Original Research Paper

Anesthesiology

Evaluation of Effectiveness of A Video Assisted Learning Programme in Placement of Double Leumen Tube Using Flexible Ambuscope Using a Bronchoscopy Simulator Amongst Anaesthesiology Residents

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ABSTRACT   *The aims of this study were to conduct an observational study to compare the efficacy of video assisted learning programme in evaluating the training effectiveness of placement of double leumen tubes using a flexible videoscope(Ambu@scope3) with bronchoscopy simulator(Truecorp-Airsim bronchi) for anaesthesiology residents.* ***Materials and methods :*** *Twenty six residents pursuing a post graduate degree course in Anaesthesiology were asked to place a double leumen tube using a flexible videoscope after one year experience in Anaesthesiology residency before and after 02 days training curriculum using a video assisted learning programme on a bronchoscopy simulator. The primary outcome was measured by the performance of the procedure on Global rating Scale(GRS) of performance and Direct observation score (DOPS) using a checklist for the procedure for effective placement of a left sided double leumen tube. Secondary outcomes were time taken, avoidance of adverse events such as inappropriate endobronchial placement (too far in /out) and effective handling of fibreoptic scope.* ***Results :*** *The results were analysed for effectiveness of the video based training programme based on Global rating Scale(GRS) of performance and Direct observation score (DOPS) using a checklist for the procedure . The performance of students after the video assisted programme was significantly better with higher scores for procedure achieved in short time of training. A video assisted training programme using high fidelity fibrescopes and bronchoscopy simulator is an effective method to train anaesthesia residents in bronchoscopy and lung isolation techniques in a safe simulated environment.*

KEYWORDS : – Lung isolation techniques, One lung ventilation , Anaesthesiology , Bronchoscopy simulator, Fibreoptic intubation. Airway simulators

INTRODUCTION

Airway management is an essential skill required by the practicing Anaesthesiologist. Not only should the anaesthesiologist be efficient in handling all the currently used airway devices for the normal as well as the difficult airway, increasing and more complex surgical methods require proficiency in lung separation techniques and placement of double leumen tubes / bronchial blockers along with fibreoptic intubation skills, bronchoscopy to carry out awake intubations to confirm airway placement in difficult cases. Brodsky et al[1] in his study has summarised the various procedures for lung separation in the difficult airway.

The number of skills required to be taught to the anaesthesiology residents within a limited time frame of training is increasing. The average anaesthesiologist should be proficient in the operation theatre, remote locations where anaesthesia services are required and in the Intensive Care Unit. It is unlikely that an anaesthesiology resident will get adequate number of cases in modern day anaesthesiology training to perfect his airway management skills in the operation theatre in the case of double leumen tubes for lung isolation techniques. Also, such patients may be severely compromised/ sick to prevent training of residents in the operation theatre without increasing morbidity.

Simulation and the use of high fidelity equipment which mimic the real patient may be the answer to provide effective and reliable training to residents in a safe controlled environment. In our study we assessed the effectiveness of a video assisted training programme for anaesthesiology residents in the placement of double leumen endotracheal tubes.In our hypothesis we maintain that Anaesthesiology residents can be effectively trained in lung separation techniques and placement of double leumen endotracheal tubes (DLTs) in a short training period.

Ambu @ scope 3 is a portable flexible fiberscope with high resolution video monitor and a disposable videoscope having an injection port for injection of local anaesthetic and a suction port. The device is regularly used for awake fibre-optic intubations by faculty and residents.

We also decided to use the Truecorp Airsim Bronchi advance airway simulator manikin for training in the use of placement of DLTs using the flexible videoscope (Ambuscope).

Fig1 Double Leumen Tube (left sided) placement with Ambuscope on Airsim Bronchoscopy simulator (Truecorp inc) :

Aims:
The aims of this study were to conduct an observational study to

assess the effectiveness of video based training for anaesthesiology residents in using flexible fiberscope (Ambu@scope) for placement of double leumen tubes (DLTs) on the bronchoscopy simulator (Truecorp Airsim Bronchi) in our skills laboratory.

Objectives:
The objective of this study was train anaesthesiology residents in the techniques of fibreoptic intubation, bronchoscopy and improve their skills in effective placement of double leumen tubes in a simulation environment.

Study design :
Single centre, prospective observational study.

METHODS :
After approval of the simulation training curriculum and approval by the ethics committee all students were informed about the study and consent taken. Anaesthesiology residents had completed one year residency and were familiar with the fibreoptic equipment and bronchoscopy simulator were asked to place a double leumen tube using the flexible fibrescope on the bronchoscopy simulator.

Students were observed by two independant instructors marking them on a Global Rating scale (GRS 1 to 5) and a Direct observation scale with a checklist(DOPS) on a scale of 10. A two days training programme was conducted with demonstration videos and training by senior Anaesthesiologists on left sided double leumen tube placement using fibreoptic intubation on Bronchoscopy simulator including checking for correct placement using the portable videoscope. The actual time to correct placement of the DLT tube from entry of the videoscope into the oral cavity was also noted. The students were evaluated again for skill improvement in the procedure as done before the training curriculum in the skills laboratory.

One instructor evaluated the students performance of the procedure on the "**Global Rating scale for procedural skills in Anaesthesia**"[2] on a scale of 1 to 5 on the following points as per the likert scale.

• Pre-procedure preparation
• Time & motion
• Instrument Handling
• Flow of procedure
• Knowledge
• Overall efficiency

A second instructor marked the students on a prepared checklist as per DOPS marking system on the steps involved on a scale of 10.The **Direct observation domains[2]** include the following

• Demonstrates understanding of procedure
• Situation awareness
• Pre-procedure prearation
• Aseptic technique
• Technical ability
• Seeks help where applicable
• Post procedure management
• Communication skills
• Considerations of patient
• Overall performance

All the anaesthesiology residents were able to successfully place the Double leumen tube and use the fibreoptic videoscope with acceptable level of competence at the end of the training programme.

STATISTICAL ANALYSIS
Results were evaluated using Mean +/- SD for both groups in the pre and post tests on the Global Rating Scale and Direct Observation and Checklist Score for the procedure. P values were calculated for the results in pre and post raining results by the Students t test and analyzed for significance.

RESULTS
Results of performance of students before training and after training as per the global rating scale for procedural skills in Anaesthesia on a scale of 5 and a direct observation Score as per a checklist on a scale of 10 are tabulated in Table 1 as follows.

Table 1 : Results of scores before & after video assisted simulator based training session.

Assessment Method	Group	Mean +/- SD	P value
Global Rating Scale (1 to 5)	Before Training	2.00 +/- 0.65	< 0.001 **Significant**
	After Training	4.23 +/- 0.51	
Direct Observation Checklist (0 to 10)	Before Training	5.07 +/- 0.84	< 0.001 **Significant**
	After Training	7.61 +/- 0.69	

The mean time to correct placement of DLTs was lower after training with lesser number of times the videoscope hit the mucosa after training. The overall confidence and skill levels of residents in the procedure was acceptable.

DISCUSSION
Availability of virtual reality simulators can reproduce lifelike scenarios for training and testing of complex procedural skills. A study by Richard Rowe et al[2] has evaluated a virtual reality airway simulator in paediatric patients and concluded a significant improvement in time to intubate and other performance indicators amongst paediatric residents.

In our study too there was a significant improvement in skill levels. A study by Cook et al[3] gives insight into learning curves for intubation training with substantial improvements with training. Smith JE et al[4] has recommended video image based training for fibreoptic nasotracheal intubation.

Goldmann et al[5] and John Mc Neil[6] in their studies concluded that residents improved significantly in a virtual reality simulator for fibreoptic intubation skills. Xavier M Campos et al[7] used a DVD video to train non cardio-thoracic anaesthesiologists in placement of left sided DLT tubes.

CONCLUSION :
The evaluation of a training methodology to train anaesthesiology residents lung isolation techniques and fibreoptic intubation with DLT placement cannot be underestimated. In our study we found that using a video based training programme on a simulator effectively trained anaesthesiology residents in a complex procedure to desirable level of skills.

A skills laboratory with requisite equipment and simulators is essential for such procedures for skill development in a short training period.

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