Original Article

IMMUNE REACTION IN THE GASTRIC MUCOSA: PASSIVE MUCOSAL ANAPHYLAXIS AND EXPERIMENTAL ULCER

Motoharu KONDO, M.D., Masashi KODAMA, M.D.*, Keiichi KAWAI, M.D., F.A.C.G.** and Masasuke MASUDA, M.D.

Department of Medicine, *Department of Surgery, and **Department of Preventive Medicine, Kyoto Prefectural University of Medicine, Kyoto, Japan

Summary

Immune reaction in the gastric mucosa using purified antigen-antibody system was investigated. Applying the technique of PCA on the gastric mucosa of dog, interesting phenomena named "Passive Mucosal Anaphylaxis" (PMA) was obtained. The reaction could be produced even by the orally administered antigen.

By the direct injection of soluble immune complex into the gastric mucosa, production of experimental ulcer was observed, in which parietal cells were relatively resistant to the immune tissue damage.

Key Words: Passive Mucosal Anaphylaxis, Immune reaction, Experimental ulcer, Immune complex

Introduction

Immune reaction in the digestive tract is known to be one of the causative factor of tissue damage, and several autoantibodies against digestive mucosa have been investigated. However, little is known about the mechanism of injury of the gastric mucosa by immune reaction.

Attempts to produce models of inflammatory process in the gastric mucosa have been made in experimental study, applying immunological techniques. The present paper aimed to investigate the immune tissue injury in the gastric mucosa using purified antigen-antibody system, and interesting results named 'Passive Mucosal Anaphylaxis' (PMA) and experimental ulcer were obtained, evaluating for the demonstration of local immune mechanism.

Materials and Methods

Crystalline bovine serum albumin (BSA: Sigma Chem. Co.) was used as an antigen. Antibody was prepared by immunizing rabbit by BSA, and the antiserum was inactivated by incubating at 56°C for 30 minutes. Soluble immune complex was prepared according to Ishizaka with BSA and anti-BSA rabbit serum in antigen excess.

Intramucosal injection of either antibody or immune complex in the gastric mucosa of dog was performed under anesthesia, through the open space by gastrotomy, using tuberculin gage.

Pontamine sky blue 6B (PSB: Tokyo Chem. Co.) dissolved in saline was intravenously given to dog as an indicator of increased vascular permeability following to the local
immune reaction.

Results

1) Passive Mucosal Anaphylaxis.

Anti-BSA serum, as well as normal rabbit serum as a control, were intramucosally injected to six dogs of 0.1 ml volumes respectively. Two hours later, 10 mg/kg body weight of BSA and 30 mg/kg of PSB were intravenously given as a challenge of antigen. After the challenge, the dogs were sacrificed and investigated the histological and macroscopic changes of the mucosa.

Blueing was observed only at the site of injection of antibody in 30 minutes and 2 hours, and marked edema accompanied by massive bleeding in the mucosa were seen in 4 to 12 hours (Fig. 1). The reaction was reduced after 24 hours, and only a slight pigmentation was left after 7 days. No erosion or ulceration at the sites of injection was demonstrated in the macroscopic findings.

Histologically, marked cell infiltrations were observed in the mucosa and submucosa after 1 hour, and edema and massive bleeding with the destruction of mucosal cells were seen after 4 to 12 hours (Fig. 2). The finding was repaired by fibrous tissue after 7 days (Fig. 3).

2) Passive Mucosal Anaphylaxis by Orally Administered Antigen.

Anti-BSA serum as well as normal rabbit

Fig. 1. Macroscopic finding of PMA in Dog stomach 4 hours after the challenge. Marked edema accompanied by submucosal bleeding is seen.

Fig. 2. Microscopic finding of PMA 4 hours after the challenge. Marked edema, hemorrhage, and cell infiltrations, as well as destruction of mucosal cells are observed.

Fig. 3. Microscopic finding of PMA 7 days after the challenge. Tissue is repaired, remaining slight cell infiltrations.