



## Case report

# Endoscopic sinus surgery training courses: Benefit and problems – a multicenter evaluation

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## ARTICLE INFO

### Article history

Received 30 June 2020

Accepted 7 October 2020

Available online 7 June 2021

### Keywords

Evaluation

Endoscopic sinus surgery

Dissection course

### Doi

<https://doi.org/10.29089/2020.20.00159>

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## ABSTRACT

**Introduction:** Dissection courses are important for trainees and surgeons in mastering the skills required to perform endoscopic sinus surgery (ESS) which is a common surgery in otorhinolaryngology.

**Aim:** To evaluate the benefits of ESS training courses and ways to improve training.

**Material and methods:** In a prospective study using a structured questionnaire, participants of ESS courses in the United Kingdom, Malaysia, India and Thailand were asked on their experiences in these courses and suggestions on improving them.

**Results and discussion:** The majority of the participants have experiences in performing ESS prior to joining the course. Infundibulotomy was considered the easiest dissection step in ESS while frontal sinus surgery was considered the most challenging by the majority of the participants. The motivation for most of the participants in joining the course is to improve their skills with almost all stating that their expectations of the course have been fulfilled with improvement of their surgical techniques, anatomical skills and on patient's safety. Almost all the participants were satisfied with the course and would recommend attending it.

**Conclusions:** ESS dissection courses are an integral part in the learning process of trainees in becoming a competent surgeon and for surgeons to improve their techniques. Continuous improvement should be made to ensure that the participants will benefit from attending the course.

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## 1. INTRODUCTION

Endoscopic sinus surgery (ESS) is an important and common procedure in otorhinolaryngology (ORL). Thorough understandings of the complex anatomy of the paranasal sinuses and sound surgical skills are important in avoiding significant surgical complications. Training courses for ESS provide a good avenue for trainees and surgeons to strengthen their anatomical knowledge and enhance their surgical skills. A study by Braun et al.<sup>1</sup> on ESS showed that training courses are considered to be beneficial by surgical trainees and are well accepted as a mode of surgical training.

## 2. AIM

To evaluate the benefits of ESS training courses and ways to improve training.

## 3. MATERIAL AND METHODS

Ninety seven participants from Malaysia, Thailand, India and the United Kingdom took part in this prospective study using a structured questionnaire which was based on a similar study by Braun et al.<sup>1</sup> asking participants on their level of surgical training, experiences during the ESS training courses and ways to improve them. Our study includes courses that were organized in Asian countries such as the countries mentioned above. All 9 ESS training courses took place between 2014 and 2016. The courses included lectures on anatomy and hands-on cadaveric dissection under supervision. Surgical steps which were demonstrated and subsequently performed by the participants under guidance included infundibulotomy, middle meatal antrostomy, anterior and posterior ethmoidectomy, frontal sinus surgery, sphenoidotomy, identification of the arteries such as the sphenopalatine, anterior ethmoidal and the posterior ethmoidal arteries, orbital procedures such as orbital decompression and skull base approaches.

There are some limitations to this study. The cost of the individual ESS courses were not stated. Courses which are more expensive would rationally be better equipped in terms of instruments and cadaver quality. Participants in these courses will in turn have a higher level of satisfaction.

## 4. RESULTS

A total of 97 participants took part in this study by answering the questionnaire: 61 from Malaysia, 15 from India, 12 from Thailand and 9 from the United Kingdom. In total, 57 participants were male, 40 were females (Malaysia: 37 males, 24 females, India: 13 males, 2 females, Thailand: 3 males, 9 females, UK: 5 males, 4 females). The majority were right-handed with only 12% being left-handed. Participants from the 30–40 years old age group accounted for about 60% of

**Table 1. Years of experience in ORL.**

| Years of experience in ORL | Number of participants, % |
|----------------------------|---------------------------|
| <5 years                   | 43                        |
| 5–10 years                 | 37                        |
| >10 years                  | 20                        |

**Table 2. Number of ESS performed.**

| Number of ESS performed | Number of participants, % |
|-------------------------|---------------------------|
| No ESS performed        | 22                        |
| <10 ESS performed       | 39                        |
| >10 ESS performed       | 39                        |

**Table 3. Problems encountered during the courses.**

| Kind of a problem                                 | Number of participants, % |
|---|---------------------------|
| Problems with endoscope ( <i>n</i> = 25)          |                           |
| Clear view  | 40                        |
| Using with other instruments                      | 36                        |
| Orientation with angled scopes                    | 16                        |
| Hand posture                                      | 8                         |
| Problems with instruments ( <i>n</i> = 29)        |                           |
| Lack of experience                                | 52                        |
| Limited selection of instruments                  | 31                        |
| Poor quality of instruments                       | 17                        |
| Problem with anatomy ( <i>n</i> = 35)             |                           |
| Viewing in 3D image                               | 69                        |
| Complex anatomy                                   | 31                        |
| Problem with dissection practice ( <i>n</i> = 30) |                           |
| Lack of experience                                | 47                        |
| Lack of time                                      | 37                        |
| Poor quality of cadaver                           | 16                        |

the total number while 16% were below 30 years old and 24% were above 40 years old. Prior to joining the dissection courses, 43% of participants had less than 5 years' experience in ORL, 37% had between 5–10 years' experience while about 20% had more than 10 years' experience (Table 1). About 22% had not performed any ESS before, while those who had performed less than 10 ESS and those that had performed more than 10 ESS accounted for 39% each (Table 2).

The participants' main motivation for joining the dissection courses was to improve their surgical skills (90%). Eight percent attended the course in preparation for their ORL specialist exams while 2% were motivated to join for the continuous medical education (CME) points.

Eighty two percent of the participants agreed that the easiest dissection step was uncinectomy, followed by anterior and posterior ethmoidectomy at 8% each. On the other hand, 89% of the participants felt that the hardest dissection step was the frontal sinus dissection.

A few problems were encountered during the ESS dissection courses (Table 3). Twenty-five participants encountered issues with the endoscopes. Ten of these had no experience

performing any ESS prior to joining the course while 8 had performed less than 10 ESS and 7 had performed more than 10 ESS. The majority (40%) had problems handling the endoscope and getting a clear view especially while using it with another instrument. Four participants had problems getting orientated to the different types of angled scopes while 2 had problems with getting the correct hand postures.

Twenty-nine participants had problems with the instruments. Half of them attributed it to the lack of experience in ESS. About a third (i.e. approximately 33%) mentioned that it was due to the lack of adequate instruments provided during the courses. Seventeen percent said that it was due to the poor quality of the instruments provided such as scissors that were not sharp and forceps that did not grip well.

Participants also encountered problems with the anatomy during the dissection courses. Most participants (69%) had difficulty in translating and visualizing what they had learned into a three-dimensional view during surgery. Others mentioned that the problem was due to the complex anatomy of certain regions such as the frontal recess area.

Thirty participants had problems in relation to the dissection practice. A lack of experience with ESS was the main reason for this issue. Thirty seven percent attributed it to the lack of time while 16% mentioned that it was due to the poor quality of the cadaver provided during the training courses.

The most common complications encountered during the training courses were complications involving the dura (17 cases) followed by orbital complications (9 cases). There was one case of carotid artery injury. The complications were found to be more common in the group that had performed more than 10 ESS.

Participants were asked on suggestions to improve the problems that were stated above (multiple answers were allowed). According to 82% of the participants, attending a dissection/training course was the best way to gain anatomical knowledge and surgical skills. This was followed by watching surgical videos (52%), assisting a ESS surgeon (49%), reading anatomical atlas and viewing anatomical video animations (34%), interactive learning program (30%), reading anatomical textbook (20%), ENT surgical textbook (18%) and general ENT textbook (8%).

Participants of the training courses reported a high level of satisfaction (96%). In total, 87% of the participants stated that their expectations were fulfilled and 98% mentioned that they would recommend the courses to their colleague. Almost all participants stated that there were improvements both in their anatomical knowledge and their surgical skills after going through the courses.

## 5. DISCUSSION

ESS training program and courses are an essential aspect in a residency program<sup>2</sup>. Stankiewicz demonstrated the steep learning curve in ESS, where the rate of complication was 29% in his first 90 patients compared to only 2.2% in the next 90 patients that were operated on.<sup>3,4</sup> Kinsella et al. noted a

complication rate of 22% among 193 cases that were performed by residents<sup>5</sup>. Another similar study by Sterman et al. however, showed only minor complications among 2 residents in their first 50 ESS procedures<sup>6</sup>. These residents had their training in the cadaveric lab and were supervised by senior consultants under a properly structured program during their training. A study in Cambridge on patients' outcome score post ESS demonstrated almost similar outcome scores between residents and established surgeons<sup>7</sup>. In that center, trainees have to attend annual ESS cadaveric dissection in addition to attending ESS courses and sinus surgery simulators. These studies show that ESS training courses is an important element in the residency training.

A thorough understanding of the anatomical variation of the paranasal sinuses is important especially now that ESS has expanded to include the skull base region. Certain surgery requires the ORL surgeon to be able to work together with the neurosurgeon using the endoscopes with other instruments especially in the two nostrils four handed technique. This requires good hand eye coordination skills. A more complete surgical dissection is also more likely when performed by surgeons with more experience compared to their counterparts with lesser surgical experience.<sup>8</sup> Rates of complications in ESS were higher in cases that were operated on by the surgical trainees compared to surgeons, indicating the importance of proper ESS training.<sup>9</sup>

The majority of the participants in this study had less than 5 years experience in ORL. Almost 80% of the participants had some experience in performing ESS prior to joining the dissection courses, showing that the motivation to join courses to improve the surgical skills continue even among surgeons with experience. Other motivations included preparing for their specialist exam and for CME points. Organizers should therefore, ensure adequate instruments and supervision with good quality cadavers in their courses to ensure that the participants will benefit fully from it.

Participants should prepare before attending the courses by understanding the anatomy as this will help in visualising it in 3D during the course.

Infundibulotomy was considered to be the easiest step in ESS and should be the first step performed under supervision by surgical trainees on patients in the operating theatre. On the other hand, frontal sinus surgery was the most difficult step according to the participants. This is likely due to the complex anatomy of the region making it difficult to identify the surgical landmarks required to perform frontal sinus works. Frontal sinus and sphenoid sinus surgery are associated with a higher risk of bleeding.<sup>10</sup> These results compared similarly to the paper by Braun et al.<sup>1</sup> which showed that infundibulotomy as the easiest steps even among participants with limited ESS experience. Frontal sinus surgery was also considered the most difficult in that similar paper even among participants with experience in ESS. Organisers of ESS courses should focus and spend more time while dissecting this region so that participants will gain more confidence while operating in the frontal sinus region.

Instruments must also be adequate to prevent time from being wasted from participants borrowing instruments from each other. Organizers have to ensure that the instrument sets are complete and similar to the ones that the participants will use in the operating theatre on their own patients. Participants should also be provided time to improve their skills during the training courses. Participants with lesser experience will definitely require more time to familiarise themselves with the instruments and anatomy of the sinuses and this training courses are the best avenue for them to practice and learn. Major complications in ESS ranges from nil to about 2.8% in some studies, the most common being major bleeding.<sup>10</sup> Although dura injury is the most common complication encountered during this study on ESS courses, it is rare in clinical practice.

We also noted that the group which had performed more than 10 ESS had the most number of complications. Braun et al.<sup>1</sup> had a similar result in their study on ESS training courses. It was postulated that the participants with more experience tend to dissect more and explore the limits of ESS including its complications compared to the participants with lesser experience in ESS who tend to be more cautious during the courses.<sup>1</sup>

Metson,<sup>11</sup> in his review on the experiences of the first 1000 cases operated on using imaged-guidance system (IGS) in Massachusetts concluded that although the system is reliable, surgeons should trust their own clinical judgement when there is a conflict or discrepancies between the IGS and their clinical judgement.

ESS training courses must also continue to be updated and improved. Other than cadaveric based ESS courses, there are other models for training courses which include anatomic plastic model.<sup>12</sup> To further assess the surgical technique of participants, there are centers which perform pre and post training course CT scans to objectively evaluate the outcome and performances of the participants.<sup>8</sup>

## 6. CONCLUSIONS

With recent advancement in ESS and with the increased availability of image-guidance system, it is important to note that technology is not a substitute to sound surgical skills and anatomical knowledge, both of which can be improved and gained from a dissection course.

### Conflict of interest

None declared.

### Funding

None declared.

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