ORIGINAL ARTICLE

Simulation training using cadaver sheep chest in pleuroscopy — A step towards skills enhancement

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Abstract

Objectives: For assessing the use of if simulation training on animal cadavers as a useful tool for training in pleuroscopy.
Methods: The email-based cross-sectional study was conducted in December 2014 at Shaikh Zayed Hospital, Federal Postgraduate Medical Institute, Lahore, Pakistan, and comprised respiratory physicians and trainees after their participation in a two-day hands-on training course on pleuroscopy and pleural medical procedures. The responses were analysed and the responses of physicians and trainees were compared.
Results: Of the 44 individuals who attended the course and were contacted through emails, 38(86.4%) responded, including 20(52.6%) physicians and 18(47.3%) trainees. All the 38(100%) subjects uniformly accepted the utility of simulation training in enhancing education, improving skill, and improving confidence by repeated practice, and felt that the inclusion of animal models for learning fundamental pleuroscopic procedures can help a lot in teaching.
Conclusion: Animal cadavers can be used as an effective teaching tool for pleuroscopy training.
Keywords: Medical thoracoscopy, Simulation training, Education. (JPMA 67: 552; 2017)

Introduction

Pleuroscopy (medical thoracoscopy/pleural endoscopy) involves passage of an endoscope through the chest wall that offers the respiratory physician a "window" for direct visualisation and collection of samples from the abnormal pleura.[1] It is a valuable diagnostic procedure and, in some cases of pleural diseases, can also provide an opportunity for treatment.[2] It is emerging as a new diagnostic modality in Pakistan, but currently its availability is limited to only a few centres in the country due to poor awareness, cost constraints and limited training opportunities.[1,3] Pleuroscopy training can be pursued by doing pleural procedures on patients under close supervision by expert trainers as well as using simulated models.[2] Evidence is increasing that simulation is an effective means of teaching interventional procedures like bronchoscopy and pleuroscopy using mannequins and animal models.[3] Simulation training using animal models enhances education, safety and skills of novices and also reduces chances for complications in patients due to repeatability of procedure.[4]

The current study was planned to see if simulation training using animal cadavers is a useful tool for training in pleuroscopy.

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Subjects and Methods

The email-based cross-sectional study was conducted in December 2014 at Shaikh Zayed Hospital, Federal Postgraduate Medical Institute, Lahore, Pakistan, and comprised respiratory physicians and trainees after their participation in a two-day hands-on training course on pleuroscopy and pleural medical procedures.

The course included interactive presentations and hands-on training sessions using animal models as well as patients requiring and consenting for various pleural medical procedures.

On day 1, the participants were divided into groups A, B, C and D, and allocated to one of four interactive stations for various pleural procedures. Prior to the hands-on training sessions, each group attended live patients' procedures, including small-bore pleural/chest drains placement (Saldinger's and non-Saldinger's techniques) and Abrams' closed pleural biopsy projected directly in the procedures room. The groups were then rotated at four supervised stations teaching pleural ultrasonography using patients and Abrams' closed pleural biopsy and small-bore pleural drains placement using sheep cadaver chest.

On day 2, two trainers performed pleuroscopy on two patients each and two groups rotated with one trainer using Richard Wolf Rigid Single Puncture Video Pleuroscopy System and the remaining two groups remained with the second trainer using Semi-rigid Olympus Video Pleuroscopy System. The third supervised

Figure-1: Introduction of pleuroscope in cadaver sheep chest with view of image on the monitor.

station comprised the animal cadaver model that was attended by all four groups in turn. Each participant was given a chance to perform the procedure on the model using both rigid and semi-rigid video pleuroscopy systems. The cadaver sheep chest model was prepared carefully in a way that the whole thorax remained intact (Figure-1). The whole thorax was dissected from the slaughtered sheep body, cutting its neck superiorly with preserved heart and lungs internally into the rib cage attached to the spine posteriorly and intact diaphragm inferiorly. With the introduction of pleuroscope, this provided an excellent view of both parietal andvisceral pleurae from inside mimicking human hemi-thorax. Each participant spent about 10 minutes practising pleuroscopy (insertion, navigation, manipulation and biopsy) on the animal model. This was performed under direct supervision of a trainer and queries were clarified during the procedure. On the 4th station, the participants were given a chance to practice all the procedures conducted on day one.

Following the course, all the participants were contacted by email and were asked for their consent and information needed for this study. Participants were sent an 8-item questionnaire to which they had to respond in a 'yes or no' format. The survey instrument was designed to assess the participant's perceptions about the improvement in their knowledge, skills, confidence and applicability through the use of simulation training using cadaver animal model in fundamental teaching of pleuroscopy. The answers of the participants were recorded and the frequencies and percentages were computed. Comparison of responses of pulmonary physicians and trainees was done by chi-square likelihood ratio.

Results

A total of 44 participants, including 34(78%) from other hospitals and 10(22%) in-house trainees, attended the course. Among them, 23(52%) were pulmonology trainees and 21(48%) were pulmonary physicians (Figure-2). There were 5(11%) females [3(60%) physicians and 2(40%) trainees), while the remaining 39(89%) were male participants.

Of the 44 individuals contacted through emails, 38(86.4%) responded, including 20(52.6%) physicians and 18(47.3%) trainees. Of the 38 subjects, 5(13%) were females and 33(87%) were males.

All the 38(100%) respondents uniformly accepted the utility of simulation training in enhancing education, improving skill, and improving confidence by repeated practice, and felt that the inclusion of animal models for learning fundamental pleuroscopic procedures can help a

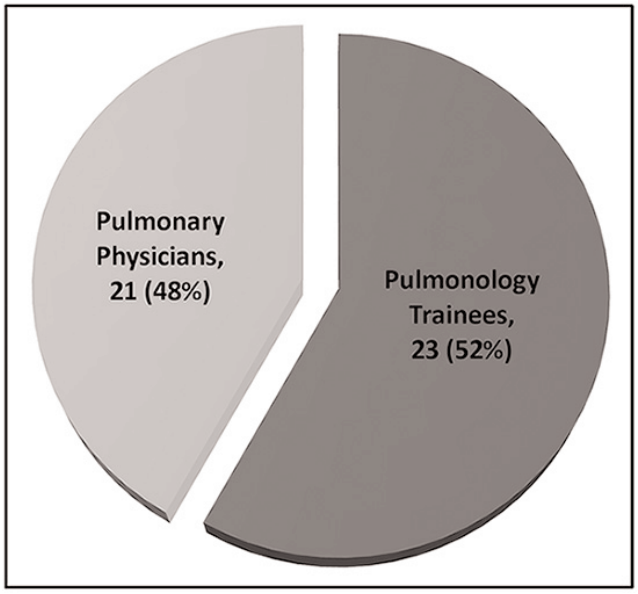

Figure-2: Distribution of participants.

Table: Responses of physicians and trainees on questions about simulation training.

		Position				p-value
		Physician		Trainee		
		n	%	n	%	
Do you think the sheep chest model resembled human thorax?	Yes	20	100.0	16	88.9	0.078
	No	0	0.0	2	11.1	
Did this increase your education about thoracoscopy?	Yes	20	100.0	18	100.0	----
	No	0	0.0	0	0.0	
Did this improve your thoracoscopic procedural skills?	Yes	20	100.0	18	100.0	----
	No	0	0.0	0	0.0	
Did it improve your confidence?	Yes	20	100.0	18	100.0	----
	No	0	0.0	0	0.0	
Did this provide you an opportunity to repeatedly practice the procedure?	Yes	20	100.0	18	100.0	----
	No	0	0.0	0	0.0	
Do you think these skills are transferable to practice in patients?	Yes	20	100.0	18	100.0	----
	No	0	0.0	0	0.0	
Do you think use of simulation based training reduces complication rates in patients?	Yes	19	95.0	18	100.0	0.253
	No	1	5.0	0	0.0	
Should simulated animal models be part of pulmonary curriculum to teach procedures?	Yes	20	100.0	18	100.0	----
	No	0	0.0	0	0.0	

lot in teaching.

There were 2(11.1%) trainees who were of the opinion that the sheep chest model did not have resemblance to the human thorax (p=0.078) and 1(5%) physician opined that this simulation process may not be helpful in reducing complications among human patients (p=0.253) (Table).

Discussion

There is currently limited research into the use of cadaveric animal tissue for pleuroscopy training. Our results show that both pulmonary physicians and trainees valued the use of cadaver sheep chest in this regard. Using animal tissue has a number of benefits over other simulation techniques, most notably that it resembles human tissue behaviour more closely than mechanical models.[3] Anatomical variation between human and animal tissue, however, can be an issue. Indeed, this is reflected in the response of the 2 trainees who thought that the sheep chest model did not resemble the human thorax. This may be due to the fact that thickness and orientation of various organs and tissues can be different.[5] Despite this, all physicians and trainees acknowledged the benefit of using sheep cadaveric tissue in a number of categories, suggesting that anatomical variation is not a barrier to providing a valuable learning opportunity for pleuroscopy. This is further reflected in the fact that all participants believed that the skills they learnt were transferable to practice in patients.

The benefit of using sheep chest cadaver for pleuroscopy training can be most reliably assessed by investigating the relationship between simulation training and procedural outcome. All participants were of the opinion that this model improved thoracoscopic procedural skills, which is likely partly due to improved confidence levels and the opportunity for repeated practice. Ex-vivo animal models have proved to be useful in the training of various other well-established endoscopic procedures, such as endoscopic haemostasis, endoscopic ultrasound, endoscopic retrograde cholangiopancreatography and endoscopic submucosal dissection.[6] The evidence shows training on animal models improves procedural skill, aids the application of endoscopic techniques in clinical practice and increases confidence within trainees.[6] Furthermore, 1-day training courses on an ex-vivo animal model have been shown to improve endoscopic resection skill, insertion of stents and application of over-the-scope (OVESCO) clips.[7] The success of using animal models for the teaching of these endoscopic procedures lends further support to the potential of using animal cadaver simulation training for pleuroscopy training.

Ex-vivo animal models have a number of advantages over other simulators. They offer a more realistic feel than mechanical models and have a lower cost than computer-based virtual-reality simulators. However, tissue acquisition, a lengthy preparation time and disposal of tissue can be potential problems.[5,8] Overall, the participants felt that teaching with the sheep cadaver model increased their education about thorocoscopy and that simulated animal models should be part of

pulmonary curriculum to teach thoracoscopic procedures.

Conclusion

Simulation-based training using cadaver sheep chest was a useful tool for implementing fundamental training in pleuroscopy, especially for pulmonary trainees and physicians. This modality has the potential to optimise operator's basic pleuroscopy skills and confidence and, being easily repeatable, enhances patient's safety providing a novel tool for pleuroscopy training modules.

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References

1. Rodriguez-Panadero F, Janssen JP, Astoul P. Thoracoscopy: general overview and place in the diagnosis and management of pleural effusion. Eur Respir J 2006; 28: 409-22
2. Mahmud T. Malignant Pleural Effusion. Pak J Chest Med 2014; 20: 26-33.
3. Blackburn SC, Griffin SJ. Role of simulation in training the next generation of endoscopists. World J Gastrointest Endosc 2014; 6: 234-9.
4. Ziv A, Wolpe PR, Small SD, Glick S. Simulation-based medical education: an ethical imperative. Acad Med 2003; 78: 783-8.
5. Desilets D, Banerjee S, Barth B, Kaul V, Kethu S, Pedrosa M, et al. Endoscopic simulators. Gastrointestinal Endoscopy 2011; 73: 861-7.
6. Parra-Blanco A, González N, González R, Ortiz-Fernández-Sordo J, Ordieres C. Animal models for endoscopic training: do we really need them?. Endoscopy 2013; 45: 478-84.
7. Martinek J, Stefanova M, Suchanek S, Zavada F, Svobodova B, Strosova A, et al. Training of Different Endoscopic Skills on Ex-Vivo Animal Model. Simulation in Healthcare. J Soc Simulation Healthcare 2014; 9: 112-9.
8. Cohen J, Thompson C. The Next Generation of Endoscopic Simulation. Am J Gastroenterol 2013; 108: 1036-9.