Comparison of oral fibre optic intubation using Parker Flex Tip® Tracheal Tube and UnoFlex Reinforced Tracheal Tube during general anaesthesia.

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TABLE OF CONTENTS PAGE

TABLE OF CONTENTS PAGE

LIST OF TABLES PAGE

LIST OF FIGURES PAGE

ABBREVATIONS

1. ETT: Endotracheal Tube
2. PFT: Parker Flex Tip
3. UFR: Unoflex Reinforced
4. OFI: Orotracheal fibreoptic intubation
5. RAE: Ring, Adair and Elwyn
6. VAS: Visual Analogue Score
7. MAP: Mean Arterial Pressure
8. HR: Heart Rate
9. SBP: Systolic Blood Pressure
10. DBP: Diastolic Blood Pressure
11. ASA: American Society of Anesthesiologist
12. IV: Intravenous
13. PVC: Polyvinylchloride
14. ILMA: Intubating Laryngeal Mask Airway
15. NIBP: Non-Invasive Blood Pressure
16. LMA: Laryngeal Mask Airway

ABSTRAK

Latar Belakang: Pilihan tiub endotrakeal (ETT) adalah penting untuk kejayaan intubasi fibreoptic orotrakeal. Tujuan kajian ini adalah untuk membandingkan penggunaan Parker Flex Tip® (PFT) ETT dengan Unoflex ™ Reinforced (UFR) ETT semasa intubasi fibreoptic.

Kaedah: Sejumlah 58 pesakit yang menjalani pembedahan elektif di bawah anestesia umum telah dibahagikan kepada dua kumpulan untuk intubasi fibreoptic selepas induksi yang berjaya dan penggunaan kolar serviks tegar untuk simulasi saluran udara yang sukar. Kumpulan A diintubasikan dengan PFT ETT (n = 29) dan Kumpulan B diintubasikan dengan UFR ETT (n = 29). Semua pesakit diberikan dos standard intravena (IV) Fentanyl 2 μg / kg dan IV Propofol 2 mg / kg dan IV Rocuronium 0.6 mg / kg. Intubasi fibreoptic dan railroading dilakukan oleh pengendali tunggal. Kemudahan memasukkan, tahap manipulasi (Klasifikasi Jones), sakit tekak, pendarahan dari rongga mulut, perubahan hemodinamik dan masa untuk intubasi dicatatkan di antara kedua-dua kumpulan.

Keputusan: Tidak ada perbezaan yang ketara antara kemudahan pemasukan (p = 0.599), darjah manipulasi (p = 0.849), sakit tekak (p = 0.15), pendarahan dari rongga mulut (p = 0.227) dan masa untuk intubasi = 488) antara kedua-dua kumpulan. Tekanan arteri dan perubahan kadar jantung juga tidak signifikan (p = 0.361 dan p = 0.152)

Kesimpulan: Parker Flex Tip® ETT adalah setanding dengan Unoflex Reinforced ™ ETT untuk intubasi fibreoptik orotrakeal dalam pesakit simulasi saluran udara yang sukar.

ABSTRACT

Background: The choice of endotracheal tube (ETT) is important for the success of orotracheal fibreoptic intubation (OFI). The aim of the study was to compare the use of Parker Flex Tip® (PFT) ETT with Unoflex™ Reinforced (UFR) ETT during oral fibreoptic intubation.

Method: A total of 58 patients who underwent elective surgery under general anaesthesia were randomised into two groups for OFI after successful induction and application of rigid cervical collar for difficult airway simulation. Group A (n=29) was intubated with PFT ETT and Group B (n=29) was intubated with UFR ETT. All patients were induced with standard dose of intravenous (IV) Fentanyl 2 µg/kg and IV Propofol 2 mg/kg, and were paralysed with IV Rocuronium 0.6 mg/kg. OFI and railroading were performed by a single operator. Ease of insertion, degree of manipulation (Jones Classification), post-operative sore throat, bleeding from oral cavity, haemodynamic changes and time to successful intubation were recorded and compared between the two groups.

Results: There were no significant differences between ease of insertion (p=0.599), degree of manipulation (p=0.849), post-operative sore throat (p=0.15), bleeding from oral cavity (p=0.227) and time to intubation (p=488) between the two groups. Mean arterial pressure and heart rate changes were also not significant between the two groups (p=0.361 and p=0.152 respectively).

Conclusion: Parker Flex Tip® ETT was comparable to Unoflex Reinforced™ ETT for orotracheal fibreoptic intubation in simulated difficult airway patients.

1.0: INTRODUCTION

The use of fibreoptic bronchoscope to facilitate endotracheal intubation by the oral or nasal route is well established in modern anaesthetic practice and undertaken in both awake (sedated) and anaesthetised patients.[1] Murphey P reported its use for tracheal intubation in 1967 and since than it has become established in the management of difficult intubation.[2] However, when inserting an endotracheal tube over fibreoptic bronchoscope, the bevelled tip can impinge on the right arytenoid, inter-arytenoid tissue, vocal cords or epiglottis and impede advancement through the laryngeal inlet.[3, 4] This difficulty can result in repeated attempts at intubation and increased risk of oedema, airway injury and or failed intubation and this is a problem that can occur regardless of the experience of the operator.[4-6] Laryngeal impingement or hold ups occur in up to 90% of OFI. [5-7]

A number of techniques have been suggested to enhance successful railroading of the ETT.[8, 9] The choice of ETT can also facilitate railroading and potential to reduce the risk of laryngeal impingement. It has been shown previously that the tracheal tip and bevel design can affect the probability of successful tracheal intubation.[7-10] Parker Flex Tip® (PFT) tracheal tube has a flexible, curved, centred and tapered distal tip geometry that is designed to facilitate rapid, easy non-traumatic intubation. When this unique tube is advanced into contact with protruding structures of the airway, it is designed to flex and slide gently past them, instead of getting hung up on them and traumatizing them.[11, 12] Wire reinforced ETT has also been described to facilitate railroading during fibreoptic intubation. It has been previously suggested that wire reinforced tube maybe easier to pass than a polyvinylchloride **(**PVC**)** tube due to its flexible nature and more

obtuse distal angle.[13, 14] However, there were no previous comparison between PFT ETT with wire reinforced ETT for OFI.

This study was conducted to compare Parker Flex Tip® ETT and Unoflex Reinforced™ ETT during OFI in simulated difficult intubation patients in terms of ease of insertion, degree of manipulation (Jones Classification), post-operative sore throat, bleeding from oral cavity, haemodynamic changes and time to successful intubation.

1.1: LITERATURE REVIEW

1.1.1: Fibreoptic intubation

OFI is a useful technique in patients whose trachea is difficult to be intubated.[2] However, there are two major difficulties with this technique. The first is location of the glottis and insertion of a fibre scope into the trachea. Induction of general anaesthesia (with or without neuromuscular block) causes the soft palate, tongue and epiglottis to approximate to the posterior pharyngeal wall[15] and thus little air space is left in the oropharynx for manoeuvring the tip of the fibre scope to locate the glottis.[16] The second difficulty is insertion of a ETT over the fibre scope (Figure 1) into the trachea. There have been reports of failed tracheal intubation despite successful insertion of a fibre scope into the trachea.[5]

1.1.2: Parker Flex Tip (PFT) ETT

Study done by Lomax et all (2011) showed that the incidence of laryngeal impingement in nasotracheal fibre optic intubation was not lower in the PFT ETT group.[4] The study result also showed no reduction of sore throat in the flex tip group. Subjects used for their study were only from elective cases for dental and maxillofacial surgery. There was lack of blinding which was also encountered by other studies.[4, 6, 9, 10, 13]

Kristensen et al (2003) studied PFT ETT with standard PVC tube for OFI. Blinding was done by covering the ETT tubes. Asleep OFI was done and patients were from emergency as well as elective surgery from multidisciplinary departments. Study finding noted that use of PFT ETT is associated with greater incidence of initial successful insertion of tube into trachea as compared to PVC tube.[12]

Figure 1: PFT ETT

1.1.3: Unoflex Reinforced ETT

Barker et al studied (2001) ease of laryngeal passage during nasotracheal fibre optic intubation comparing 3 tubes which were Portex RAE Tracheal Tube with Flexometallic Tracheal Tube and Tapered Tip Tracheal Tube via ILMA. Nasotracheal intubation was used instead of orotracheal. It was a double blinded, randomized controlled trial. Number of patients enrolled was 54 and only elective dental patients were put into the study. Forty percent difficulty in railroading a Flexometallic Tracheal Tube and fifty percent for Portex RAE Tracheal Tube via nasal fibre optic intubation. Tapered Tip Tracheal Tube insertion via ILMA was found to be superior to Flexometallic Tracheal Tube or Portex RAE Tracheal Tube via nasotracheal fibre scope.[(1)]

M.R.Rai et al (2009) compared Flexometallic Tracheal Tube and ILMA for nasotracheal fibre optic intubation. Sixty (60) patients were enrolled and only dental patients were chosen in the study. Thirty three percent impingement occurred in Flexometallic Tracheal Tube group. When impingement was observed a single disimpaction with a ninety degrees anticlockwise rotational manoeuvre overcame the impingement. There was lack of blinding in this study.[6]

Figure 2: UFR ETT

1.2: RATIONALE OF STUDY

There are many studies done previously comparing different types of ETT placements through a fibre scope either through nasal or oral cavities.

[4] Compared nasotracheal fibre optic intubation comparing PFT ETT and Pre-Rotated Nasal Rae Tracheal Tube. The study showed that the impingement rate was higher in PFT ETT as compared to Nasal RAE Tracheal Tube group and sore throat numerical rating were similar. Ninety degrees anticlockwise pre-rotation of RAE tube had higher initial rate of successful railroading.

[1] Compared 3 types of tube namely Portex Tracheal Tube and Flexometallic Tracheal Tube for nasal intubation and Tapered Tip Tracheal Tube via intubating laryngeal mask airway (ILMA). The Tapered Tip Tracheal Tube was found to be superior as compared to the other two tubes.

[17] Compared PFT ETT and Conventional Portex Tracheal Tube via oral intubation. Study was done in difficult airway cases and showed that PFT ETT was no superior to conventional PVC Tracheal Tube.

[12] Compared PFT ETT with Standard Portex Tracheal Tube for OFI. PFT ETT was found to have reduced the incidence of repositioning the tube during insertion into trachea.

[6] Studied a comparison of Flexometallic Tracheal Tube for nasotracheal fibre optic intubation with ILMA. The study showed that rate of impingement was higher in Flexometallic Tracheal Tube group and laryngeal trauma was significantly higher in this group.

[18] Compared PFT ETT with Conventional Tracheal Tube on the reduction of postoperative sore throat. Result showed that PFT ETT did not reduce the incidence of postoperative sore throat.

Few studies has shown that PFT ETT is superior to other tracheal tubes,[1, 12, 19, 20] but there is no study comparing PFT ETT and UFR ETT for OFI. As the use of fibre optic bronchoscope to facilitate difficult endotracheal intubation is well established in modern anaesthesia,[2, 7, 13, 18, 21] there are still problems railroading these tubes over the fibre scope.[3, 4, 22] The posterior bevelled and flex tip of PFT ETT is conceived to pass easily through glottis.[20] It has also been suggested that wire reinforced tube maybe easier to pass than a PVC tube due to its flexible nature and more obtuse distal angle.[13, 14]Furthermore, the tapered tip reduces the gap between the fibre scope and inside of the tube. Therefore, this study was designed to compare the ease of intubation and complications between these two types of tubes during OFI.

Instead of nasotracheal fibre optic intubation, we decided to choose OFI technique in our study to avoid the risk of epistaxis and nasal airway trauma. These complications may not only be uncomfortable and distressing but it can worsen any airway obstruction as well.[23] Furthermore, most of previous studies were done for nasotracheal fibre optic intubation.[1, 4, 6, 9]

There are certain conditions where nasal intubation is contraindicated e.g., in midface instability, coagulopathy, suspected basal skull fracture, large nasal polyp, recent nasal surgery, upper neck haematoma or infection and prosthetic heart valve. Therefore, if this group of patients has suspected difficult airway, OFI may be the only option of securing the airway. This study was meant to be carried out on simulated difficult airway subjects by placing a cervical collar to compare the ease of securing the airway

between PFT ETT (Figure 2) and UFR ETT (Figure 3) using OFI and its associated complications.

2.0: OBJECTIVE

2.0.1: GENERAL OBJECTIVE:

To compare the ease of intubation and the complications between using PFT ETT and UFR ETT during OFI in simulated difficult airway patients during general anaesthesia.

2.0.2: SPECIFIC OBJECTIVES:

1. To compare the ease of insertion (successful intubation on the 1st attempt and number of attempts) between using PFT ETT and UFR ETT during OFI in simulated difficult airway patients under general anaesthesia.
2. To compare the degree of manipulation for tube placement based on Jones classification system (Table 1) between using PFT ETT and UFR ETT during OFI in simulated difficult airway patients under general anaesthesia.
3. To assess post-operative sore throat using visual analogue score and airway trauma between using PFT ETT and UFR ETT during OFI in simulated difficult airway patients under general anaesthesia.
4. To compare the haemodynamic parameters (blood pressure and heart rate) before intubation, after 1 mins and 5 mins of intubation between using PFT ETT and UFR ETT during OFI in simulated difficult airway patients under general anaesthesia.
5. To determine the time (seconds) from fibre optic intubation to successful railroading of tracheal tube over the fibre optic into the trachea between using PFT ETT and UFR ETT during OFI in simulated difficult airway patients under general anaesthesia.

2.1: HYPOTHESIS NUL

1. There is no significant difference in the ease of insertion (successful intubation on the 1st attempt and number of attempts) between using PFT ETT and UFR ETT during OFI in simulated difficult airway patients under general anaesthesia.

2. There is no significant difference in the degree of manipulation for tube placement based on Jones classification system between using PFT ETT and UFR ETT during OFI in simulated difficult airway patients under general anaesthesia.

3. There is no significant difference in post-operative sore throat and airway trauma between using PFT ETT and UFR ETT during OFI in simulated difficult airway patients under general anaesthesia.

4. There is no significant difference in haemodynamic parameters (blood pressure and heart rate) before intubation, after 1 mins and 5 mins of intubation between using PFT ETT and UFR ETT during OFI in simulated difficult airway patients under general anaesthesia.

5. There is no significant difference of time (seconds) needed, from fibre optic intubation to successful railroading of tracheal tube over the fibre optic into the trachea between using PFT ETT and UFR ETT during OFI in simulated difficult airway patients under general anaesthesia.

3.0: MANUSCRIPT

3.0.1: TITLE:

Orotracheal fibreoptic intubation: A randomised control trial comparing Parker Flex Tip® Oral Tracheal Tube with Unoflex™ Reinforced Endotracheal Tube

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Key words: fibreoptic, endotracheal tube, general anaesthesia, intubation

3.0.2: ABSTRACT

Background: The choice of endotracheal tube (ETT) is important for the success of orotracheal fibreoptic intubation (OFI). The aim of the study was to compare the use of Parker Flex Tip® (PFT) ETT with Unoflex™ Reinforced (UFR) ETT during oral fibreoptic intubation in simulated difficult airway patients.

Method: A total of 58 patients who underwent elective surgery under general anaesthesia were randomised into two groups for OFI after successful induction and application of rigid cervical collar for difficult airway simulation. Group A (n=29) was intubated with PFT ETT and Group B(n=29). was intubated with UFR ETT All patients were induced with standard dose of intravenous (IV) Fentanyl 2 µg/kg and IV Propofol 2 mg/kg, and were paralysed with IV Rocuronium 0.6 mg/kg. OFI and railroading were performed by a single operator. Ease and the number of attempt of insertion, degree of manipulation (Jones Classification), post-operative sore throat, bleeding from oral cavity, haemodynamic changes and time to successful intubation were recorded and compared between the two groups.

Results: There were no significant differences between the ease of insertion (p=0.599), degree of manipulation (p=0.849), post-operative sore throat (p=0.15), bleeding from oral cavity (p=0.227) and time to intubation (p=488) between the two groups. Mean arterial pressure and heart rate changes were also not significant (p=0.361 and p=0.152 respectively).

Conclusion: Parker Flex Tip® ETT was comparable to Unoflex Reinforced™ ETT for orotracheal fibreoptic intubation in simulated difficult airway patients.

3.0.3: INTRODUCTION

The use of fibreoptic bronchoscope to facilitate endotracheal intubation by the oral or nasal route is well established in modern anaesthetic practice and undertaken in both awake (sedated) and anaesthetised patients.[1] Murphey P reported its use for tracheal intubation in 1967 and since than it has become established in the management of difficult intubation.[2] However, when inserting an ETT over fibreoptic bronchoscope, the bevelled tip can impinge on the right arytenoid, inter-arytenoid tissue, vocal cords or epiglottis and impede advancement through the laryngeal inlet.[3, 4] This difficulty can result in repeated attempts at intubation and increased risk of oedema, airway injury and or failed intubation and this is a problem that can occur regardless of the experience of the operator.[4-6] Laryngeal impingement or hold ups occur in up to 90% of OFI.[5-7]

A number of techniques have been suggested to enhance successful railroading of the tracheal tube.[8, 9] The choice of ETT can also facilitate railroading and potential to reduce the risk of laryngeal impingement. It has been shown previously that the tracheal tip and bevel design can affect the probability of successful tracheal intubation.[7, 10] Parker Flex Tip® (PFT) tracheal tube has a flexible, curved, centred and tapered distal tip geometry that is designed to facilitate rapid, easy non-traumatic intubation. When this unique tube is advanced into contact with protruding structures of the airway, it is designed to flex and slide gently past them, instead of getting hung up on them and traumatizing them.[11, 12] Wire reinforced ETT has also been described to facilitate railroading during fibreoptic intubation. It has been previously suggested that wire reinforced tube maybe easier to pass than a polyvinylchloride **(**PVC**)** tube due to its flexible nature and more obtuse distal angle.[13, 14] However there was no previous comparison between PFT ETT with wire reinforced ETT for OFI.

This study was conducted to compare Parker Flex Tip® ETT and Unoflex Reinforced™ ETT during OFI in simulated difficult intubation patients in terms of ease of insertion, degree of manipulation (Jones Classification), post-operative sore throat, bleeding from oral cavity, haemodynamic changes and time to successful intubation.

3.0.4: METHODS

After approval from institution ethics committee and written informed consent from patients, we recruited 58 elective surgical patients who fulfilled the inclusion and exclusion criteria during pre-operative assessment. The inclusion criteria were American Society of Anesthesiologist (ASA) classification of I-II and age of the patients between 18-65 years old. Patients with anticipated difficult airway on assessment, previous history of airway and cervical surgery, known case of hypertension, morbidly obese and pregnancy were excluded from the study. All selected patients were randomized into two groups using computer generated randomization; Group A (n=29) was intubated with PFT ETT and Group B (n=29). was intubated with UFR ETT The number generated was placed in an envelope and allocation was done on the day of study prior to intubation. All patients were given premedication with oral midazolam 7.5mg on the night prior to surgery and prior to operation theatre call. In the operation theatre, an 18G or 20G intravenous (IV) cannula was inserted and non-invasive monitoring such as electrocardiogram (ECG), pulse oxymetry (SpO2), capnography and non-invasive blood pressure (NIBP) were placed. The fibreoptic scope (Storz flexible fiberscope-4mm OD, 60cm length-Karl Storz Endoscopy Inc)(Figure 1) was prepared earlier and the type of ETT based on randomisation was railroaded and loosely fixed at the proximal part of the scope. Group A used Parker Flex Tip® ETT size 7, 7.5, 8 (Parker Medical Inc) whereas Group B used Unoflex Reinforced™ ETT size 7, 7.5, 8 (Unomedical Sdn Bhd). After pre-oxygenation with 100% oxygen for 3 min, all patients were induced with IV Propofol 2 mg/kg and IV Fentanyl 2 mcg/kg. After successful induction, rigid cervical neck collar was then applied to simulate difficult airway condition and anaesthesia was maintained with sevoflurane 2–3% with

100% of inspired oxygen. Once adequate mask ventilation was established, IV Rocuronium 0.6 mg/kg was administered as muscle relaxant and IV Glycopyrrolate 200 μg as anti-sialagogue. After establishment of complete muscle relaxation as determined by single twitch monitoring, OFI was initiated with jaw thrust manoeuvre to obtain the view of the glottis and advanced into the trachea via vocal cords. Once the carina seen on the screen, the preloaded ETT was railroaded into the trachea. All the OFI and the railroading of the tube was done by a single operator. If any impingement occurred, the steps of manoeuvres were attempted based on Jones classification (Table 1). If SpO2 dropped less than 95%, the procedure was stopped temporarily, and the patient was manually ventilated again until SpO2 improved. The next attempt was labelled as second attempt and if it was still unsuccessful, the rigid cervical collar was removed, and the patients were subsequently intubated using conventional laryngoscopy. This patient was considered as failed fibreoptic intubation and was withdrawn from statistical analysis. After successful OFI and railroading of the ETT, yankauer suction was applied to determine any blood-stained aspirate. Haemodynamic parameters were recorded at baseline before intubation, after 1 min and after 5 min of successful OFI and railroading of ETT by the anaesthesia assistant. The time taken for OFI until successful railroading and scoring of sore throat based on visual analogue scale (VAS) (Figure 4) thirty minutes postoperatively were also recorded.

Sample size was calculated using Power and sample size software version 3.0 based on previous study by Barker et al.[1] with p0 is taken as 0.01, p1 as 0.333, m =1 with α= 0.05 (type 1 error) and power of 0.9. There were 26 subjects per group from the calculation and after taking into consideration of 10% dropout rate, total of 58 subjects (29 in each group) were studied.

Data was analysed using IBM SPSS statistics 22. Ease of insertion, degree of manipulation, bleeding and sore throat complications were analysed using chi square test. Time for intubation using independent t-test and haemodynamic parameters using repeated measures ANOVA. $P < 0.05$ was considered statistically significant.

3.0.5: RESULTS

There was no significant difference in demographic data between the two groups (Table 2). Intubation profiles which were number of attempts, degree of manipulations (according to Jones Classification), sore throat score, bleeding status and intubation time were also insignificant between the two groups (Table 3). There was no significant difference in haemodynamic parameters of different time intervals between the two study groups (Table 4).

3.0.6: DISCUSSION

The flexible fibre optic scope is a valuable instrument for performing difficult intubations.[1] However successful placement of the fibreoptic scope in the trachea does not ensure successful passage of an ETT into the trachea.[3, 4, 13] Furthermore, repeated attempts at passage may result in airway bleeding, damage to arytenoid cartilages or epiglottis, or swelling of the airway, making subsequent endo-tracheal intubation attempts more difficult.[4-6, 21] Our study included patients from multiple disciplines and the demographic data were comparable between the two groups.

Our study result showed that although all the patients were successfully intubated in a single attempt, only 62% and 69% from PFT ETT and UFR ETT respectively had no difficulty during railroading of the ETT over the fibreoptic scope. Reports from previous studies showed that PFT ETT had reduced resistance for tracheal intubation as compared to standard ETT [19] as well as lower impingement rate.[12, 20] One study had 100% success rate with first time railroading [1] and others had 91% success rate,[18] 89%,[12] and 76% [20] respectively but our study showed only 62% had first time success rate for PFT ETT. However there were also studies which showed PFT ETT insertion rate was not statistically significant in terms of ease of railroading which was similar to the findings from our study.[4, 17] Another study showed that there was only 7% incidence of difficulty with tapered tip tube.[9] In term of UFR ETT, our rate of success with railroading was 69% (higher than PFT ETT) but not statistically significant if compared to PFT ETT. However previous studies have shown that the rate was up to 95%,[13] reason being flexometallic tube are much easier to pass and being softer are kinder to both tissue and bronchoscope.[7, 13] However, our study did not manage to reproduce this high level of success rate. Ease of insertion was 62% and 69%

respectively for PFT ETT and UFR ETT from our study. Although UFR ETT had more patients being able to railroad easily, statistically this was not significant (p=0.849). Study done by Barker et al showed that for nasal fibreoptic intubation, PFT ETT had easier success as compared to Mallinckrodt-Reinforced Tracheal Tube. Jones classification 0 was n=15 and 9 respectively (p=0.034).[1] Study by Kristensen using PFT ETT and Portex for orotracheal intubation also showed that PFT ETT had a statistically significant (p<0.01) for ease of insertion of PFT ETT.[12] From our study for OFI, PFT ETT was comparable with UFR ETT for ease of railroading.

Timing for tube insertion in our study was started from the beginning of fibre optic intubation to successfully railroading of the study tube into the trachea and confirmation of the tube in the trachea by visualising carina. Mean intubation time for PFT ETT was 63.9 sec and 56.9 sec for UFR ETT (p=0.488). This finding was similar to study done by M.So et al which showed PFT ETT did not have a statistically significant reduction of time to intubation.[11] However study by Kristensen showed time for intubation was shorter for PFT ETT,7.5 sec as compared to 20 sec for conventional tube which was halved the time required.[12] In another study by Lomax et al, all the patients were intubated in less than 1 minute (60s) but the result was clinically insignificant which was similar to our study.[4]

Overall incidence of sore throat post intubation from previous study is 63.9%.[24] Cochrane database review incidence range from 30-70%.[25] PTF ETT did not reduce incidence of sore throat from studies done previously[4, 18, 21] and this finding is similar to our study(p=0.483). Mean VAS score (range of 0-10) was 1.52 and 1.28 respectively for PFT ETT and UFR ETT. Aetiology of post-operative sore throat is likely to be multifactorial. Post-operative sore throat had been reported with laryngeal mask airway

(LMA) and even face mask. Thus, it is partially related to ETT itself and perceived trauma during ETT insertion. There is also lack of correlation between multiple attempts at intubation with sore throat development. Duration of the presence of ETT also affects incidence of sore throat [24] as does amount of intraoperative analgesics used. Duration of more than 90 minutes significantly affected postoperative sore throat.[24] Insertion of Guedal airway as well might have influence on the sore throat score. One study showed that PFT ETT has less severe sore throat as compared to standard ETT.[19] Our study showed that 17.2% of PFT ETT subjects had bleeding from oral cavity as compared to 6.9% from UFR ETT group. This was similar to study done by Timothy et al which resulted in no significant difference in oropharyngeal bleeding between PFT ETT and Standard Tracheal Tube.[18] In term of haemodynamic changes, there were few previous studies that showed significant changes in haemodynamic parameters between fibreoptic intubation and conventional intubation.[26-28] Our study was formulated to compare haemodynamic changes between two tubes both inserted by OFI. There were no significant differences in mean arterial pressure (MAP) (p=0.361) and heart rate (HR) (p=0.152) between the PFT ETT and UFT ETT. This findings was similar to the findings from the study by J. E. Smith.[26] As stated by one study, insertion of an ETT may itself be the most invasive stimulus during intubation procedures.[27]

There were few limitations of our study. Our study was designed as a single blinded study which was performed in simulated difficult airway patients. It is better if the comparison can be double blinded but it was difficult and this was similarly encountered by several other studies.[4, 6, 9, 10, 13] We also designed this study in simulated difficult airway condition for OFI during general anaesthesia which might not accurately reflect the actual difficult airway patient for awake oral fibreoptic intubation.

Most 0f the studies done were long time ago and only a few are newer ones.In term of the sore throat incidence, our study also did not take into consideration the duration of ETT in-situ and the use of analgesia as other influential factors.

CONCLUSION

Parker Flex Tip® ETT (PFT ETT) was comparable to Unoflex Reinforced™ ETT (UFR ETT) for orotracheal fibreoptic intubation(OFI) in simulated difficult airway patients in terms of ease of insertion, number of insertion attempts, time for successful intubation, haemodynamic stability and complications profile.

CONFLICT OF INTEREST

The author had no conflict of interest and did not receive any specific funding for the research.

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