Management of upper gastrointestinal bleeding in neonates admitted at Neonatal Intensive Care Unit of Assiut University Children's Hospital: A clinical audit

Sara Mohamed Saleh, Samia Atwa Mohamed, Nafisa Hassan Refat

Department of Pediatrics, Faculty of Medicine, Assiut University, Assiut, Egypt

Correspondence to Sara Mohamed Saleh, Resident of Pediatrics, Department of Pediatrics, Faculty of Medicine, Assiut University, Assiut, Egypt.
Tel: +01013268872;
e-mail: sarasaleh29190@gmail.com

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Background
Upper gastrointestinal bleeding (UGIB) is an uncommon but potentially serious, life-threatening condition in neonates. Rapid assessment, stabilization, and resuscitation should precede all diagnostic modalities in unstable neonates. The diagnostic approach includes history, examination, laboratory evaluation, endoscopic procedures, and imaging studies. The clinician needs to determine carefully whether any blood or possible blood reported represents true UGIB because most neonates with true UGIB require admission to a neonatal intensive care unit (NICU).

Objective
The aim of this clinical audit study is to assess how much the adapted protocols of diagnosis and management of UGIB were applied in NICU in Assiut University Children Hospital.

Patients and methods
The present study was conducted in Assiut University Children's Hospital and included 100 neonates with UGIB who were admitted to NICU of Assiut University Children's Hospital over a 1-year period from the 1st of January 2017 to 31st of December 2017.

Results
Complete history was fulfilled in 100% of cases including the type of delivery, way of nutrition, history of maternal drug use, family history of bleeding, and vitamin K prophylaxis. Data of examination was fulfilled in 100% of cases including vital sign, hepatosplenomegaly, jaundice, bowel sound, and passing of stool. Data of investigations was fulfilled in 100% of cases except for Alkali denaturation test (Apt–Downey test) and upper endoscopy for ulcer evaluation was recorded in 0% of cases. Data about management was fulfilled in 100% of cases regarding secure airway, prophylaxis vitamin K, antibiotic therapy, and gastric lavage with normal saline; obtain two intravenous line was done in 18% of cases; replace blood loss with saline was done in 96% of cases; Foley catheter placement in shocked patient was done in 12% of cases; epinephrine lavage was done in 37% of cases; administration of H_2 blockers was done in 13% of cases; administration of PPIs was done in 46% of cases; blood transfusion was done in 72% of cases; and plasma transfusion was done in 79%.

Conclusion
The international guidelines for the management of UGIB had been followed by personnel working at NICU of Assiut University Children's Hospital regarding treatment lines and that some of the default is due to poor resources and lack of medication.

Recommendations
Infection control measures must be appropriately done, this can be achieved by training nurses and resident doctors on infection control program continuously and also by staff members' supervision. Prolonged use of total parenteral nutrition increases the incidence of neonatal sepsis, this can be prevented by start of oral feeding as early as possible and proper infection control. Early weaning from ventilation as much as possible as prolonged use of mechanical ventilation to newborn predisposes them to develop sepsis and stress ulcer; this can be prevented by early weaning from ventilation. Evaluation and stabilization with airway management, intravenous fluids, or blood transfusion is essential before and during diagnostic evaluation. Gastric lavage with normal saline and epinephrine lavage should be done for all cases with UGIB. Complete laboratory investigations such as complete blood count, type and cross-match blood and coagulation profile should be done for all cases. Mother should be examined for cracked nipples as a source of swallowed blood, blood is usually apparent on examination.

Keywords:
Assiut University Children Hospital, audit, bleeding, neonate, upper gastrointestinal tract

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Introduction

Gastrointestinal bleeding in the upper gastrointestinal tract is commonly defined as bleeding from the esophagus, stomach, or the duodenum [1,2]. Upper

gastrointestinal bleeding (UGIB) is a potentially life-threatening condition in neonates. Rapid assessment, stabilization, and resuscitation should precede all diagnostic modalities in unstable neonates. Diagnostic approach includes history, examination, laboratory evaluation [3], endoscopic procedures, and imaging studies [4]. The clinician needs to determine carefully whether any blood or possible blood reported represents true UGIB because most neonates with true UGIB require admission to a neonatal intensive care unit (NICU).

Anatomically, the upper gastrointestinal tract includes the esophagus to the ligament of Treitz. Therefore, UGIB includes bleeding that originates throughout this region. Common signs and symptoms at presentation include hematemesis (73%), melena (21%), and coffee-ground emesis (6%). However, patients may also experience epigastric pain and abdominal tenderness. Blood may be observed in vomit (hematemesis) or in an altered form in the stool (melena). Depending on the severity of the blood loss, there may be symptoms of insufficient circulating blood volume and shock. As a result, UGIB is considered a medical emergency and typically requires hospital care for urgent diagnosis and treatment. The causes of UGIB can be categorized by age groups. In newborns, the predominant causes include coagulation disorders such as vitamin K deficiency [5], cow milk intolerance [6], gastritis from stress, sepsis, and trauma from the placement of nasogastric tube.

The initial approach to patients with significant UGIB should be to ensure patient stability, to establish adequate oxygenation, to place intravenous line, to initiate fluid and blood resuscitation, and to correct any underlying coagulopathies [7].

The aim of this clinical audit study is to assess how much the adapted protocols of diagnosis and management of UGIB are applied in NICU in Assiut University Children's Hospital.

Patients and methods

The present study was conducted in Assiut University Children Hospital and included 100 neonates with UGIB who were admitted to the NICU of Assiut University Children Hospital over a 1-year period from the 1st of January 2017 to 31st of December 2017. Ethical approval and consent statement was taken from parents. The study was approved and monitored by the Medical Ethics Committee, Assiut Faculty of Medicine. IRB#17101428.

Study site

NICU in Assiut University Children's Hospital.

Study population

The target population of this retrospective study were all neonates who were admitted to NICU with UGIB during the period between the 1st of January 2017 to 31st of December 2017.

Inclusion criteria

The study included all newborn infants with UGIB occurring during the neonatal period, within the first 4 weeks whatever the underlying cause of UGIB which may be due to gastric or duodenal causes, hemorrhagic disease of the newborn, swallowed maternal blood, milk enterocolitis [8], and neonatal sepsis [9].

Exclusion criteria

Patients with dysmorphic features and syndromic patients.

Methods

Cases of UGIB were diagnosed according to clinical suspicion from history, physical examination, and laboratory investigation.

Approach to clinical diagnosis of a case of UGIB according to the protocol in NICU of Assiut University Children Hospital.

The following items were analyzed:

History: type of delivery (NVD vs. CS), type of feeding, history of maternal drug use, family history of bleeding, and vitamin K prophylaxis.

Examination: vital signs including heart rate, blood pressure and capillary refilling, bleeding from other body orifice, jaundice, hepatomegaly, splenomegaly, bowel sound, passing stool, and blood in NG tube.

Investigations: APT test, complete blood count, prothrombin time, prothrombin concentration, abdominal plain erect, abdominal ultrasound, and upper endoscopy for ulcer evaluation.

Treatment: resuscitation and supportive measures, secure airway, obtain two intravenous line, replace blood loss with saline, Foley catheter placement in shocked patients, gastric lavage with normal saline, epinephrine lavage, vitamin K therapy, administration of H_2 blockers, administration of proton pump inhbitors [10], blood transfusion [11], plasma transfusion, and antibiotic therapy (Figs. 1 and 2, Tables 1–5).

Table 1 Demographic data (studied cases *n*=100)

Categories	*n*	Recorded	Not recorded	Percentage	*P*
Age: 1-28 days	100	100	0	100	<0.001**
Sex					
Male	68	68	0	68	<0.001**
Female	32	32	0	32	<0.001**

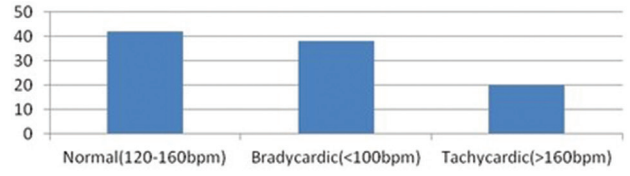
Data about the age and sex were recorded in 100% of cases. We reported 100 cases of neonates with upper gastrointestinal bleeding. Their age ranged from 1 to 28 day. There were 68 men and 32 women at Neonatal Intensive Care Unit at Assiut University Children's Hospital. *Statistically significant difference (P<0.05). **Highly statistically significant difference (P<0.01).

Table 2 Recorded data about history in studied cases

Categories	Recorded	Not recorded	Percentage	*P*
Type of delivery				
NVD	26	0	26	<0.001**
CS	74	0	74	<0.001**
Nutrition				
Entral	72	0	72	<0.001**
Parenteral	28	0	28	<0.001**
History of maternal drug use				
Present	16	0	16	<0.001**
Not present	84	0	84	<0.001**
Family history of bleeding				
Present	18	0	18	<0.001**
Not present	82	0	82	<0.001**
Vitamin K prophylaxis				
Done	88	0	88	<0.001**
Not done	12	0	12	<0.001**

Data of history including the type of delivery shows that 26% was NVD and 74% was CS, type of nutrition shows that 72% were on entral feeding and 28% on parenteral feeding, history of maternal drug use was present in 16% of cases, family history of bleeding was positive in 18% of cases, and vitamin K prophylaxis was done in 88% of cases. *Statistically significant difference (P<0.05). **Highly statistically significant difference (P<0.01).

Figure 1



Recorded data of heart rate.

Table 3 Recorded data of examination

Categories	Present	Not present	Percentage	*P*
Bleeding from other body orifice	34	66	34	<0.001**
Hepatomegaly	8	92	8	<0.001**
Splenomegaly	2	98	2	<0.001**
Jaundice	48	52	48	0.671
Bowel sound	67	33	67	<0.001**
Passing stool	56	44	56	0.120
Blood in NG tube	83	17	83	<0.001**

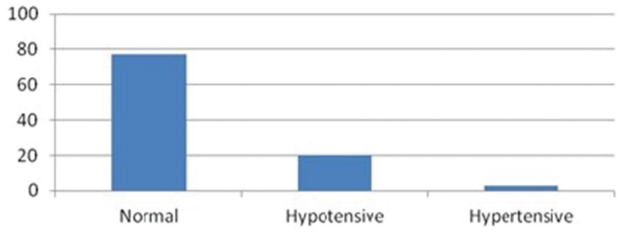
Data about examination was recorded including heart rate, blood pressure, capillary refill time was recorded in 100% of cases, bleeding from other body orifice that was present in 34% of cases, hepatomegaly was present in 8% of cases, splenomegaly was present in 2% of cases, jaundice in 48% of cases, bowel sound audible in 67%, passing stool in 56%, blood in NG tube was present in 83%. *Statistically significant difference (P<0.05). **Highly statistically significant difference (P<0.01).

Table 4 Data about investigations

	Done	Not done	Percentage	*P*
APT test	0	100	0	<0.001**
CBC	100	0	100	<0.001**
Coagulation profile	93	7	93	<0.001**
Abdominal plain erect	100	0	100	<0.001**
Abdominal US	95	5	95	<0.001**
Upper endoscopy for ulcer evaluation	0	100	0	<0.001**

Data about laboratory investigations and imaging studies show that APT test was recorded in 0% of cases; CBC was done in 100% of cases; coagulation profile was done in 93% of cases; abdominal plain erect was done in 100% of cases; abdominal US was done in 95% of cases; and upper endoscopy for ulcer evaluation was done in 0% of cases. CBC, complete blood count; US, ultrasound. *Statistically significant difference (P<0.05). **Highly statistically significant difference (P<0.01).

Figure 2



Recorded data of blood pressure.

Conclusion

The international guidelines for the management of neonates with UGIB have been followed by the NICU of Assiut University Children's Hospital in most treatment lines and that some of the default is due to poor resources and lack of medication.

Recommendations

(1) Infection control measures must be appropriately done, this can be achieved by training nurses and resident doctors on infection control program continuously, and also by staff members' supervision.

(2) Prolonged use of total parenteral nutrition increases the incidence of neonatal sepsis; this can be prevented by the start of oral feeding as early as possible and proper infection control.

Table 5 Recorded data of management of upper gastrointestinal bleeding

	Done	Not done	*P*
Secure airway	100	0	<0.001**
Obtain 2 IV line	18	82	<0.001**
Replace blood loss with saline	96	4	<0.001**
Foley catheter placement in shocked patients	12	88	<0.001**
Gastric lavage with normal saline	98	2	<0.001**
Epinephrine lavage	37	63	0.0004**
Vitamin K therapy	100	0	<0.001**
Administration of H_2 blockers	13	87	<0.001**
Administration of PPIs	46	54	0.322
Blood transfusion	72	28	<0.001**
Plasma transfusion	79	21	<0.001**
Antibiotic therapy	100	0	<0.001**

Data about management show that secure airway was done in 100% of cases; obtain two intravenous line was done in 18% of cases (according to infection control policy at neonatal intensive care unit no need for two intravenous line to guard and protect the patient against transmission of infection); replace blood loss with saline was done in 96% of cases; Foley catheter placement in shocked patient was done in 12% of cases because insertion of urinary catheter can transmit infection but regular follow up of urine output is done; gastric lavage with normal saline was done in 98% of cases; epinephrine lavage was done in 37% of cases; prophylaxis vitamin K was done in 100% of cases; administration of H_2 blockers was done in 13% of cases because histamine 2 blockers, such as cimetidine, ranitidine, and famotidine, suppress gastric acidity and are associated with increased risk of NEC, administration of PPIs was done in 46% of cases; blood transfusion was done in 72% of cases; the rest of the cases were not anemic; plasma transfusion was done in79% for correction of impaired coagulation profile; and antibiotic therapy was given in 100% of cases. *Statistically significant difference (P<0.05). **Highly statistically significant difference (P<0.01). p value <0.00111

(3) Early weaning from ventilation as much as possible such as prolonged use of mechanical ventilation to newborn predisposes them to develop sepsis and stress ulcer, this can be prevented by early weaning from ventilation.
(4) Evaluation and stabilization with airway management, intravenous fluids, or blood transfusion is essential before and during diagnostic evaluation.
(5) Gastric lavage with normal saline and epinephrine lavage should be done for all cases with UGIB.
(6) Complete laboratory investigations such as complete blood count, type, and the cross-match blood and coagulation profile should be done for all cases.
(7) Mother should be examined for cracked nipples as a source of swallowed blood, blood is usually apparent on examination.

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Nil.

Conflicts of interest
There are no conflicts of interest.

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