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ECG CHANGES DURING UPPER GASTROINTESTINAL TRACT ENDOSCOPY (A PROSPECTIVE STUDY)

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Abstract

This study aimed to evaluate the cardiac changes and complications that occurred in patients who underwent upper gastrointestinal tract endoscopy. The study was conducted from January 2002 to December 2002at Basrah General Hospital and Al-Sadir Teaching Hospital. One hundred and forty eight patients complaining of upper gastrointestinal tract disorders were included in this study. Detailed history, physical examination and ECG was taken before, during and half hour after endoscopic examination. Patients were divided into two groups according if they have previous cardiopulmonary diseases.

One hundred and forty eight patients included in the study, 91 males and 57 females. The age group between 20–40 years represent the commonest group underwent oesophago-gastroduodenoscopy (O.G.D) examination.

All ECG changes that developed in patients before endoscopic examination arise from those who had cardiopulmonary diseases. Forty-two (40.4%) and 21 (47.7%) patients from group I. and group II. respectively showed abnormal ECG changes while 18 (17.3%) and 13 (29.5%) patients from group I. and group II. respectively showed abnormal ECG findings half hour after endoscopic examination . Bradycardia represents the commonest ECG changes occurred during and half hour after examination. We concluded that OGD is a safe procedure but in elderly patients and those with cardiopulmonary disease ECG monitoring should be done during endoscopic examination

Introduction

Oesophagogastroduodenoscopy (OGD) examination is safe, easy, low cost, low risk for patients, need simple preparation (only fasting for 6-8 hours), can detect diseases in early stage and can also be used for therapeutic procedures which would otherwise require surgery[1].

The development of flexible endoscopy allows the endoscopist to perform diagnostic and therapeutic procedures and with this capability comes the realization that all procedures carry with them the risk of complication[2]. As endoscopists, we must be aware of the things that can go wrong, anticipate their occurrence, make the necessary preparation to minimize their occurrence and most importantly be prepared to properly diagnose and treat them. It is with this philosophy that the morbidity and mortality of these complications can be reduced[3].

The entire process of endoscopic procedure may result in changes in blood pressure, pulses, respiration, O2 saturation and ECG. Therefore some or all of these parameters should be observed or monitored[4].

Therapeutic endoscopy carry a more

frequent complications than diagnostic one and this may attributed to the adverse effect of the drugs used for sedation and analgesia during therapeutic procedure together with the effect of the introduction of the scope through the upper segment of the gastro-intestinal tract[4]. The incidence of these complications tend to decrease with the improvement of techniques and experience of endoscopist. The overall complication rate is about 0.1%[3]. Several factors influence cardio-pulmonary changes before, during and after OGD examination. Hypoxemia induced by sedation and analgesia, old age and underlying chronic cardio-pulmonary diseases may favors the development of complication[5,6].

Anxiety that developed before the procedure may increase sympathetic tone and lead to changes of cardiac rhythm. In addition, the passage of the endoscope through the upper segment of the gastro-intestinal tract may cause vagal effect. Aspiration that may occur during the procedure may lead to broncho-pulmonary complication[7].

Electrocardiographic changes are observed in 33%-35% of patients undergoing OGD[6]. These changes range from cardiac dysarrhythmias to myocardial ischemia. Cardiac arrhythmias include sinus tachycardia and bradycardia, premature ventricular contraction, multiple premature atrial beats and aterial fibrillation. These events may lead to serious complications including myocardial infraction, ventricular fibrillation and cardiac arrest[7].

Patients and Method

A prospective study conducted from January to December 2002 at Basrah General Hospital and Al-Sadir Teaching Hospital, Department of Surgery (endoscopic unit). One hundred and forty eight patients from out-patient and in-patient scheduled for OGD for different gastro-intestinal tract disorders. The age of patients ranged from 16-80 years (mean 48 years). Detailed history was taken with special stressing on cardio-pulmonary disease.Thorough physical examination and ECG was taken before, during and 30 minutes postendoscopic procedures.

Patients were divided into two groups:

Group I: include patients underwent OGD and they have no cardio-pulmonary disease.

Group II: include patients underwent OGD and they have chronic disease (cardio-pulmonary disease).

There was no specific preparation a part from fasting over night before the day of endoscopy or at least 6 hours prior to procedure, topical hypopharyngeal anesthesia (xylocain 10%) was applied and in some patients who were anxious we used sedative drug (e.g.diazepam 10mg). Endoscopist did endoscopic procedures and patients were monitored during endoscopic procedures by using ECG monitor and observed by endoscopist and if any abnormality detected, a strip of ECG would be taken.

Results

Over one year period, 148 patients were included in this study, 91 patients (62%) were males and 57 patients (38%) were females. Age ranged was 16-80 years (mean 48 years). Patients between age 20-40 years were the most common age group underwent OGD examination (56%), Table I. One hundred and four patients (70.3%) had no history of any cardiopulmonary diseases while the remaining 44 patients (29.7%) had evidence of cardio-pulmonary diseases, Table II. Dyspepsia and epigastric pain were the most common indication for OGD as shown in Table III.

All abnormal ECG findings that developed before endoscopic examination (5.4%) were found in

group II. only, Table IV. Forty two patients (40.4%) in group I. showed ECG changes during the endoscopic procedures in contrast to 21 patients (47.7%) in group II.as shown in Table V. The most common changes in both groups was bradycardia, Table VI. The commonest age group showed these changes during endoscopic procedure was 20-40 years followed by the age group between 40-60 years, TableVII.
Half-hour after endoscopic procedures, 13 patients (29.5%) out of 44 patients in group II. showed ECG changes in contrast to 18 patients (17.3%) from group I. with bradycardia represented the commonest ECG findings,Tables VIII. and IX.

Discussion

Many patients complaining from upper gastro-intestinal disorders need to be investigated. Many methods can be used, but upper gastro-intestinal endoscopy increasingly used for evaluating those patients, because it is more sensitive than conventional radiology in assessment of majority of the gastro-intestinal conditions[8].

Inspite of OGD is considered as safe procedure, still there are many potential hazards in elderly patients, many studies suggest that simple diagnostic OGD carries a risk of significant complications in about 1/10000 procedures, these complication are more likely to be encountered in elderly, acutely ill patients, during emergency and in therapeutic endoscopic procedures[5,9]. In present study we have 148 patients underwent OGD for different causes as shown in table III.
Group I. (104 patients) didn't show any ECG changes before the endoscopic procedures but 42 (40.4%) patients developed changes during endoscopy and 18 (17.3 %) of them still having ECG changes ½ hour after the endoscopic procedures, while in group II. from 44 patients ,only 8 (5.4%) of them having ECG findings before the endoscopy and these findings are due to their chronic cardiopulmonary diseases and not related to endoscopy and all of those 8 patients were hypertensive (two of them developed S-T segment depression and only one of them remained having this changes half hour after the procedure).During endoscopy the number of the patients in group II. who developed ECG changes were increased up to 21 patients (47.7%) and 13 of them (29.5 %) still having ECG changes half hour after the endoscopic procedures.

The present study also showed that most common type of ECG changes that occur during upper GI tract endoscopy was bradycardia in 43 patients (29.1%), 33 of them were in group I. and the remaining 10 patients in group II, whoever 20 of them (13.5%) still having this changes half hour after the procedure and this might be due to increasing of vagal tone which caused by either gagging or gastric distention which leads to vagus nerve stimulation[7.]
The next change was tachycardia that occurred in 11 patients (7.4%), 5 of them from group I. while the remaining 6 patients from group II.whoever 6 of them (4.75%) still having this change half hour after endoscopy and this might be due to anxiety and stress before and during the procedure[8.]

The another ECG change encountered were S.T segment depression and this may reflect the ischemia of myocardium occurs during these procedures and these types of changes consider as significant and serious. This might be due to stimulation of already impaired heart or due to hypoxia that might resulted from the effect of sedative drugs that may be used during the procedure. This type of changes occurred in 6 patients only during endoscopy, 3 of them having criteria of group I and the others of group II. Half-hours after endoscopy only 3 of them

still having S.T segment depression and all of them were of group II.

The last ECG change that occurred during endoscopy was atrial ectopics in 3 patients tow of them were of group II and one of group I. Only 2 patients remained having this changes ½ hour after endoscopy, one from each group. This type of changes might be due to hypoxia or over stimulation of the vagus nerve, or when the scope became adjacent to the heart[4].

ECG changes that may occurred in patients underwent upper G.I tract endoscopy were divided into two types, benign changes that most likely occur in young patients and serious changes (e.g. S-T segment depression) that may lead to complications like a ventricular fibrillation or even cardiac arrest and they occur in patients above age 40 years especially those with chronic cardiopulmonary diseases[10].

There are controversy about the values of monitoring the patients underwent upper GI tract endoscopy. Many studies like Froechlish study suggested that OGD sometime associated with ECG abnormality, so that continuous ECG monitoring could not be reduce the complications and therefore the routine use of monitoring dose not justified in low risk patients[10]. While Schenck study suggested that OGD is potentially harmful procedures especially in those patients with chronic diseases so he recommended close monitoring of those patients to reduce the risk of complications[11].

In addition, Froechlish showed that ECG changes occur in a rate of 33-35% of all patients underwent endoscopy (benign ECG changes) and the serious ECG changes occur in a rate 0.1-0.2% only[10], while the present study showed that benign ECG changes occurred in 38.5% of patients and serious ECG changes (S-T segment depression) occurred in 4.04% of patients and this high percent might be due to inadequate sedation used during the procedure.

Finally we concluded that OGD is a very safe procedure that can be used as the first line in diagnosis of upper gastro-intestinal tract disorder and can be done as out patient investigation but this procedure not without risk which expected to be more when use in elderly patients especially if they had chronic disease, so in order to reduce the hazard of endoscopy, ECG monitoring of high risk patients should be done. Therefore the endoscopic units should be supplied with appropriate equipment for monitoring and resuscitation.

Table I: Distribution of patients according to age and sex.

Age	Male	Female	Total	Percentage
< 20 years	8	2	10	6.75
20-40 years	48	35	83	56.05
40-60 years	26	19	45	30.48
> 60 years	9	1	10	6.75
Total	91	57	148	100

Table II: Distribution of patients according to disease.

	Male	Female	Total	Percentage
No cardiopulmonary dis.	71	33	104	70.27%
Hypertension	11	16	27	18.2%
DM	8	5	13	8.78%
Hypertension+HF	1	2	3	2.02%
Hypertension+DM	0	1	1	0.67%

Table III: Indication for upper GI tract endoscopy

Indication	No.	Percentage
Dyspepsia and epigastric pain	93	62.83
Follow-up of previously diagnosed P.U	15	10.15
Haematemesis and\or melena	7	6.08
Other causes	31	20.9

Table IV: ECG finding before endoscopy

Patients groups	Patients	No. of pt. Having abnormal ECG finding	Percentage
Group I.	104	0	0
Group II.	44	8	5.4%

Table V: Numbers of patient developed ECG changes during endoscopy

Patients group	Total	No. of patients have ECG changes	Percentage
Group I.	104	42	40.38
Group II.	44	21	47.7

Table VI: Distribution of ECG changes in patients groups during endoscopy

Patients groups	S.T depression	Increased H.R	Decreased H.R	Atrial ectopic	Total
Group I.	3	5	33	1	42
Hypertension	2	3	8	2	15
DM	-	3	-	-	3
Hypertension+ HF	1	-	2	-	3
Total	6	11	43	3	63

Table VII.: Types of ECG changes during endoscopy (according to age group)

Age group	S.T depression	Decreased H.R	Increased H.R	Atrial ectopic	Total
<20 years	-	1	-	-	1
20-40 years	1	27	3	1	32
40-60 years	3	14	7	2	26
> 60 years	2	1	1	-	4
Total	6	43	11	3	63

Table VIII.: ECG Changes half hour post endoscopy

Patient groups	Total	ECG changes during endoscopic	ECG changes half hr. postendoscopy	
			No.	%
Group I.	104	42	18	17.3
Group II.	44	21	13	29.5

Table IX.: Types and distribution of ECG changes half hour postendoscopy

Patient group	S.T depression	Decreased HR	Increased HR	Atrial ectopic
Group I.	-	15	2	1
Hypertension	2	3	2	-
DM	-	2	1	-
Hypertension + DM	1	-	-	1
Hypertension + HF	-	-	1	-
Total	3	20	6	2

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