Positive sequelae and negative drawbacks of some of Intensive Care Medications on the Digestive tract

Essay

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List of Abbreviations

ACS	Abdominal compartmental syndrome
AED	Anti-epileptic drugs
AGI	Acute gastrointestinal injury
AUGIB	Acute upper gastrointestinal bleeding
BLM	Basolateral membrane
CCK	Cholecystokinin
COX	Cyclooxygenase
CT	Computed tomography
EN	Enteral nutrition
GERD	Gastro esophageal reflux disease
GI	Gastrointestinal
GID	Gastrointestinal system dysfunction
GIF	Gastrointestinal failure
GIP	Gastric inhibitory peptide
GIT	Gastrointestinal tract
GRV	Gastric residual volume
GTN	Glycerol-trinitrate
HMG-Co A	3-hydroxy-3-methyl-glutaryl-CoenzymeA reductase
IAH	Intra-abdominal hypertension
IAP	Intra-abdominal pressure
ICU	Intensive care unit
IL	Interleukin
IVF	Intravenous fluids
LCT	Long chain triglyceride
LDL-C	Low-density lipoprotein cholesterol
LES	Lower esophageal sphincter
MCT	Medium chain triglycerides

MOD	Multiple organ dysfunction syndrome
NG	Nasogastric
NO	Nitric oxide
NSAIDS	Non-steroidal anti-inflammatory drugs
OIBD	Opioid-induced bowel dysfunction
PPI	Proton pump inhibitor
SE	Status Epilepticus
TLR	Toll-like receptor
TNF	Tumor necrosis factor
TNFR	Tumor necrosis factor receptor
VEGF	Vascular endothelial growth factor
VIP	Vasoactive intestinal peptide

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INTRODUCTION

Until relatively recently, the gastrointestinal (GI) tract was considered a dormant, metabolically and immunologically inactive organ in critically illnesses. However, the GI tract provides a number of crucial functions that, in fact, may influence morbidity and mortality of many critically ill patients. Its large absorptive area provides a site for nutrient digestion and utilization and serves as an important barrier preventing the systemic absorption of intraluminal microbes and its toxic products. Moreover, the GI tract is the largest reservoir of lymphocytes in the body, which significantly contribute to the immune response of the critically ill patients ***(Matejovic et al., 2002).***

Gastrointestinal problems occur frequently and are associated with adverse outcomes in critically ill patients. Despite this, there is no consensual means for obtaining a precise assessment of gastrointestinal function. Furthermore, gastrointestinal function is not included in any of the scoring systems widely used to assess organ failure in critical illness ***(Reintam et al., 2008).***

Widespread usage of broad spectra of drugs in variety of critical illnesses mostly can affect the digestive system functions which may worsen the prognosis and lengthen the stay in Intensive Care Unit. On the other hand; some of Intensive Care unit medications can promote and enhance functions of the digestive tract in collateral to their main actions. The incidence of antimicrobial resistance is on continued rise with a threat to return to the "pre-antibiotic" era. This has led to emergence of such bacterial infections which are essentially untreatable by the current armamentarium of available treatment options. Various efforts have been made to develop the newer antimicrobials with novel modes of action which can act against these multi-drug resistant strains. Unfortunately; Newer -broad spectrum- antimicrobials can kill the digestive tract microbiota which can do harm to the critically ill patient in collateral to their benefits ***(Rai and Kaur, 2013).***

Also, in our practice, Vasopressors are cornerstone of a lot of plans of therapy and strategic drugs in several life-threatening situations. The use of vasopressors for treatment of shock syndromes may have adverse effects on microcirculatory blood flow in the gastrointestinal tract ***(Krejci et al., 2006).***

However, there are other categories of ICU drugs can affect the digestive tract of the patient in negative or positive manners; Analgesics, Sedatives, Anti-thrombotics, Anti-stress ulcer agents…etc. Here is the place to say *Poisons and medicine are oftentimes the same substance given with different intents* ***(Marino and Sutin 2007).***

AIM OF THE WORK

- To spotlight on GIT dysfunction in ICU as an outcome of some strategic drugs used in critically ill patients.
- To view probable positive impacts of other medications on GIT.

I- Functions of Digestive Tract

The Digestive System:

The digestive system is made up of the gastrointestinal (GI) tract, (also called the digestive tract), the liver, pancreas, and gallbladder, which is a series of hollow organs joined in a long, twisting tube from the mouth to the anus. The hollow organs that make up the GI tract are the mouth, esophagus, stomach, small Intestine and large intestine, which include the rectum and anus. Food enters the mouth and passes to the anus through the hollow organs of the GI tract. The liver, pancreas, and gallbladder are the solid organs of the digestive system. The digestive system helps the body digest food ***(NIH, 2013).***

The human digestive system consists of organs from the gastrointestinal tract, which is a tube that goes from the mouth to the anus. Either end of the mouth and the anus contain a lumen, which is open on each side for the external environment. Everything inside the lumen is considered to be external to the body. The organs that make up the GI tract consist of the mouth, stomach, pharynx, oesophagus, large intestine, small intestine, and the anus. The human digestive system also consists of other organs that help with digestion,

such as the salivary glands, teeth, liver, tongue, gallbladder, and the pancreas ***(Allen and Harper, 2009)***.

The digestive system aids in ingesting food, secreting juices, moving and mixing food, breaking down food into absorbable, tiny molecules, absorbing digestive substances and molecules throughout the GI tract wall and inside the body, discharging through the anus ***(Tortora, 2012).***

There are two kinds of digestions, mechanical, and chemical digestions. Mechanical digestion is the breaking down of food into smaller pieces. It starts off in the mouth, and goes through the stomach and the small intestine. In the mouth, masticating or chewing occurs, which mechanically breaks down the food and allows it to be swallowed and travelled to the stomach. As the food reaches the stomach, the mixing of food and digestive juices occurs in until the food reaches the small intestine ***(Allen, Harper 2009).***

Bacteria in the GI tract, also called gut flora or micro biome, help with digestion. Parts of the nervous and circulatory systems also play roles in the digestive process. Together, a combination of nerves, hormones, bacteria, blood, and the organs of the digestive system completes the complex task of digesting the foods and liquids a person consumes each day ***(NIH, 2013).***

Embryology and Evolution of the Digestive System:

In amphioxus, an invertebrate member of the Chordata (the phylum to which all vertebratesbelong), early divisions of the fertilized egg cell give rise to an embryo that is hollow and nearly spherical. An invagination (infolding) of cells at the vegetal (yolk) pole of the embryo converts the initially single-layered embryo into a two-layered one, a process called gastrulation. The new inner layer of cells, called endoderm (sometimes entoderm), surrounds a cavity, the archenteron, which has an opening to the exterior at the point at which invagination occurred; this opening is called the blastopore. The archenteron eventually becomes the cavity of the digestive tract, and the blastopore becomes the anus; the mouth arises as a new opening ***(Hightower et al., 2016).***

The early stages of embryonic development in most vertebrates are not as simple as in amphioxus, largely because the egg cells contain much yolk or, in mammals, undergo specialized changes preparatory to implantation in the uterus. Thus, gastrulation is seldom a simple involution at the vegetal pole, and the blastopore, if a "pore" appears at all, usually becomes overgrown with cells. Nevertheless, in all vertebrate embryos an endodermal-lined cavity arises by some process that may be regarded as analogous to