

Enteral bile reinfusion in severe abdominal trauma

Reinfusión biliar enteral en traumatismos abdominales graves

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Submitted: 03-01-2023

Revised: 10-04-2023

Accepted: 06-07-2023

Published: 07-07-2023

How to Cite: Lipovestky F, Radrizani D, Guantay E, Casabella C, Lattanzio B, Casanova M, et al. Enteral bile reinfusion in severe abdominal trauma. Interamerican Journal of Health Sciences. 2023; 3:15. <https://doi.org/10.59471/ijhsc202315>

ABSTRACT

Enteral reinfusion of bile is a rarely used technique in critical care, primarily indicated for treating digestive intolerances due to biliary fistulas. This case report presents a 22-year-old male who sustained closed abdominal trauma, resulting in bile duct injury and a high-output biliary fistula. The patient, initially intolerant to enteral feeding and showing signs of gastroparesis, was treated with bile reinfusion through the nasoenteric route, leading to good tolerance of food without complications. The liver secretes 600 to 1000 ml of bile daily, and injuries to the duodenal, pancreatic, and biliary tracts can cause excessive fluid output, leading to bile acid deficiency and associated complications like fat malabsorption, diarrhea, and electrolyte imbalances. In such scenarios, bile reinfusion can be an effective treatment method, providing a low-cost alternative to exogenous bile acid replacement and reducing the need for fluid resuscitation. This case involved a young man who suffered severe polytrauma from a vehicle collision, leading to a burst-type injury to the second duodenal portion. Initial surgical interventions included duodenal suture and gastroenteroanastomosis. Following complications, a second surgery was performed, externalizing bile and pancreatic fluids. Despite initial exclusive parenteral nutrition, enteral feeding was introduced but led to digestive intolerance. Subsequently, bile reinfusion was implemented, resulting in stable patient evolution, symptom resolution, and no complications. The reinfusion protocol included sterile collection of bile, reinfusion every 6 hours using a continuous infusion pump, and co-administration with enteral nutrition. The patient tolerated the procedure well, with no adverse effects observed over six weeks. This case highlights the potential of bile reinfusion as a viable, cost-effective intervention for patients with duodenal or bile duct injuries, particularly in the absence of extensive literature on its use in traumatic contexts. Further studies are warranted to validate the efficacy and safety of this technique in broader clinical settings.

KEYWORDS

Bile, Enteral Feeding, Biliary Tract Injury.

RESUMEN

La reinfusión enteral de bilis es una técnica poco utilizada en cuidados críticos, indicada principalmente para tratar intolerancias digestivas debidas a fistulas biliares. Se presenta el caso de un varón de 22 años que sufrió un traumatismo abdominal cerrado que le produjo una lesión de la vía biliar y una fistula biliar de alto flujo. El paciente, inicialmente intolerante a la alimentación enteral y con signos de gastroparesia, fue tratado con reinfusión biliar por vía nasoentérica, con lo que toleró bien los alimentos sin complicaciones. El hígado segrega entre 600 y 1000 ml de bilis al día, y las lesiones de los tractos duodenal, pancreático y biliar pueden causar una salida excesiva de líquido, lo que provoca una deficiencia de ácidos biliares y complicaciones asociadas como malabsorción de grasas, diarrea y desequilibrios electrolíticos. En tales situaciones, la reinfusión biliar puede ser un método de tratamiento eficaz, ya que proporciona una alternativa de bajo coste a la sustitución

exógena de ácidos biliares y reduce la necesidad de reanimación con líquidos. En este caso se trataba de un hombre joven que sufrió politraumatismos graves por colisión de un vehículo, lo que provocó una lesión de tipo estallido en la segunda porción duodenal. Las intervenciones quirúrgicas iniciales incluyeron sutura duodenal y gastroenteroanastomosis. A raíz de las complicaciones, se realizó una segunda intervención quirúrgica, en la que se exteriorizaron la bilis y los fluidos pancreáticos. A pesar de la nutrición parenteral exclusiva inicial, se introdujo la alimentación enteral, pero provocó intolerancia digestiva. Posteriormente, se llevó a cabo una reinfusión biliar, que dio lugar a una evolución estable del paciente, la resolución de los síntomas y la ausencia de complicaciones. El protocolo de reinfusión incluyó la recogida estéril de bilis, la reinfusión cada 6 horas mediante una bomba de infusión continua y la administración conjunta con nutrición enteral. El paciente toleró bien el procedimiento, sin que se observaran efectos adversos durante seis semanas. Este caso pone de relieve el potencial de la reinfusión biliar como intervención viable y rentable para pacientes con lesiones duodenales o de las vías biliares, sobre todo en ausencia de una amplia bibliografía sobre su uso en contextos traumáticos. Se justifica la realización de nuevos estudios para validar la eficacia y seguridad de esta técnica en contextos clínicos más amplios.

PALABRAS CLAVE

Bilis, Alimentación Enteral, Lesión del Tracto Biliar.

INTRODUCTION

Enteral reinfusion of bile is a rare technique in critical care units, it may be indicated for the treatment of digestive intolerances due to biliary fistulas. Few cases have been described in the literature on this methodology. Although the most frequent indications are in the outpatient setting due to abdominal pathologies of oncological origin, our case is a post-surgical critical patient in the ICU.

We present the case of a 22-year-old man with closed abdominal trauma with subsequent injury to the bile duct, and the presence of a high-output biliary fistula. Due to intolerance to enteral feeding and signs of gastroparesis, bile is infused through the nasoenteric route with subsequent good tolerance to food. No complications or adverse effects were found due to this technique.

Table 1. Secretion of fluids from the gastrointestinal tract

Source	ml/24 hours
Saliva	500-1500
Stomach	2000-3000
Bile	600-1000
Páncreas	1000
Intestine	1000

Table 2. Bile Composition

Substance	Hepatic bile	Vesicular bile
Water	97,5 gr/dl	92 gr/dl
Bile Salt	1,1 gr/dl	6 gr/dl
Bilirubin	0,04 gr/dl	0,3 gr/dl
Cholesterol	0,1 gr/dl	0,3 a 0,9 gr/dl
Fatty acids	0,12 gr/dl	0,3 a 1,2 gr/dl
Lecithin	0,04 gr/dl	0,3 gr/dl
Na	145 meq/l	130 meq/l
K	5 meq/l	12 meq/l
Ca	5 meq/l	23 meq/l
Cl	100 meq/l	25 meq/l
HCO3	28 meq/l	10 meq/l

One of the many functions of the liver is the secretion of bile in amounts ranging between 600 and 1000 ml/day.⁽¹⁾ Duodenal, pancreatic and biliary tract injuries can generate a very high production of fluids outwards of more than 3 000 ml, due to the sum of the different secretions (table 1) and this can lead to a deficiency of bile acids causing numerous problems such as fat malabsorption, diarrhea, kidney failure, and electrolyte abnormalities.

There may be certain circumstances that the arrival of bile to the intestine is not possible, as in the case we present, in these situations the reinfusion of bile is a possible procedure.

Biliary reinfusion (BR) is a method of enteral refeeding of bile secretions to replenish the patient's own bile acids. In addition, RB is a low-cost alternative to exogenous bile acid replacement and decreases the need for fluid resuscitation for hospitalized patients.

Currently, the evidence on the efficacy of BR is limited because there are only a few case studies in intestinal pathologies and there are no descriptions in traumatic pathology.⁽³⁾

CASE REPORT

A 22-year-old patient suffers severe polytrauma due to a vehicle collision. He presented closed abdominal trauma with a burst-type injury to the second duodenal portion. Initially, duodenal suture and gastroenteroanastomosis (first surgical intervention) were performed. It evolved with sepsis of abdominal origin, requiring a second intervention where a resection of the duodenum was performed, with drainage to the outside of the wirsung and the common bile duct, with which all the bile and pancreatic fluid was externalized outwards.

From a nutritional point of view, he initially receives exclusive parenteral support. Fifteen days after the second surgery, enteral feeding was started through a nasoenteral tube through the gastroenteroanastomosis, with a semi-elemental formula. The patient evolves stable, without signs of infection, but 5 days after the start of enteral support, diarrhea, abdominal distension and digestive intolerance are evident. The reinfusion of bile associated with pancreatic enzymes (pancreatin) was decided. After this measure, he evolved asymptomatic for 6 weeks with adequate tolerance of nutritional support and bile, with no complications of any kind being observed.



Figure 1. Open abdomen with multiple drains. Bile drainage is seen



Figure 2. Patient receives bile enterally

Our reinfusion plan was as follows

1. Collection of bile secretions in a sterile bottle.
2. Reinfusion every 6 hours in conjunction with enteral feeding.
3. Reinfusion was performed using a continuous infusion pump. (Another option is the syringe method).
4. Instillation 200 ml of bile every 6 hours while the patient is receiving enteral nutrition.

DISCUSSION

We describe a case of enteral BR in a patient who underwent intestinal resection due to closed abdominal trauma. The exit of a large volume of bile through the duodenostomy and the worsening of the clinical state led to the decision to perform RB by enteral route. The patient was able to easily tolerate the enteral supply, and no complications were observed in this regard.

Bile is a complex solution that comprises water, inorganic electrolytes, and organic solutes such as bile acids, phospholipids, cholesterol, and bile pigments.

It performs two important functions: first, it plays a role in the digestion and absorption of fats, this is due to the presence of bile acids⁽²⁾. At this point, bile acids are essential for:

Help emulsify large fat particles in food, converting them into multiple tiny particles that are attacked by lipases in pancreatic juice.

Promote the absorption of the final products of fat digestion through the intestinal mucosa.

Second, bile serves as a medium for the excretion of several important waste products from the blood. These waste products include, in particular, bilirubin, the end product of hemoglobin destruction, and excess cholesterol.⁽²⁾

RB has shown variable success as reported in some case reports and small studies focusing primarily on patients with obstructive cholangiocarcinoma.^(4,5,6)

Although there are no prospective studies to support the practice of re-infusion of intestinal secretions, certain procedures or devices to preserve bile secretions. Reinfusion methods have been achieved using percutaneous endoscopic gastrostomy⁽⁷⁾ percutaneous endoscopic duodenostomy⁽⁸⁾ transhepatic external biliary drainage tubes connected to gastrostomies or nasogastric tube.^(9,10)

Undoubtedly, this method is more cost-effective than alternative therapies such as exogenous bile salts or intravenous (IV) fluid resuscitation.

To our knowledge, there are no case reports of RB in the context of abdominal trauma. In conclusion, BR is a safe, low-cost intervention and should be considered in patients with duodenal/bile duct injury who develop malabsorption, dehydration, worsening electrolyte disturbances, or acute kidney injury.

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FINANCING

The authors did not receive financing for the development of this research.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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