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Stress-Related Mucosal Disease in Critically Ill Patients

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ABSTRACT

Mucosal damage in Gastro Intestinal (GI) system happens due to stress and is more common in upper part of GI tract in patients admitted to Intensive Care Unit (ICU). This kind of injuries occurs in critically ill patients. Stress ulcer prophylaxis is necessary and increases the gastric (Power of Hydrogen) pH (more than 4) especially in stress exposure time. In this paper we provide an overview of stress ulcer and currently used preventive approaches for this complication in critically ill patients in ICU. Recent promotion in ICU care and increase in scientific knowledge about Stress-Related Mucosal Disease (SRMD) risk factors help us to reduce the number of patients develop stress ulcer. Prophylaxis can prevent significant bleeding and mortality.

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Introduction

Stress related mucosal damage in Gastro Intestinal (GI) system is more common in upper part of GI tract in patients admitted to Intensive Care Unit (ICU).

These kinds of injuries occur in critically ill patients.

Gastro Intestinal Bleeding (GIB) is the most common manifestation in patients with stress mucosal injury.

ICU patients are at the risk of developing GI Stress ulcer and subsequent bleeding. GIB increases mortality rate about 5 times more in ill patients (1, 2).

Some factors might deteriorate mucosal damage in Intensive Care Unit (ICU) patients such as: head trauma, extensive burn, multi organ failure, coagulopathies, mechanical ventilation, GI damaging drugs etc. in these patients various malfunction of gastric defensive mechanisms occur like bicarbonate, mucus secretion and mucosal blood supplements and acid secretion raises, also (3). Stress ulcer prophylaxis is necessary and increases the gastric (Power of Hydrogen) pH (more than 4) especially in stress exposure time (4). This goal might be achieved by early oral feeding or administration of acid secretion inhibitors (5).

Histamine blockers (H_2), proton pomp inhibitors and Sucralfate are some of these drugs. H_2 blockers like ranitidine frequently used in such conditions. Regard to ranitidine effect in stress ulcer prophylaxis, it should be administered in the manner to increase pH for a longer time (6). Histamine two Receptor Antagonists (H_2RAs) and Proton Pump Inhibitors (PPIs) suppress acid secretion and sucralfate induce a protective barrier (7).

Stress-Related Mucosal Disease (SRMD) and subsequent upper Gastrointestinal (GI) bleeding could place critically ill patients at a high risk of mortality and morbidity. And if GIB occurs, its management and control might be difficult. Hence, preventative therapy reduces such complications in at risk for stress-related ulceration and bleeding, impressively (8).

Although various factors associate with SRMD development acid is the main cause of mucosal injury in critically ill patients who admitted to ICU (9).

H_2RA_2s are widely used due to their availability, low cast and easy administration method (both orally and intravenous) (2).

In this paper we provide an overview of stress ulcer and currently used preventive approaches for this complication in critically ill patients in ICU.

SRMD epidemiology

GIB in critically ill patients mentioned in scientific literature in 1800. Determining its exact prevalence is impossible because of the heterogeneity of patient population in ICU and lack of exact definition with end point. It is estimated that 6 to 100 of patients who been admitted to ICU develop SRMD. And more than 75% of ICU patients need some degree of diagnostic or therapeutic endoscopic interventions and these interventions are more frequent in the first three days of admission. By considering the positive occult blood test or drop in hemoglobin level as the end point for stress ulcer detection, its prevalence is between 15 and 50 percent (10). Patients' disease and severity of illness could influence SRMD. Recent studies demonstrate

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that cardiovascular surgeries are one of the most important risk factors for SRMD and about one half of them might develop stress ulcer. In a study it was revealed that about 30% of ICU patients receive prophylaxis. In recent study it was shown that also the prevalence of SRMD is high in these patients, only a small portion of them have significant bleeding (11, 12).

Some recent retrospective studies resulted that acid secretion is not the main cause of stress ulcer preformation in pH greater than 3.5. These researches showed that loss of mucosal barrier is more important factor in critically ill patients. And 15% reduction blood volume leads to 40% elimination of splanchnic blood flow and this hypoperfusion has a crucial role in SRMD (13).

Prophylaxis

Although so many studies have been performed to find out the best method of stress ulcer prophylaxis, it is a controversy issue in medicine, yet.

Antiacid administration from a nasogastric tube to maintain gastric pH more than 3.5 is of the first choices in literature. Patients received bolus dose and intragastric pH have been monitored. Aspiration, metabolic alkalosis and diarrhea were expected complications (14). H_2-antagonist introduction was a revolution in SRMD prophylaxis. Some recent studies revealed that continues infusion of H_2-agonist provides a better control of pH in compare with intermittent method.

The most important factors for H_2-antagonist selection are drug potency and side effects. For example cimetidine might leads to blood pressure decrease in bolus infusion form. Ranitidine might induce thrombocytopenia in some patients (15).

M_1-cholinoceptor antagonist called Pirenzipine, reduces gastric acidity in ICU patients. But in compare with ranitidine it is not a potent drug. And its rapid infusion result in tachycardia (15).

In recent years proton pomp inhibitors such as Omeprazole have been used for SRMD prophylaxis. In the first 24 hours of admiration its efficacy is as same as H_2 antagonists, but after this interval it is more effective for acid suppression in compare with H2 blockers (16).

An orally administered aluminum salt of sucrose and octasulfate (sucralfate) is a protective barrier which keeps the gastric mucosal safe from damage. There are some evidence demonstrated that sucralfate increase PGE2 a cytoprotective agent which elevates mucosal blood flow. This drug would not be absorbed by GI tract and has few side effects, so (17).

Data extraction from randomized clinical trial studies showed that ranitidine was more effective in reduction of the number of significant GIB in compare with sucralfate. On the other hand cost effectiveness studies revealed that H_2 blocker are a better choice instead of sucralfate.

Early enteral nutrition is another possible method for decrease SRMD. It's a cost effective strategy.

A number of patients need surgery to control their bleeding. In this case rebleeding chance is higher than others and total gastrectomy is recommended. And mortality rate increases in cases with rebleeding (18).

Conclusion

Stress-Related Mucosal Disease (SRMD) and subsequent upper Gastrointestinal (GI) bleeding is one of the important concerns in critically ill patients. Recent promotion in ICU care and increase in scientific knowledge about SRMD risk factors help us to reduce the number of patients develop stress ulcer. Prophylaxis can prevent significant bleeding and mortality. Selecting drug dose and method of administration should be performed independently in each patients regard to their risk factors and careful monitoring should be considered for possible side effects.

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