



## COMPLICATIONS OF ENDOSCOPIC SURGERIES

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**ABSTRACT** **Introduction:** Ever since the period of Kussmaul (Who had done the first oesophagoscopy), endoscopic procedures were one of the most common surgical procedures done in our speciality  
**Methods:** The following is a prospective study analyzing the patients admitted for endoscopic procedure in the department of E .N.T. The study aims to know the incidence of complications, their nature and whether they vary from previous studies  
**Results:** Of 83 cases of direct laryngoscopy, 20 cases had injury to another pillar (24.39%) with mucosal haemorrhage which produced no symptoms and was resolved by itself after 3-4 days In direct hypopharyngoscopy of 61 cases, 36 patients had normal findings on indirect laryngoscopy at the end of six hour period. 20 cases (32.69%) had injury to the anterior pillar with mucosal haemorrhage which was asymptomatic and resolved by itself after few days. Injury and loosening of teeth occurred on 4 cases (6.55%), and it occurred mainly in those having caries teeth.  
 During the period of study, 15 patients underwent 16 bronchoscopic procedure Injury and mucosal haemorrhage over the anterior pillar occurred in one patient which subsided spontaneously. Injury and loosening of teeth occurred in one patient.  
**Conclusion:** The patients who are otherwise clinically normal can be discharged on the same day. High risk patients should be admitted in the ward and observed at least for 24 hours. High index of suspicion should be there if there is any abnormal difficulty in the procedure.

**KEYWORDS :** Endoscopy, Direct laryngoscopy, Indirect laryngoscopy, Bronchoscopy, Introduction

### Introduction

Ever since the period of Kussmaul (Who had done the first oesophagoscopy), endoscopic procedures were one of the most common surgical procedures done in our speciality. The complications reported after these procedures were very common in those days. Even with the advent of suspension laryngoscope, flexible fiberoptic endoscope, and recently video endoscope and laser, better anaesthetic techniques such as venturi (jet) ventilation, risks of endoscopy is not completely eliminated. However complications are not uncommon even in experienced hands especially with rigid endoscopes.

The most common injuries reported are injury to teeth and tongue, mucosal hemorrhage in oropharynx and hypopharynx, cardiac arrhythmias, myocardial ischaemic changes and most important of all oesophageal perforation. (1)

The following is a prospective study analyzing the patients admitted for endoscopic procedure in the department of E .N.T. The study aims to know the incidence of complications, their nature and whether they vary from previous studies. It also helps to know whether endoscopic procedures are feasible as an outpatient procedure.

### Review of literature

The first successful indirect laryngoscopic examination was done by Manoel Garcia in 1854 by means of 2 mirrors and sunlight Von Mikuliez of Vienna in 1881 designed a practical oesophagoscope, a straight rigid tube with slanting distal end, illuminated by means of an interior platinum wire.

In April 1895 Kirsten of Berlin saw for the first time the interior of larynx by direct examination employing a flat spatula and incandescent lamp.

Gustav Killian "Father of Bronchoscopy" adapted oesophagoscope to direct examination of trachea and bronchi. He designed oesophagoscopic and bronchoscopic tubes with proximal lighting. He was the first to remove a foreign body (a bone) from the larynx by the direct method, and introduced dorsal position for the patient. He introduced suspension laryngoscopy in 1911 allowing both hands free (Scott Stevenson & Douglas Guthrie, 1995.)

Chevalier Jackson designed a bronchoscope with a suction tube as well as light carrier and attached a right angled handle to endoscopic tube. He described how to remove foreign bodies and also various complications. Negus, another prominent endoscopist designed his own endoscopes with proximal lighting.

Numerous other innovations occurred in the field of endoscopy and in 1960's and 70's Venturi (Jet) ventilation, laser endoscopy and flexible

fiberoptic endoscopes were introduced.

Reported that increased airway manipulation leads to increased rate of recovery room reintubation. It is highest for patients who underwent panendoscopy with a laryngeal biopsy and especially those with T3 laryngeal lesion. 82% of the recovery room intubation occurred within one hour and they recommend close monitoring is essential for one hour. (2)

Badran & Jamal reported a case of pneumomediastinum and surgical emphysema following venturi ventilation during microlaryngeal surgery who recovered spontaneously (3).

P M Robinson studied incidence of laryngeal oedema and haematoma formation in patients undergoing endoscopic laryngeal surgery. Airway was assessed pre and post-operatively. Indirect laryngoscopy was performed pre-operatively and again 4-6 hours following surgery excluding patients with tumour and those who had tracheostomy or other major surgical procedure. Any increase in laryngeal oedema or swelling or mucosal haemorrhage are noted. The slight irregularity at the site of biopsy or lesion was considered insignificant. (4)

He found mucosal haemorrhage or increased swelling of the pharynx or larynx in 31% cases. Commonest abnormality found was mucosal haemorrhage in the region of soft palate, oedema of epiglottic in one patient and mild vocal cord oedema in 2 patients. In none of these 3 airway compromise occurred

### Oesophagoscopy:

Awareness of the possibility of oesophageal perforation as a complication of oesophagoscopy is essential for all who performs this procedure (5)

Hardins 6 studied 18 perforations exclusive of spontaneous rupture. (6) 8 followed endoscopy and of this only one of the patients was operated upon and no death were clearly attributed to perforation. They concluded that management of traumatic perforation of oesophagus should be individualised, and when a period of non-operated treatment is elected initially the advent of clinical evidence of uncontrolled infection should usually prompt immediate operation.

Flexible fiberoptic scopes were originally considered as 100% flexible and completely safe. Katz believed that such confidence in the flexible instrument was unwarranted because fibro-oesophagoscopy carries a perforation rate of 0.093%. thus representing no meaningful improvement on safety over the rigid scope. Also due to the large bullet shaped head it tends to produce a true transmural rupture, rather than mucosal tear and benign escape of air often seen at standard oesophagoscopy. They are not suited for dilatation, foreign body

manipulation procedures.

According to Samson & Jones despite surgical advances and diagnostic techniques mortality rate is 14% when surgery is performed within 24 hours of injury and 56% when surgery performed after 24 hours period with or without any intervention

In a series 374 endoscopies --Dale A Ellesan etal -- of which 247 were performed at a centre where junior residents are doing scopy.3perforation occurred. Oesophagoscopy were performed mainly for cancer and foreign body. In another centre 127 oesophagoscopies performed staffed by more experienced residents - same indication - no perforation occurred. They concluded that one of the greater risk of oesophageal perforation is an inexperienced endoscopist.(7)

According to them important factors contributing to the mortality rate are -- advanced age, underlying malignancy and delay in treatment. The single factor under our control is delay in treatment. It is a true surgical emergency and delay diminishes chances of a favourable outcome. When diagnosis is made broad spectrum antibiotics intravenously should be given, and surgical treatment begun. A nasogastric tube is carefully passed (if possible guided by fluoroscopy) and suction begun. The fact that small perforation can be treated by conservative management is not questioned. Real problem is difficulty in classifying the perforation and predicting outcome. Many authors support early suture and closure and drainage of all oesophageal perforations.

Hargrove etal studied usefulness of fiberoptic oesophagoscope and reported that it is useful in children and can be used with little or no sedation.

Mc Elvein R.B. etal studied 24 patients with oesophageal perforation either spontaneously or instrumental and concluded that plain X-ray film findings provide a useful guidelines to the diagnosis of cause and location of perforation and found to be valuable in performing subsequent oesophagogram.(8)

According to Janet A Wilson's study fiberoptic oesophagoscopy is not a viable alternative in examination of post cricoid and pyriform fossa lesion.(9)

**Bronchoscopy:**

Burman etal studied 62 bronchoscopies in 61 patients without clinical evidence of heart disease. 51 revealed abnormally rapid heart rate. Of this 10 began prior to insertion of the scope and 49 began when it touched trachea, carina or bronchi (10)

While bronchoscopy in patients without clinical heart disease is a relatively safe procedure, it should be undertaken with caution in patients having valvular lesion or coronary heart disease. In these patients he recommends ECG monitoring and immediate termination of the procedure if gross abnormalities in rate or rhythm occur.

He also suggested that afferent pathways of cardiorespiratory reflexes are considered to be via the trigeminal nerve and vagus nerve, and efferent routes via vagi, and thoracic sympathetic outflow with vagi being dominant. Neither atropine nor cocaine was found to be useful in abolishing these reflexes or affording protection against their effects.

Hody K studied influence of endoscopes on the airways and oesophagus on cardiac function in 40 children and concluded that a proper premedication and a good team work minimize complications.(11)

Ashley Woodcock etal (1989) made the following observations: (12)

1. Bacterial contamination is heaviest at the start of bronchoscopy list due to colonisation of the instrument during storage.
2. Thorough washing of bronchoscope in neutral detergent immediately after use removes 99.9%of respiratory pathogens.
3. Agents such as gluteraldehyde acts as a fixative for mucous and blood and this prevents disinfection. So it is essential to wash the bronchoscope before putting into disinfectant.
4. 70%alcohol is a powerful antimycobacterial agent. It leaves bronchoscope dry and is therefore a useful rinsing agent.
5. All bronchoscopists should wear gloves, gown and mask and close fitting eye protection for all patients. Mucocutaneous

transmission of HIV has occurred from splashing of blood and secretion. It is not possible to identify the infectious patient and the only sensible policy is a universal one.

6. Do not use a needle to remove biopsy material from biopsy forceps since serum hepatitis had been reported to occur by accidental puncture.
7. All those working on endoscopy units should receive hepatitis vaccination.

Colt HG etal studied fiberoptic bronchoscopy in 281 patients without sedation except for topical anaesthesia and found useful and suggested that this can make use as outpatient procedure(13)

Hodgson reaffirms need for close observation of patients recovering from bronchoscopy. He reported a case of hemoptysis following bronchoscopy which is monitored and patient survived with treatment .(14)

**MATERIALS & METHODS**

This particular study was undertaken in 158 patients admitted for endoscopic procedures in the Department of E.N.T All the patients were admitted for a minimum period of 24 hours in the ward in order to assess any post-operative complication if at all developed.

A detailed history of the patient was taken. This included age, sex, complaints and relevant past history. E.N.T. examination and systemic examinations were done. Patients considered to be at higher risk for complications, were noted.

The patients were examined at the end of the procedure, 6 hours after the operation and after 24 hours (at the time of discharge). Any injuries during the operation such as loosening of teeth, injury to tongue, oropharynx, hypopharynx and larynx were recorded. The patients were again examined at the end of 6 hour period for any further complications like bleeding, respiratory distress or subcutaneous emphysema in the neck. A detailed E.N.T. examination including indirect laryngoscopy and a systemic examination of the patient were also done at the time of discharge in order to exclude any late complication which could have developed overnight.

Age	Male	Female
0-9	9	6
10-19	2	2
20-29	4	8
30-39	5	6
40-49	31	6
50-59	24	4
60-69	32	1
70-79	13	1
80-89	4	0
Total	123	35

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1. Direct laryngoscopy
2. Hypopharyngoscopy
3. Oesophagoscopy
4. Bronchoscopy

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**Direct laryngoscopy :**

83 surgeries were done in 82 patients. This was because of the fact that in one patient, direct laryngoscopy could not be done satisfactorily under local anaesthesia and the procedure was repeated under general anaesthesia. Of this, 64 procedures were done under local anaesthesia and 19 under general anaesthesia. 28 procedures were done using suspension laryngoscope of which 19 were local anaesthesia and 9 under general anaesthesia. Of the rest 55 were done by using anterior commissure type of direct laryngoscopy and ordinary laryngoscope.

**Symptoms :**

Commonest presenting symptom of the patients who underwent direct laryngoscopy was change in voice (hoarseness) followed by stridor.

**Table 2**

Symptom	Number	Percentage
Hoarseness	67	81.7
Stridor	17	20.7
Dysphagia	6	7.3
Pain throat	4	4.8
Swelling in the neck	3	3.6
Foreign body	2	2.4

**Post-operative complications**

Patients were observed during the procedure and in the immediate post-operative period. Indirect laryngoscopy was done 4-6 hours after the procedure, as well as after 24 hours period and at the time of discharge. Indirect laryngoscopy could not be done in a child with subglottic stenosis with tracheostomy.

54 patients (65.88%) were discharged on second day and 10 on third day. Only few had hospital stay more than 5 days who otherwise could not be discharged because of the fact that they were coming from a far-away place and waiting for biopsy report.

Of 83 cases of direct laryngoscopy, 20 cases had injury to another pillar (24.39%) with mucosal haemorrhage which produced no symptoms and was resolved by itself after 3-4 days. Injury and loosening of teeth occurred in 6 patients, and it occurred mainly in those having carious teeth.

Out of 6 patients with bilateral abductor paralysis who underwent endoscopic lateralisation of vocal cords, 3 developed laryngeal oedema after 6 hours. Of this, one patient improved with parenteral steroids, one patient had to undergo emergency tracheostomy on the same evening.

**Hypopharyngoscopy :**

61 procedures were done in 61 patients during the period. Of this 52 cases were done under local anaesthesia and 9 cases under general anaesthesia and 9 cases under general anaesthesia.

**Symptoms :**

The most common symptom was difficulty in swallowing (Dysphagia) followed by hoarseness and pain throat.

**Pathological conditions for which hypopharyngoscopy was done :**

The most common indication of doing hypopharyngoscopy was for malignancy of hypopharynx, followed by removal of foreign body.

**Post-operative complications:**

Patients were observed during the procedure and in the immediate postoperative period. Indirect laryngoscopy was done 4-6 hours after the procedure as well as after 24 hours and at the time of discharge. Indirect laryngoscopy could not be done in a 2 year old child.

Of 61 cases, 36 patients had normal findings on indirect laryngoscopy at the end of six hour period. 20 cases (32.69%) had injury to the anterior pillar with mucosal haemorrhage which was asymptomatic and resolved by itself after few days. Injury and loosening of teeth occurred on 4 cases (6.55%), and it occurred mainly in those having caries teeth.

One patient with malignancy of hypopharynx with stridor on admission developed laryngeal oedema after 6 hours following the procedure and underwent emergency tracheostomy.

**Oesophagoscopy**

During the period of study, 32 patients underwent oesophagoscopy. Of this, 2 patients underwent oesophagoscopy as part of pan-endoscopy. 20 cases were done under local anaesthesia and 12 cases under general anaesthesia.

**Symptoms :**

The most common symptoms of the patients was swallowing of foreign boy, followed by dysphagia

**Post-operative complications:**

The patients were observed during the procedure and in the immediate post-operative period. Patients were monitored with pulse, BP, any occurrence of symptoms such as pain in the neck and chest, respiratory distress and surgical emphysema. Indirect laryngoscopy was done 4-6

hours after the procedure as well as 24 hours and at the time of discharge. Indirect laryngoscopy could not be done on 5 children under the age of 5 years. Systemic examination was normal in those patients.

3 patients had injury and loosening of teeth, who had multiple caries teeth. 8 patients had mucosal injury and haemorrhage over the anterior pillar and one patient had injury over vallecula which subsided spontaneously. One patient had oedema over the arytenoid which subsided by itself

**BRONCHOSCOPY**

During the period of study, 15 patients underwent 16 bronchoscopic procedure. This was because one patient who underwent tracheostomy and bronchoscopy came with foreign body in the trachea, and had to undergo repeat bronchoscopy and removal. 11 procedures were done under general anaesthesia and 5 under local anaesthesia.

Injury and mucosal haemorrhage over the anterior pillar occurred in one patient which subsided spontaneously. Injury and loosening of teeth occurred in one patient.

**DISCUSSION**

The complications of endoscopic surgeries are well known, and these complications had been a nightmare of every ENT surgeon who performed it either as a diagnostic or therapeutic procedure. In spite of various developments in the investigation facilities and the fact that most modern equipments are available for endoscopies there are various types of complications which can develop either during or after the procedure. Because of the fact that often limited beds are available in the ENT wards (which is more so in the smaller hospitals) it is for endoscopy. This study has helped us to know whether routine admissions were necessary before undertaking any endoscopic procedures. This study also has thrown some light into the fact that how many patients would have been adversely affected if they were discharged from the hospital on the same day of the procedure.

158 patients were taken up for the study and 192 procedures were performed among them. All the 158 patients were admitted so as to enable us to monitor these patients very closely for the development of any complications in the post-operative period. We are able to find that 108 patients (67.08%) did not develop any complications at all either during or in the postoperative period but 50 patients had single or multiple complications.

The most common complication was injury to the anterior pillar in 31 patients followed by injury to the teeth. In the present study of 82 patients, 63 patients underwent direct laryngoscopy under local anaesthesia and 18 patients underwent the procedure under general anaesthesia. In the present study of 82 patients, 63 patients underwent direct laryngoscopy under local anaesthesia and 18 patients underwent the procedure under general anaesthesia.

We noted that patients who underwent direct laryngoscopy under local anaesthesia did not develop any laryngeal oedema in the post-operative period. But among the 18 patients who underwent the procedure under general anaesthesia, 3 patients developed postoperative oedema of the larynx (16.67%).

It is to be noted that all the patients who developed oedema of larynx belonged to the group of endoscopic lateralisation of the vocal cord for bilateral abductor paralysis. The operation itself involved increased manipulation of the larynx which could lead to the increase in the incidence of laryngeal oedema.

In the present study of 61 patients who underwent hypopharyngoscopy, 52 were done under local anaesthesia and 9 under general anaesthesia. 36 out of 61 patients (59.16%) did not develop any complication either during in the post-operative period.

Injury to the anterior pillar occurred in 20 patients (32.69%) and 2 of them had other injuries -- one had injury to the teeth and the other had laryngeal oedema.

**HYPOPHARYNGOSCOPY**

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Injury to the anterior pillar occurred in 20 patients (32.69%) and 2 of them had other injuries -- one had injury to the teeth and the other had laryngeal oedema. None of the high risk patients such as having diabetes mellitus, hypertension, ischaemic heart disease and cervical spondylosis had any complication.

Awareness of the possibility of oesophageal perforation as a complication of oesophagoscopy is essential for all who performs this procedure (Palmer et al.). There are 3 areas of anatomical narrowing of oesophagus. The oesophageal introitus is the narrowest region, where the lumen is decreased by the cricopharyngeous muscle. Iatrogenic perforation most commonly occur at this level, when the oesophageal wall is compressed against the sixth or seventh cervical vertebra. This area has been respected since the time of Chevalier Jackson who described it as Bab-el Man-deb or "the gates of tears." Hyper extension of the head, kyphosis or hypertrophic vertebral spurs increase the pressure of the instrument against the posterior oesophageal wall. The aortic arch and the left main bronchus constitute the second level of narrowing and gastro-oesophageal junction the third. Other factors known to increase the risks of injury are technical difficulties with the procedure or anaesthesia, inexperienced endoscopist, presence of oesophageal diverticulum, or cancer and either a large or sharp foreign body.

Intrathoracic perforation may present with epigastric discomfort, retrosternal pain, pain between the shoulder blades, dyspnoea, pleural effusion, pneumothorax or even abdominal pain.

No cases of oesophageal perforation or mediastinitis occurred in our study. Injury to the anterior pillar was found in 8 cases (25%). One of the patient had injury to the teeth also. Injury to the teeth alone developed in 2 patients. Arytenoid oedema was developed in one patient (3.12%) and no airway compromise occurred. It subsided spontaneously. These are consistent with previous study on endoscopic surgery Robinson 1991 and Hill 1987. One patient had angina immediately after the procedure. He had ischaemic heart disease previously. He underwent oesophagoscopy for removal of foreign body. He improved with medical treatment. In previous studies no cases of cardiac complication were reported.

### BRONCHOSCOPY

During our study 15 patients underwent 16 bronchoscopic procedures. It was due to the fact that one patient who had underwent tracheostomy and bronchoscopy came with foreign body in the trachea. She underwent bronchoscopy and removal of foreign body. 1 procedure was done under general anaesthesia and 5 under local anaesthesia.

Mucosal injury to the anterior pillar occurred in one patient and injury to teeth occurred in one patient.

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Mucosal injury to the anterior pillar occurred in one patient and injury to teeth occurred in one patient.

In our study no evidence of hypoxaemia or hypercarbia were found.

### Summary and Conclusion

The complications of endoscopic procedures were very common in earlier days. With modern equipments and better anaesthetic techniques, the rate of complication had been reduced to a minimum recently. Even though minimal, complications could occur after endoscopic procedures.

The following were the conclusions arrived at in our study.

1. The patients who are otherwise clinically normal can be discharged on the same day.
2. High risk patients should be admitted in the ward and observed at least for 24 hours.
3. High index of suspicion should be there if there is any abnormal difficulty in the procedure.

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