY, TRIVANDRUM
THIRUVANANTHAPURAM - 695 011, KERALA, INDIA
(एक राष्ट्रीय महत्व का संस्थान, विज्ञान और प्रौद्योगिकी विभाग, भारत सरकार)
(An Institution of National Importance, Department of Science and Technology, Government of India)
टेलीफोन नं./Telephone No.: 0471-2443152 फैक्स/Fax: 0471-2446433, 2550728
ई-मेल/E-mail: sct@sctimst.ac.in वेबसाइट/Website: www.sctimst.ac.in

PROJECT COMPLETION REPORT

1. **Project Number** : 5403

2. **Title of the Project** : A comparative study to evaluate the efficacy of virtual versus direct airway assessment in the preoperative period in patients presenting for neurosurgery.

3. **Funding Agency Name** : Sree Chitra Neuroanesthesia and Critical care Society

4. **Project Reference Number provided by the Funding Agency**: Proj. SNACS/2020/01

5. **Principal Investigator (Name & Address) : Dr Ajay Prasad Hrishi, Additional Professor, Neurosanesthesia, SCTIMST**

6. **Co-Investigators (Name & Address):**
   i. **Dr Unnikrishan P, Additional Professor, Neurosanesthesia, SCTIMST**
   ii. **Dr Ranganatha Praveen CS,Associate Professor, Neurosanesthesia, SCTIMST**
   iii. **Dr Smita V,Professor, Neurosanesthesia, SCTIMST**
   iv. **Dr Manikandan S, Professor, Neurosanesthesia, SCTIMST**

7. Implementing Institution : SCTIMST

8. Collaborating Institutions : None

9. Date of Commencement : 12/05/2020

10. Duration : 1 year

11. Date of Completion : 30/04/2021

12. Objectives as approved :

Neurosurgical patients with cervical spine pathologies, craniofacial and craniovertebral junction anomalies, recurrent cervical spine, and posterior fossa surgeries frequently present with an airway that is anticipated to be difficult. Though the routine physical evaluation is non-aerosol generating, the Mallampati scoring, mouth opening, and assessment of lower cranial nerve function could generate aerosols, imposing a greater risk for acquiring infection by the deadly severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus. Moreover, airway evaluation requires the patient to remove the mask, posing a greater risk to the assessing anaesthesiologist. Thus, we designed this study to evaluate the efficacy of virtual airway assessment(VAA) done via telemedicine in comparison to direct airway assessment (DAA) and to assess the feasibility of VAA as a part of the pre-anesthetic evaluation (PAE) of patients presenting for neurosurgery in the backdrop of COVID19 pandemic.

13. Deviation made from original objectives if any, while implementing the project and reasons thereof :
None

14. Field/Experimental work giving full details of summary of methods adopted, data collected supported by necessary tables, charts, diagrams and photographs :

Fifty-five patients presenting for elective neurosurgical procedures were recruited in this prospective, observational study. The preoperative assessment of the airway was first done by a remote anesthetist via an encrypted video call using a smartphone which served the purpose of telemedicine equipment, followed by a direct assessment by the attending anesthetist. The following parameters were assessed: Mouth Opening (MO), presence of any anomalies of tongue and palate, Mallampati Classification (MPC) grading, Thyromental distance (TMD), upper lip bite test (ULBT), cervical spine extension, and LEMON scoring system.

15. Detailed anaylsis of results :

Statistical analysis

Demographic parameters were expressed as Mean ± SD. Agreement between the values obtained by virtual assessment and direct examination of airway parameters were analyzed with the Kappa test.

Results
We observed a 'perfect agreement' between the DAA and VAA with regards to MO. Assessment of ULBT, spine extension, and the LEMON score had an overall 'almost perfect agreement between the DAA and VAA. We also observed a 'substantial agreement' between VAA and DAA during the assessment of MPC grading and TMD.

16. Summary sheet of not more than 2 pages under following heads :
(Title, Introduction, Rationale, Objectives, Methodology, Results, Translational Potential)

Objectives

Neurosurgical patients with cervical spine pathologies, craniofacial and craniovertebral junction anomalies, recurrent cervical spine, and posterior fossa surgeries frequently present with an airway that is anticipated to be difficult. Though the routine physical evaluation is non-aerosol generating, the Mallampati scoring, mouth opening, and assessment of lower cranial nerve function could generate aerosols, imposing a greater risk for acquiring infection by the deadly severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus. Moreover, airway evaluation requires the patient to remove the mask, posing a greater risk to the assessing anaesthesiologist**.** Thus, we designed this study to evaluate the efficacy of virtual airway assessment(VAA) done via telemedicine in comparison to direct airway assessment (DAA) and to assess the feasibility of VAA as a part of the pre-anesthetic evaluation (PAE) of patients presenting for neurosurgery in the backdrop of COVID19 pandemic.

Materials and Methods

Fifty-five patients presenting for elective neurosurgical procedures were recruited in this prospective, observational study. The preoperative assessment of the airway was first done by a remote anesthetist via an encrypted video call using a smartphone which served the purpose

of telemedicine equipment, followed by a direct assessment by the attending anesthetist. The following parameters were assessed: Mouth Opening (MO), presence of any anomalies of tongue and palate, Mallampati Classification (MPC) grading, Thyromental distance (TMD), upper lip bite test (ULBT), cervical spine extension, and LEMON scoring system.

Statistical analysis

Demographic parameters were expressed as Mean ± SD. Agreement between the values obtained by virtual assessment and direct examination of airway parameters were analyzed with the Kappa test.

Results

We observed a 'perfect agreement' between the DAA and VAA with regards to MO. Assessment of ULBT, spine extension, and the LEMON score had an overall 'almost perfect agreement between the DAA and VAA. We also observed a 'substantial agreement' between VAA and DAA during the assessment of MPC grading and TMD.

Conclusion

Our study shows that PAE and VAA via telemedicine can reliably be used as an alternative to direct physical pre-anesthetic consultation in the COVID19 scenario. This could reduce unnecessary exposure of anaesthesiologists to potential asymptomatic covid positive patients thereby protecting the available skilled workforce, without any significant compromise to patient care.

17. Contributions made towards increasing the state of knowledge in the subject :

PAE and VAA via telemedicine can reliably be used as an alternative to direct physical pre-anesthetic consultation

18. Conclusions summarising the achievements and indication of scope for future work :

Our study shows n in the COVID19 scenario. This could reduce unnecessary exposure of anaesthesiologists to potential asymptomatic covid positive patients thereby protecting the available skilled workforce, without any significant compromise to patient care.

19. Science and Technology benefits accrued :

a. List of research publications with complete details :

1. Hrishi AP, Prathapadas U, Praveen R, Vimala S, Sethuraman M. A Comparative Study to Evaluate the Efficacy of Virtual Versus Direct Airway Assessment in the Preoperative Period in Patients Presenting for Neurosurgery: A Quest for Safer Preoperative Practice in Neuroanesthesia in the Backdrop of the COVID-19 Pandemic! J Neurosci Rural Pract. 2021 Sep 28;12(4):718-725. doi: 10.1055/s-0041-1735824. PMID: 34737506; PMCID: PMC8558970.

b. Manpower trained on the project : None

i. Research Scientists or Research Fellows :

ii. No. of PhD's produced :

iii. Other Technical Personnel trained :

c. Patents taken, if any :

d. Products developed, if any :

20. Abstract:

Background

Neurosurgical patients with cervical spine pathologies, craniofacial and craniovertebral junction anomalies, recurrent cervical spine, and posterior fossa surgeries frequently present with an airway that is anticipated to be difficult. Though the routine physical evaluation is non-aerosol generating, the Mallampati scoring, mouth opening, and assessment of lower cranial nerve function could generate aerosols, imposing a greater risk for acquiring infection by the deadly severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus. Moreover, airway evaluation requires the patient to remove the mask, posing a greater risk to the assessing anaesthesiologist. Thus, we designed this study to evaluate the efficacy of virtual airway assessment(VAA) done via telemedicine in comparison to direct airway assessment (DAA) and to assess the feasibility of VAA as a part of the pre-anesthetic evaluation (PAE) of patients presenting for neurosurgery in the backdrop of COVID19 pandemic.

Materials and Methods

Fifty-five patients presenting for elective neurosurgical procedures were recruited in this prospective, observational study. The preoperative assessment of the airway was first done by a remote anesthetist via an encrypted video call using a smartphone which served the purpose of telemedicine equipment, followed by a direct assessment by the attending anesthetist. The

following parameters were assessed: Mouth Opening (MO), presence of any anomalies of tongue and palate, Mallampati Classification (MPC) grading, Thyromental distance (TMD), upper lip bite test (ULBT), cervical spine extension, and LEMON scoring system.
Statistical analysis
Demographic parameters were expressed as Mean ± SD. Agreement between the values obtained by virtual assessment and direct examination of airway parameters were analyzed with the Kappa test.

Results
We observed a 'perfect agreement' between the DAA and VAA with regards to MO. Assessment of ULBT, spine extension, and the LEMON score had an overall 'almost perfect agreement between the DAA and VAA. We also observed a 'substantial agreement' between VAA and DAA during the assessment of MPC grading and TMD.

Conclusion
Our study shows that PAE and VAA via telemedicine can reliably be used as an alternative to direct physical pre-anesthetic consultation in the COVID19 scenario. This could reduce unnecessary exposure of anaesthesiologists to potential asymptomatic covid positive patients thereby protecting the available skilled workforce, without any significant compromise to patient care.

21. Procurement/Usage of Equipment:

a. Details of Equipment:

Sl. No.	Name of Equipment	Make/ Model	Cost (Rs.)	Date of Installation	Utilisation	Remarks regarding maintenance breakdown
1	Smartphone	Redme 8 A dual	160/1156 EQMOBP0 127/5403	July 2020	Equipment utilized for the project	Currently used in the Neuroanesthesia Division

b. Suggestions for disposal of equipment(s):

Dr Ajay Prasad Hrishi
29/11/2023
(Name and Signature of PIs with date)

Routing: *Signed copy of "Project completion Report" by PI → root@sctimst.ac.in, rpc@sctimst.ac.in*