



Quantitative characteristics of acetylcholine-induced contractions of gastric smooth muscle strips isolated from patients with gastric carcinoma; gastric and duodenal ulcer

Kvantitativne karakteristike acetilholinom izazvanih kontrakcije preparata glatkih mišića želuca dobijenih od pacijenata sa karcinomom želuca, ulkusom želuca i duodenuma

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ABSTRACT. The aim of this study was to compare the contractile responses to acetylcholine of gastric wall strips taken from three groups of patients: one with gastric carcinoma and two other with gastric and duodenal ulcers. Acetylcholine induced concentration-dependent contractions of the longitudinal and circular smooth muscle preparations resected from the gastric corpus in all experimental groups. The EC_{50} values for acetylcholine were compared: longitudinal smooth muscle preparations from patients with carcinoma were significantly more sensitive to acetylcholine than muscle strips from patients with gastric ulcer, whereas longitudinal muscle strips from patients with duodenal ulcers were significantly less sensitive to the acetylcholine than both other groups. Reactivity to acetylcholine of the circular smooth muscle layers from all three experimental groups followed the pattern of the reactivity of the longitudinal smooth muscles, but the differences were not significant. These results suggest that pathological damage of the gastric mucosa lead to the enhanced reactivity of the gastric wall smooth muscle layers to acetylcholine.

KEY WORDS: acetylcholine, stomach, smooth muscle, gastric carcinoma, gastric ulcer, duodenal ulcer

In vitro experiments on the preparations from the human stomach are inevitably performed on the gastric wall strips taken from diseased organs. However, little attention has been paid to the possibility that a specific pathological damage of the gastric mucosa might alter the motility of the stomach, as well as the reactivity of the smooth muscles to pharmacological agents. The motility and the emptying of the stomach are under powerful cholinergic control (1), and acetylcholine – induces concentration-dependent contractions of isolated gastric wall strips in most species (2, 3, 4, 5). Therefore, the aim of the present study was to investigate whether the contractility of the human gastric wall strips taken from three groups of patients, one with gastric carcinoma and the two others with gastric and duodenal ulcers, might be differentially affected by acetylcholine *in vitro*.

SAŽETAK. Cilj ovog rada bio je da se uporedi kontraktilna aktivnost acetilholina na izolovanim isečcima zida želuca i duodenuma, dobijenih od tri grupe pacijenata: prve sa karcinomom želuca, druge sa ulkusom želuca i treće sa ulkusom duodenuma. Acetilholin je izazvao kontrakcije preparata longitudinalnog i cirkularnog glatkog mišićnog sloja u svim tri eksperimentalne grupe. Efekat acetilholina bio je zavisao od njegove koncentracije u rastvoru. Upoređene su vrednosti EC_{50} za acetilholin: preparati longitudinalnog glatkog mišića uzeti od pacijenata sa karcinomom želuca pokazali su značajno veću osetljivost na acetilholin od preparata dobijenih od pacijenata sa ulkusom želuca, dok su isecci dobijeni od pacijenata sa ulkusom duodenuma značajno manje osetljivi na acetilholin od obe prethodne eksperimentalne grupe. Reaktivnost u osetljivosti preparata cirkularnog mišićnog sloja na acetilholin slične su kao kod preparata longitudinalnog mišića, ali nisu statistički značajne. Predpostavlja se da patološke promene u želučanoj sluznici doprinose povećanoj reaktivnosti glatkih mišića na acetilholin.

KLJUČNE REČI: acetilholin, želudac, glatki mišić, karcinom želuca, ulkus želuca, ulkus duodenuma

MATERIALS AND METHODS

Total gastrectomy was performed in six patients (4 men and 2 women) aged between 40 and 66 years, with gastric cancer (adenocarcinoma-intestinal type).

A 2/3 gastric resection was performed in 12 patients (8 men and 4 women) aged between 30 and 59 years, with peptic ulcer located on small curvature of the stomach (6 cases) and in duodenum (6 cases).

Immediately after gastrectomy, a strip of the anterior gastric wall (1.5 cm wide and 2 cm long) was cut off next to the greater curvature, and at least 10 cm far from the macroscopic tumor boundaries. The preparation was rinsed and immersed in Tyrode solution and transported to the laboratory.

In the laboratory, the mucosa from the strip was removed by sharp dissection. Thereafter, two segments from the full thickness of the gastric wall strip were prepared, so that the contraction of the longitudinal and circular smooth muscles could be recorded separately. A segment of the longitudinal smooth muscle was produced by cutting the strip in the direction of the longitudinal smooth muscle fibres. Some four to six cuts produced a segment of the longitudinal smooth muscle of sufficient length. From the other segment, a circular muscle strip was prepared in the same manner as for the longitudinal smooth muscle strip, but the cuts were made along the length of the circular muscle fibres. The same number of cuts were similarly spaced in each of the preparations. Slight incisions were made along the longitudinal axis of both strips to interrupt muscle layers with different directions.

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