Study of the antireflux function of the Roux-en-y jejunal loop in reconstruction following gastrectomy

N. Picardi*, E. Santeusanio**, G. Tucci*

*I Div.Clinicizzata di Chirurgia Generale
Università “G. d’Annunzio” di Chieti
**Medicina Nucleare - Osp. SS. Salvatore di Pescara

Abstract

Persistance of global orthograde peristaltic propulsion in the Y jejunal loop according to Roux makes this latter adequate for reconstruction of digestive transit after gastric resection or total gastrectomy, simultaneously avoiding reflux. Ectopic pacemakers can set in its proximal tract and favor intestinal and bile juice reflux in the gastric stump or esophageus, especially if the loop is too short and the new pacemaker is far from its superior margin. Moreover, the slower peristaltic waves can favor a relative stasis and, thus, a containing function, which could represent an element of morbidity over a certain limit.

If the Y loop is not too long, but long enough to include the higher frequency ectopic pacemaker, which overcomes the lower frequency ones located distally, the positive aspects of both these characteristics can be exploited for satisfying and free of morbidity results. We believe that the best length is 35-40 cm, with positive clinical results. 99Tc-HIDA sequential scintigraphy clearly shows the absence of bile material reflux in the digestive tract proximal to the anastomosis.

Key words: Roux-en-Y jejunal loop, total gastrectomy, gastric resection, antireflux ileal loop.

Introduction

The different reconstruction methods adopted in the past years, after a gastric resection or a total gastrectomy sign the various phases of the evolution of pathophysiological knowledge from the late 800s with Billroth to now. In the last 25 years spreading of staplers has favored further technical innovations, so allowing new, easier solutions. Physionomy of stomach demolitive surgery has been substantially changed all around the world due to two different reasons:

1. the new pharmacological therapies of ulcer and the assessment of new causing agents has reduced and reduces the necessity for surgical treatment of gastro-duodenal ulcers, which enter the operating room only occasionally.
2. the incidence of gastric cancer is reduced all over the world, although the increase of mean life reduces the entity of such a reduction, and modernization of surgical techniques, not of intraoperatively but also pre- and postoperatively, widens indications for gastric resections even in the elderly.

Reconstruction of gastric continuity after Billroth I resection is aimed at restoring duodenal transit, so to optimize absorption, especially of iron. The pathophysiological price to pay for this type of reconstruction is alkaline reflux in the proximal digestive tract, resulting in gastritis and esophagitis. Such price is so high

Riassunto

STUDIO DELLA FUNZIONE ANTIFLUSSO DELL’ANSA DIGIUNALE AD Y SECONDO ROUX NELLA RICOSTRUZIONE DOPO GASTRECTOMIA TOTALE

La persistenza di una propulsione peristaltica globale di tipo ortografo nell’ansa digiunale ad Y secondo Roux fa sì che essa sia adeguata per ricostruire il tratto doppio digestivo dopo resezione gastrica o dopo gastrectomia totale, evitando nel- lo stesso tempo i reflussi. Pacemakers ectopici possono attivarsi nel suo tratto prossi- male e favorire un reflusso biliare ed enterico nel monco- ne gastrico o nell’esofago, specie se l’ansa è troppo breve ed il nuovo pacemaker si localizza lontano dal suo margine superiore. Inoltre le lente onde peristaltiche possono favori- re una stasi relativa e quindi una funzione di serbatoio, che può rappresentare però un elemento di morbidità se eccitativa.

Se però l’ansa ad Y non è troppo lunga, ma abbastanza

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1. moderate stasis in the loop which works as temporary container, and without obstacles to emptying;
2. prevention of bile reflux in the digestive tract proximal to the loop.

As for post-operative control, the patient clinical and laboratory status can witness the relative importance of duodenal transit sparing. Reflux prevention is generally controlled only by endoscopy based on patient subjective claims. Therefore, we have decided to verify effectiveness of these functional elements of the loop isolated according to Roux for preventing bile reflux.

We believe that this latter is extremely important for quality of life and prognosis of possible future morbidity. Therefore study of HIDA route during follow-up in a series of patients subjected to gastric resection or total gastrectomy seemed useful. Indeed, possible reflux in the Roux loop and up to the superior digestive tract is easily revealed by sequential scintigraphy.

Material and Methods

Patients in our series, previously subjected to total gastrectomy or to gastric resection were followed-up. They all had uniform reconstruction of the digestive transit, using always a 35 and 40 cm jejunal loop according to Roux. The gastro-jejunal or esophageal-jejunal anastomosis was performed with 25 or 28 mm circular staples. Likewise, the lower jejunal-jejunal anastomosis was performed before the superior one using a 25 mm circular staple. All patients were subjected to a series of nutritional, blood, and x-ray controls of the esophageal-gastric-jejunal or esophageal-jejunal transit. Furthermore, where indicated, patients underwent tumor investigations. In order to follow in time bile bolus characteristics of progression, sequential scintigraphy after 99Tc-HIDA administration represented the main means to verify results and effectiveness of our reconstruction strategy. Table I reports the series of patients subjected to such controls.


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<th>Non-tumor diseases – Total number of patients</th>
<th>Tumor diseases – Total number of patients</th>
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<td>45 F M</td>
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<td>Resection after Billroth II</td>
<td>8 4 4</td>
<td>Superior Gastric Resection</td>
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<tr>
<td>Subtotal gastrectomy + Roux-en-Y</td>
<td>37 15 22</td>
<td>Resection after Billroth II</td>
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<td>Subtotal gastrectomy + Roux-en-Y + LN R3</td>
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<td>Total gastrectomy + Roux-en-Y + LN R3</td>
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Fig. 1: Reconstruction using Y jejunal loop according to Roux.
Study of the antireflux function of the Roux-en-y jejunal loop in reconstruction following gastrectomy

Imaging Results

Fig. 2: a) Esophageal-jejunal transit after total gastrectomy and esophageal-jejunal reconstruction using Roux Y jejunal loop. b) Sequential control of transit with 99Tc-HIDA without esophageal reflux.

Fig. 3: a) Esophageal-jejunal transit after total gastrectomy and esophageal - jejunal reconstruction using Roux Y jejunal loop. b) Sequential control of transit with 99Tc-HIDA without esophageal reflux.

Fig. 4: a) Esophageal-jejunul transit after sub total gastrectomy and esophageal-jejunal reconstruction using Roux Y jejunal loop. b) Sequential control of transit with 99 Tc-HIDA without gastric stump reflux.
Discussion and Conclusions

Thanks to reflex intrinsic motility of muscular layers, which is spared in an isolated jejunal loop (4), the orobal sense of “Bayliss and Sterling peristaltic reflex” is likewise spared (3).

However, if the jejunal loop is not interrupted bipolarly but only proximally – loop according to Roux – then, in its median tract, at variable distance from the proximal end, a series of ectopic pacemakers fire. The most proximal pacemaker is capable of triggering an orthodromic peristaltic wave only in its distal tract, while the proximal loop is run by a retrograde wave (5).

This condition results in: firstly, slowing down of oroaboral progression of the bolus in the Roux proximal tract (1); and secondly, the possibility to trigger reflux (5) of the proximal content in oral direction.

Jejunal section located after Treitz loop interrupts the progression of the peristaltic wave triggered by the duodenal pacemaker, and the slower ectopic jejunal pacemakers gain value, since freed from duodenal control (5). The impulses generated by the most proximal ectopic pacemaker are slowly transmitted orally, so favoring reflux. Consequently, if Roux loop is too long a pathologic stasis can develop (1, 2). On the other hand, if it is too short, then reflux can result (6, 2).

In cases of reconstruction with Roux loop after total gastrectomy or gastric resection, such reflux of intestinal and bile juice would provoke alkaline stump gastritis or esophagitis.

The ideal Roux loop lengths are 35-40 cm (7). In our patients this is confirmed by the constant absence of morbidity due to Roux loop motility: neither stasis nor reflux. This latter aspect was demonstrated through 99Tc-HIDA sequential scintigraphy.

Dilation of the proximal tract of Roux loop is somehow ausplicable, since it represents some kind of food container which substitutes the stomach. Contrarily, a possible reflux must be avoided. This can be obtained limiting the length of the loop between 35 and 40 cm. Forty cm length must not be overcome so to avoid excessive slow down of emptying peristalsis in the Roux loop. Moreover, loop length must be at least 35 cm so to avoid reflux of intestinal and bile juice in the gastric stump and esophageus as a result of ectopic pacemaker firing.

References


Address for correspondence:
Prof. Nicola PICARDI
Via Montevideo, 6
00198 ROMA - ITALIA
E-mail: picardi@unicht.it