COMPLICATIONS AFTER UPPER GASTROINTESTINAL ENDOSCOPY IN CHILDREN: 30 DAYS FOLLOW-UP

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ABSTRACT

Background: *Gastrointestinal (GI) endoscopy in the pediatric population has evolved during the last 30 years with an increasing number of diagnostic and therapeutic applications (Tringali et al., 2017). There are Limited comprehensive data are available on the complications of upper gastro intestinal endoscopy (UGE) in adults and particularly in children (Thakkar et al., 2007).*

Objectives: *The goals of this study were to identify complications and adverse events reported by patients and their parents after UGE under general anesthesia (GA).*

Patients and Methods: *This is a prospective study where pediatric patients who underwent GI endoscopy under GA at Al-Hussein University Hospital in the period from September 2016 to August 2017 were evaluated for 30 days after the procedure.*

Results: *A total of 100 patients (80 cases (80%) had upper GI endoscopy (UGE) and 20 cases (20%) had lower GI endoscopy (LGE)) participated in this survey. Of the patients, 45% who had UGE developed minor complications. Complications were cough (n = 31; 38%), sore throat or hoarseness (n = 28; 35%), fatigue (n = 7; 8.7%), headache (n = 10; 12.5%), excessive gas or burping (n = 13; 16.2%), nausea (n = 11; 13%), emesis (n =10; 12.5%), abdominal pain (n = 19; 23.7%), fever (n = 4; 5%), behavior problems (n = 9; 11.25%), upper respiratory symptoms (n = 6; 7.5%) and perioral rash (n = 2; 2.5%). In our study, patients who had LGE under GA we find that 30 % developed minor complications. These complications were abdominal pain (n = 5; 25%) and fever (n = 1; 5%).*

Conclusion: *Safety of performing upper GI endoscopy as no major complications or adverse events was reported by patients or their parents at 30 days after GI endoscopy under GA. No Complications of general anesthesia during the procedure were reported.*

Recommendations: *GI endoscopy is invasive procedure, may have risk for developing serious complications and should be done under standard precautions by perfect endoscopists in well-equipped centers. Complete history taking and physical examination is a main factor for good preparation and subsequent good result for*

endoscopy. In addition, Follow up of cases is important to detect and manage any complications that may appear.

Key words: *complications, upper gastrointestinal endoscopy, general anesthesia.*

INTRODUCTION

Gastrointestinal endoscopy has become an essential diagnostic and therapeutic procedure in the pediatric population. Although generally considered a safe procedure, EGD has the potential for complications. Most informed consent forms mention aspiration, allergic reaction, hypoxia, perforation, infection, and bleeding as possible risks of upper endoscopy. However, the current frequency of these complications remains unclear. There are scarce pediatric data showing complication rates and most prior studies involve small numbers of procedures **(Thakkar et al., 2007)**.

Ethical considerations:

1. Approval of ethical committee, Faculty of Medicine, Al-Azhar University.
2. Written consents from the parents of the patients.
3. The patients have the right to withdraw from the study at any time.
4. All the obtained data are confidential and the patients have the right to keep them.
5. The authors declare that there is no any financial conflict regarding the research and publication.
6. No conflict of interest regarding the study and publication.

PATIENT AND METHODS

This study was a prospective study to evaluate complications after gastrointestinal endoscopy done for Pediatric patients under GA at Al-Hussein University Hospital in the period from September 2016 to August 2017. This study was including totally 100 cases (80 cases who had UGE and 20 cases who had LGE). The interviewer obtains a verbal consent and performs standardized interviews 30 days after the UGE.

Inclusion criteria:

All pediatric patients who underwent GI endoscopy under GA.

Exclusion criteria:

Patients who had procedures performed other than GI endoscopy was excluded.

All study patients were underwent the following:

- Complete history taking,

- Complete physical examination,
- GI endoscopy (under GA),
- Patients or parents were contacted within 30 days after UGE and were invited to participate in the study at the time of the interview.

Definition of Terms:

General anesthesia (GA) is defined as the absence of sensation and consciousness as induced by various anesthetic medications given by inhalation or i.v. injection. We defined complications or adverse events as development of any symptom different from the patient's pre endoscopic state of health. **A major or life-threatening complication** was defined as that which necessitated interruption of the procedure or required invasive intervention after endoscopy. **A minor complication** was one that did not require interruption of the procedure or use of invasive intervention after the UGE. Behavior problems were defined in our study as any changes from the patients' baseline behavior, such as irritability and nocturnal awakening **(Mosby, 2002)**.

RESULTS

Table (1): demographic data of study cases:

	Age (years)	Weight(kg)
Mean + SD	7.66 + 2.958	24.02 + 8.937
Median	8.00	23.00
Mode	8	25

Table (2): distribution of Cases according to Endoscopy:

	Frequency	Percent
upper Endoscopy	80	80.0%
lower Endoscopy	20	20.0%
Total Endoscopy	100	100.0

Table 3: distribution of Cases according to Gender:

Endoscopy	Gender	Frequency	Percent
Total	Male	61	61%
	Female	39	39%
Upper	Male	48	60%
	Female	32	40%
Lower	Male	13	65%
	Female	7	35%

Table 4: Frequency of Symptoms among study group after Gastrointestinal Endoscopy in Children during 30 Days

According to age			
Years	<6 years	6-11years	>11years
Number	25	65	10
Frequency	13; 52%	30;46.1%	3;30%
According to sex			
Sex	Male	female	
Number	61	39	
Frequency	25;40.9%	17;43.5 %	
According to weight			
Weight	<20kg	20-30 kg	>30kg
Number	32	63	15
frequency	17;53.1%	31;49.2%	4;26.6%

Follow-Up according to age, sex and weight:

Frequency of symptoms increased in younger age, female sex and in lowest weight.

Table 5: Frequency of Symptoms among study group after upper Gastrointestinal Endoscopy (80 cases) in Children during 30 Days Follow-Up:

Symptoms		NO	YES
Cough	Frequency	49	31
	Percent	61.25%	38.75%
Sore Throat	Frequency	52	28
	Percent	65%	35%
Headache	Frequency	70	10
	Percent	87.5%	12.5%
Fatigue	Frequency	73	7
	Percent	91.25%	8.75%
Abdominal Pain	Frequency	61	19
	Percent	76.25%	23.75%
Excessive Gas	Frequency	67	13
	Percent	83.75%	16.25%
Emesis	Frequency	70	10
	Percent	87.5%	12.5%
Nausea	Frequency	69	11
	Percent	86.25%	13.75%
Upper Respiratory Symptoms	Frequency	74	6
	Percent	92.5%	7.5%
Behavioral problem	Frequency	71	9
	Percent	88.75%	11.25%
Fever	Frequency	76	4
	V Percent	95%	5%
Prioral Rash	Frequency	78	2
	Percent	97.5%	2.5%
Nose bleed	Frequency	80	0
	Percent	100%	0%
Excessive drowsiness	Frequency	80	0
	Percent	100%	0%
Chest Pain	Frequency	80	0
	Percent	100%	0%
Anesthesia side effect	Frequency	80	0
	Percent	100%	0%

The most frequent symptom appear after UGE endoscopy was cough with 38.75% followed by sore throat with 35% and abdominal pain with 23.75% while disappearance of symptoms like Nose bleed, excessive drowsiness, chest pain and other anesthesia side effect.

Table 6: Frequency of Symptoms among study group after lower Gastrointestinal Endoscopy (20 cases) in Children during 30 Days Follow-Up:

Symptoms		NO	YES
Fatigue	Frequency	20	0
	Percent	100%	0.%
Sore Throat	Frequency	20	0
	Percent	100%	0%
Headache	Frequency	20	0
	Percent	100%	0%
Cough	Frequency	20	0
	Percent	100%	0%
Abdominal Pain	Frequency	15	5
	Percent	75%	25%
Excessive Gas	Frequency	20	0
	Percent	100%	0%
Emesis	Frequency	20	0
	Percent	100%	0%
Nausea	Frequency	20	0
	Percent	100%	0%
Upper Respiratory Symptoms	Frequency	20	0
	Percent	100%	0%
Behavioral problem	Frequency	20	0
	Percent	100%	0%
Fever	Frequency	19	1
	Percent	95%	5%
Prioral Rash	Frequency	20	0
	Percent	100%	0%
Nose bleed	Frequency	20	0
	Percent	100%	0%
Excessive drowsiness	Frequency	20	0
	Percent	100%	0%
Chest Pain	Frequency	20	0
	Percent	100%	0%
Anesthesia side effect	Frequency	20	0
	Percent	100%	0%

Abdominal pain and fever were the only complications were present after LGE 30 days follow up.

Table 7: Frequency of Symptoms among study group after Gastrointestinal Endoscopy (upper and lower = 100 cases) in Children during 30 Days Follow-Up:

Symptoms		No	YES
Fatigue	Frequency	93	7
	Percent	93%	7%
Sore Throat	Frequency	72	28
	Percent	72%	28%
Headache	Frequency	90	10
	Percent	90%	10%
Cough	Frequency	69	31
	Percent	69%	31%
Abdominal Pain	Frequency	76	24
	Percent	76%	24%
Excessive Gas	Frequency	87	13
	Percent	87%	13%
Emesis	Frequency	90	10
	Percent	90%	10%
Nausea	Frequency	89	11
	Percent	89%	11%
Upper Respiratory Symptoms	Frequency	94	6
	Percent	94%	6%
Behavioral problem	Frequency	91	9
	Percent	91%	9%
Fever	Frequency	91%	9
	Percent	91%	9%
Prioral Rash	Frequency	98	2
	Percent	98%	2%
Nose bleed	Frequency	100	0
	Percent	100%	0%
Excessive drowsiness	Frequency	100	0
	Percent	100%	0%
Chest Pain	Frequency	100	0
	Percent	100%	0%
Anesthesia side effect	Frequency	100	0
	Percent	100%	0%

The most frequent symptom appear after GI endoscopy was cough with 31% followed by Sore Throat with 28% and abdominal pain with 19% while disappearance of symptoms like Nose bleed, excessive

drowsiness, chest pain and other anesthesia side effect.

DISCUSSION

In our study Pediatric patients who underwent GI endoscopy under GA between September, 2016 and August, 2017 at Al-Hussein University Hospital, pediatric gastrointestinal endoscopy unit were identified and contacted for 30 days. Patients who had procedures performed other than UGE were excluded.

Patients or parents were contacted during this study period through weekly visits that include complete history taking and physical examination in each visit. **(Ammar et al, 2003)** were conducted similar study using telephone interview.

A 30-days follow-up period was chosen as in previous studies that evaluated UGE-related complications in adults **(Zubarik et al., 1999)** and UGE related complications in pediatrics **(Ammar et al., 2003)**.

According to the study of **(Ammar et al., 2003)**, Complications or adverse events reported by the patients or parents at 30 days after UGE endoscopy under GA were include sore throat or hoarseness, fatigue, cough, headache, excessive gas or burping, nausea, emesis, abdominal pain, fever, behavior problems, upper respiratory symptoms, excessive drowsiness, nosebleed, perioral rash, and chest pain. In our study we studied these items in addition to complications of general anesthesia during the procedure (hypoxia, allergic reaction, hypotension, perforation, bleeding and any other complications that require intervention).

Patients or their parents were asked whether the patient experienced specific symptoms listed below and any other symptoms in this study period. They were asked whether they attributed these symptoms to the GI endoscopy and whether the symptoms required medical assistance in the form or clinic visit with the primary care physician or pediatric gastroenterologist, an emergency room visit, a hospital admission, or surgical intervention. Finally, they were asked for any other comments.

(Fleischer et al., 1992) classified complications in an

endoscopy unit into five categories: no complication, complication-no management required, complication-medical home management required, complication requiring hospitalization for medical management, and complication requiring surgical intervention.

Using this classification, the majority of the complications in our study fall into the second category. There was no procedure related mortality in our study. No major complications or adverse events were reported by patients or their parents at 30 days after GI endoscopy under GA.

Also, our cases were underwent pre-endoscopic complete history taking and complete physical examination to ensure stabilization and good preparation for endoscopy in addition to exclusion of unsuitable cases from our study.

In our study, patients or their parents agreed to participate in this survey, our study was include 100 cases that underwent GI endoscopy under GA at Al Hussein university hospital.

A total of 100 patients had GI endoscopy done during the 1-yr study period. Patients were contacted 30 days after the GI endoscopy.

Of these patients:

- Mean patient age was 7.6 ± 2.9 years (range from 24 months to 14 years). Mean patient weight was 24 ± 8.9 kg (range from 10 kg to 50 kg) **table 1**.
- 61% were males while 39 % were females as in **table 2**.
- 25 patients were < 6 years, 10 patients were >12 years and 65 patients lie in between these two age groups as in **table 3**.
- 80 cases (80%) had UGE and 20 cases (20%) had LGE as shown in **table 2**.

Table 4 show that there were slight increasing in frequency of complication or adverse events in females (n = 39; 43.9%) than males (n = 61; 40.9%), also complications were moderately increased in younger ages ((n = 25; 53.1%) in ages < 6 years and (n = 65; 46.1% in ages 6-11 years and (n =10; 30 %) in ages >11 years) and in lowest weight (n = 32; 53.1%) in weight < 20 kg, (n = 63; 49,2%) in weight 20-29 kg and (n = 15; 26.6%) in weight >30 kg). These results were in agreement with **(Abraham et al., 2002)** and **(Thakkar et al., 2007)** studies that demonstrated that Young age, female sex and low weight are risk factors for developing complications.

From **table 6** we find that abdominal pain (n = 5; 25%) and

fever (n = 1; 5%), are the only complications were reported in the LGE group while disappearance of all other complications listed above. Further studies with large number of LGE cases should be done.

In our study on the eighty cases that had UGE we found that 45 % of cases had one or more complications or adverse events after the UGE compared to **(Ammar et al., 2003)** study that reported 42 % of cases that had one or more complications and 68 % in **(Treepongkaruna et al., 2000)** study. None of these complications or adverse events was major or life-threatening in all these studies.

Table 5 show Complications or adverse events reported by the patients or parents who had UGE at 30 days were cough (n = 31; 38%), sore throat or hoarseness (n = 28; 35%), fatigue (n = 7; 8.7%), headache (n = 10; 12.5%), excessive gas or burping (n = 13; 16.2%), nausea (n = 11; 13%), emesis (n =10; 12.5%), abdominal pain (n = 19; 23.7%), fever (n = 4; 5%), behavior problems (n = 9; 11.25%), upper respiratory symptoms (n = 6; 7.5%) and perioral rash (n = 2; 2.5%).

In **(Ammar et al., 2003)** study on 492 cases, Complications or adverse events reported by the patients or parents after UGE in the same period were sore throat or hoarseness (n= 136; 34.6%), fatigue (n= 26, 6.6%), cough (n =16; 4.1%),headache (n =13; 3.3%), excessive gas or burping (n= 11; 2.8%), nausea (n =10; 2.5%), emesis (n= 9; 2.3%), abdominal pain (n =8; 2%), fever (n =8; 2%), behavior problems (n =7; 1.8%), upper respiratory symptoms (n =5; 1.3%), excessive drowsiness (n=2; 0.5%), nosebleed (n=1; 0.3%), perioral rash (n =1; 0.3%), and chest pain (n 1; 0.3%).

Our study revealed no excessive drowsiness, nose bleed or chest pain were reported.

Cough was the most common reported complications/adverse events in our study (38%), while sore throat or hoarseness was the next most common complications (35%), compared to sore throat or hoarsness which was the most common complication (34%) and fatigue which was the the next in frequency (26%) in **(Ammar et al., 2003)** study. We were unable to delineate clearly whether the reported complications/adverse events were due to the procedure itself, the underlying process for which the patient was endoscoped, the administration of general anesthesia, or concurrent illness.

No Complications of general anesthesia during the procedure were reported. In all cases oxygen saturation and blood pressure values remained normal throughout the procedure. Also there were no perforations, aspiration, allergic reactions or bleeding. These results were in agreement with **(Kuusela and his colleagues, 2000)** and **(Wengrower and his colleagues, 2004)**.

Based on the report of **(Ruuska et al, 1996)**, that no complication occurred in 100 children who underwent UGE under sedation, it is reasonable to conclude that most of the adverse events reported by our study participants were most likely related either to the administration of GA, e.g., sore throat and hoarseness from irritation of the larynx during administration of general anesthesia through an endotracheal tube or secondary to an intercurrent illness, e.g., a viral infection. Excessive eructation is likely secondary to air insufflation of the upper GI tract during UGE.

Of all the complications or adverse events reported, Most of these complications or adverse events lasted for a short time, from 1 hour to 1week ; only 3 cases lasted as long as 2 weeks. This is in agreement with **(Ammar et al., 2003)** study. Patients with complications or adverse events not needed more than the routine follow up by the pediatric gastroentologist and some of them used over the counter medications (paracetamol, ibuprofen, or decongestants).

Our data provides evidence for the safety of performing UGE under GA, No mortality occurred, and all procedures were completed without resulting in any major complications that would require surgical intervention or any other invasive procedures.

CONCLUSION

1. Safety of performing UGE under GA and well tolerated in children.
2. Young age, female sex and low weight are risk factors for developing complications of UGE.
3. Cough was the most common reported complications in our study (38%), while sore throat or hoarseness was the next complication (35%).
4. No Complications of general anesthesia during the procedure were reported.
5. Patients with complications or adverse events not needed more than the routine follow up and Most of these complications or

adverse events lasted for a short time.

6. There was no procedure related mortality in our study.
7. No major complications or adverse events were reported by patients or their parents at 30 days after UGE under GA.

RECOMMENDATIONS

1. GI endoscopy is invasive procedure, may have risk for developing serious complications.and should be done under standard precautions by perfect endoscopists in well-equipped centers.
2. UGE is amjor and diagnostic tool should be done if indicated without any concern.
3. Complete history taking and physical examination is a main factor for good preparation and subsequent good result for endoscopy.
4. General anaethesia in pediatric endoscopy is safe and well tolerated as we didn't record any complications for it.
5. Follow up of cases is important to detect and manage any complications that may appear.

LIMITATION OF THE STUDY

1. Limited number of cases of lower gastrointestinal endoscopy.
2. Withdrawal of some patients from the study.

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المضاعفات الناتجة بعد عمل منظار الجهاز الهضمى العلوى فى حالات الأطفال خلال ثلاثون يوما من المتابعة

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الهـــدف : متابعـــة وتقيـــيم عمـــل منظـــار الجهـــاز الهضـــمى العلـــوى تحـــت تـــأثير التخـــدير الكلـــى فـــى الأطفـــال وملاحظـــة حـــدوث أى مضاعفات خلال ثلاثون يوما بعد إجراء العملية.

المرضـــى وطـــرق المتابعـــة: تـــم التواصـــل مـــع المرضـــى وأوليـــاء أمـــورهم خـــلال ثلاثـــون يومـــا بعـــد إجـــراء العمليـــة فـــى الفتـــرة مـــن ســـبتمبر 2016 حتـــى ســـبتمبر 2017. بمستشـــفى الحســـين الجـــامعى التابعـــة لجامعـــة الأزهـــر.وتم عمـــل متابعـــة اســـبوعية للحـــالات اشـــتملت علـــى أخـــذ التـــاريخ المرضـــى الكامـــل للمـــريض والفحـــص الإكلينيكـــى فـــي كـــل زيـــارة وكـــان عـــدد الحـــالات التـــى اشـــتملت عليهـــا الدراســـة مائـــة حالـــة أجـــرت منظـــار الجهـــاز الهضـــمى تحـــت تـــأثير التخدير الكلى .

النتائج:

- % 45 مـــن الحـــالات ظهـــر عليهـــا واحـــد أو أكثـــر مـــن المضـــاعفات بعـــد عمـــل منظارالجهـــاز الهضـــمى العلـــوى (80 حالـــة) خـــلال 30 يومًـــا مـــن المتابعـــة بعـــد العمليـــة وكانـــت

كالتالى: الكحة (ع = 31؛38٪) ، والتهاب الحلق أو بحة في الصوت (ع = 28 ؛ 35٪) ، والإرهاق (ع = 7؛8.7 ٪) والصداع (ع = 10؛ 12.5 ٪) والإنتفاخ (ع = 13؛ 16.25 ٪) والغثيان (ع = 11 ؛ 13 ٪) والقيء (ع = 10 ؛ 12.5 ٪) وآلام بالبطن (ع = 19 ؛ 23.7 ٪) وارتفاع الحرارة (ع = 4 ؛ 5 ٪) وتغير فى السلوك (ع = 9 ؛ 11.25 ٪) ، وأعراض الجهاز التنفسي العلوي (ع = 6 ؛ 7.5 ٪) وطفح جلدي حول الفم (ع = 2 ؛ 2.5 ٪).

- 30% من الحالات التى أجرت منظار الجهاز الهضمى السفلى (20 حالة) ظهر عليها هذه المضاعفات: ألم بالبطن (ع = 5؛25٪) وارتفاع بالحرارة(ع = 1؛5 ٪).

- لوحظ فى الدراسة زيادة حدوث المضاعفات في المرضى الأصغر سنا وزيادة طفيفة في الإناث والأقل وزنا ولم تكن أيا من هذه المضاعفات أو الأعراض التى ظهرت على المرضى كبيرة أو مهددة للحياة ولم تظهر أي مضاعفات من التخدير الكلى أثناء العملية ولا توجد أى وفيات.

التوصيات: تعتبر الدراسة دليل على أمان إجراء منظار الجهاز الهضمى العلوى للأطفال تحت تأثير التخدير الكلى.