Clinical Study

An Audit of Fibreoptic Intubation Training Opportunities in a UK Teaching Hospital

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Airway management is the foundation upon which anaesthesia is built, and fibreoptic intubation (FOI) is a key facet of this skill. Despite this, many trainee anaesthetists in the UK have been unable to perform sufficient FOIs to gain competence. We aimed to establish the incidence of FOI in adult patients, in a UK teaching hospital, in order to determine what FOI training opportunities actually exist. During the study period (from October 1st, 2008, to September 30th, 2009) an estimated 11712 general anaesthetics were undertaken that necessitated tracheal intubation. In 141 of these cases FOIs were performed giving an incidence of FOI of 1.2% (95% confidence interval 1%–1.4%). Of these, 86 (61%) were in awake and 55 (39%) in anaesthetised patients. Only 16 (11%) of the FOIs were done solely for the purposes of training. We suggest that a greater number of FOIs should be undertaken to allow trainees to gain and consultants to maintain the FOI expertise necessary for the provision of safe anaesthesia.

1. Introduction

Airway management is the foundation upon which anaesthesia is built. Fibreoptic intubation (FOI) is a key part of this skill and forms the basis of the management of many difficult intubations, both anticipated and unexpected [1–3]. Accordingly, the National Confidential Enquiry into Perioperative Deaths (NCEPOD) [4] recommended that every hospital should have anaesthetists trained in FOI. Furthermore, competence in FOI is considered to be an essential part of the training of anaesthetists in the UK. Despite this, many trainee anaesthetists in the UK complete their training having been unable to perform enough FOIs in order to gain competence [5, 6]. The situation is likely to be compounded by the time constraints presented by Modernising Medical Careers and the European Working Time Directive. Training opportunities are likely to be reduced [7] which may make competence at FOI even more difficult to achieve and maintain.

The incidence of FOI varies greatly between countries. In Canada, FOIs make up 1.4% of all tracheal intubations [8], whilst in Switzerland the rate is in excess of 12% [9, 10]. To our knowledge, the incidence of FOI within the UK has never been determined. Therefore, we aimed to establish the incidence of FOI in adult patients in a tertiary centre for maxillofacial, ENT, and spinal surgery in order to determine what FOI training opportunities actually exist.

2. Methods

Guidance from the National Research Ethics Service (NRES) classified the project as service evaluation, meaning that formal ethical approval was unnecessary. Local approval was gained from our institution’s audit committee. We prospectively documented the details of every FOI undertaken in any adult (≥16 years of age) in our institution over a 12-month period, (from October 1st, 2008, to September 30th, 2009) into a departmental database. The most senior anaesthetist present during the FOI was subsequently asked to identify, from a list of options, the primary reason why a FOI had been performed.

(1) Predicted difficulty in direct laryngoscopy due to:
Table 1: The primary indication for performance of fibreoptic intubation (FOI). Values shown are in numbers (proportions).

<table>
<thead>
<tr>
<th>Indication</th>
<th>Awake FOI</th>
<th>Asleep FOI</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predicted difficult direct laryngoscopy</td>
<td>32</td>
<td>11</td>
<td>43 (30)</td>
</tr>
<tr>
<td>Limited mouth opening</td>
<td>23</td>
<td>7</td>
<td>30 (21)</td>
</tr>
<tr>
<td>Abnormalities in oropharyngeal anatomy</td>
<td>6</td>
<td>2</td>
<td>8 (6)</td>
</tr>
<tr>
<td>Limited neck movement</td>
<td>15</td>
<td>6</td>
<td>21 (15)</td>
</tr>
<tr>
<td>Previous difficult direct laryngoscopy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unstable cervical spine</td>
<td>8</td>
<td>1</td>
<td>9 (6)</td>
</tr>
<tr>
<td>Rescue for failed intubation</td>
<td>0</td>
<td>14</td>
<td>14 (10)</td>
</tr>
<tr>
<td>Teaching</td>
<td>2</td>
<td>14</td>
<td>16 (11)</td>
</tr>
<tr>
<td>Total</td>
<td>86 (61)</td>
<td>55 (39)</td>
<td>141</td>
</tr>
</tbody>
</table>

Table 2: The parent specialities of patients undergoing fibreoptic intubation. Values shown are in numbers (proportions).

<table>
<thead>
<tr>
<th>Speciality</th>
<th>Awake FOI</th>
<th>Asleep FOI</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maxillofacial surgery</td>
<td>40</td>
<td>20</td>
<td>60 (43)</td>
</tr>
<tr>
<td>Ear, nose, and throat</td>
<td>18</td>
<td>8</td>
<td>26 (18)</td>
</tr>
<tr>
<td>Neurosurgery</td>
<td>9</td>
<td>11</td>
<td>20 (14)</td>
</tr>
<tr>
<td>General surgery</td>
<td>6</td>
<td>6</td>
<td>12 (9)</td>
</tr>
<tr>
<td>Orthopaedics</td>
<td>4</td>
<td>7</td>
<td>11 (8)</td>
</tr>
<tr>
<td>Spinal surgery</td>
<td>7</td>
<td>3</td>
<td>10 (7)</td>
</tr>
<tr>
<td>Gynaecology</td>
<td>2</td>
<td>0</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Total</td>
<td>86</td>
<td>55</td>
<td>141</td>
</tr>
</tbody>
</table>

(a) reduced mouth opening;
(b) anatomical abnormalities of the oropharynx;
(c) anatomical abnormalities of the larynx;
(d) limited neck movement.

(2) Previously documented difficult direct laryngoscopy.
(3) Unstable cervical spine.
(4) Expected difficult bag, valve, mask ventilation.
(5) Teaching FOI.
(6) Rescue technique for failed intubation of the trachea by direct laryngoscopy.

The total number of tracheal intubations that occurred during the study period was estimated using local data submitted to the Royal College of Anaesthetists National Audit Project 4 (NAP4).

3. Results

During the study period, 25,515 operations were performed in patients aged 16 or over. Snapshot data obtained from the Royal College of Anaesthetists National Audit Project 4 (NAP4) showed that 85% of patients undergoing surgery in our institution have a general anaesthetic, of which 54% required tracheal intubation. Therefore, approximately 11,712 episodes of tracheal intubation occurred during the data collection period.

During the study period, 141 FOIs were performed giving an incidence of FOI of 1.2% or 1:83 (95% confidence interval 1.1–1.4%). Of these, 86 (61%) were in awake and 55 (39%) in anaesthetised patients. There were no failed fibreoptic intubations. The stated primary for undertaking FOI is shown in Table 1. Only 16 (11%) FOIs were done solely for the purposes of training.

The vast majority of FOIs were undertaken in patients undergoing maxillofacial or ear, nose, and throat (ENT) procedures (see Table 2). There were no incidents of failed tracheal intubation or FOI in obstetric patients.

There was no morbidity or mortality associated with FOI performed either awake or under general anaesthesia.

4. Discussion

The FOI rate of 1.2% in our institution is comparable to that of North America [8] and is greater than that seen in Australia, (where FOI make up only 0.76% of all tracheal intubations undertaken by trainees [11]) but is low in comparison to other European countries [9]. Only 11% of FOIs were done primarily for the purposes of training, which is in stark contrast to other European institutions where teaching is the primary indication for up to 45% of FOIs [9].

What constitutes competence in FOI is yet to be satisfactorily defined. The majority of studies that investigate competence use surrogate markers of skill, such as first pass success rates and time for completion. Such studies has suggested that as after 10 oral [12, 13] and 18 nasal [14] FOIs on anaesthetised patients, an individual will have attained an acceptable level of proficiency. Extension of these learning curves suggests that 45 FOIs are necessary to achieve true expertise [14], and yet the majority of anaesthetic trainees in the United Kingdom do less than 10 FOIs prior to gaining consultant posts [6]. This is far less than the number completed by trainees in other countries. In New Zealand, for example, anaesthetic trainees do around 4 FOIs per year [15]. However, in a high-stakes skill such as FOI, expertise cannot be assured by numbers alone, as nontechnical skills are vital for its safe and successful performance.

Within our institution’s anaesthetic training program, a teaching day is run annually that focuses upon airway management. This includes FOI training using several bronchoscopic simulators (both high and low fidelity) to try and allow trainees to develop the necessary psychomotor skills prior to clinical practice. Competency assessments are subsequently
made by direct clinical observation by consultant medical staff. Two to four hours of training on bench-top models can provide an individual with the necessary skills to undertake FOI in the clinical settings, without exposing patients to the potential risks associated with a novice's learning curve [16].

There are several possible reasons underlying the low rate of FOI in the United Kingdom. Based on the results of scenario-based surveys, consultant anaesthetists in the UK appear to be more reluctant than colleagues in other countries to undertake FOI [17–19]. This may reflect a narrower range of perceived indications for FOI, service pressures, or a perceived or actual lack of skill. There are increasing economic pressures upon UK anaesthetists, with a greater need for efficiency in theatres. FOI is often perceived as taking a significant longer period of time than tracheal intubation by direct laryngoscopy. Therefore, it is likely that many training opportunities in FOI will fall victim to the need to improve theatre utilisation. However, asleep FOI can be completed in less than 60 s [20, 21] and awake FOI in around 180 s [22] (although additional time is required for airway preparation). Another common misperception is that FOI has a greater propensity to cause patient harm or distress, yet FOI is associated with similar cardiovascular responses [20, 21] and a similar incidence of vocal cord damage [23] to direct laryngoscopy. Furthermore, patients questioned after undergoing awake FOI consistently report high levels of satisfaction [24].

The implications upon anaesthetic training of a low FOI rate are potentially great, especially in light of decreasing rates of tracheal intubation [25] and less clinical exposure for anaesthetists in training. We believe that a greater number of clinical learning opportunities in FOI could be created within the current service constraints. For example, one asleep FOI per day in a theatre suite would equate to approximately 200 additional FOIs in a 40-week working year. In doing so, trainees could learn and consultants could maintain their FOI expertise. There will, however, be logistical and service constraints that may make this difficult. In addition, it is likely that not all consultant anaesthetists believe that FOI is a necessary skill for independent practice, and so our argument may fall on deaf ears. We believe that fibreoptic intubation remains a key aspect in the provision of safe anaesthesia, and anaesthetists should be wary of allowing FOI to become a forgotten or occasional skill.

Conflict of Interests

The authors declare that they have no conflict of interests.

References


