Completeness of Vagotomy: Sugar and Spice or the Surgeon's Eyes?

In 1943, Dragstedt and Owen1 reintroduced truncal vagotomy for the treatment of duodenal ulcer, over two decades after Latarjet2 first reported the procedure. Over the next two decades, selective vagotomies came into vogue. Around the same period Hollander3 introduced the insulin test to assess completeness of vagotomy. Over the years a need was felt to modify this test in order to improve its predictive value.

Hollander4 originally classified post-vagotomy responses to insulin hypoglycemia as 'positive' or 'negative' based on the rise in acid concentration. This premise was inherently flawed as vagus-mediated gastric acid secretion is predominantly through increase in volume rather than concentration.4 A rise in acid output (concentration x volume) was later recommended as a criterion.5 Grossman6 advocated using numerals instead of positive and negative. Despite these and other earlier modifications of the criteria, clinical use of the test remained marred by disappointing results.4,5 This is not surprising since hypoglycemia also stimulates acid secretion via the sympathetic nervous system7 and the pituitary-adrenal axis8; additionally, the test is inconvenient to the patient and has the potential for dangerous cardiovascular side-effects, including death.9 Nonetheless, attempts to refine the technique and interpretation of the test continue. In this issue of the Journal, Kohli et al10 confirm observations made earlier11 about the value of interpreting volume (peak and 1/2 to 2 h) responses. These attempts add bursts of life to a test that was primarily unphysiologic.

Along the way, Duke et al12 recommended 2-deoxy-D-glucose as a glucocorticoid agent for vagal stimulation. This agent, which increases glucose level in the blood but decreases it in the cells, was also found to have detrimental effects on the brain and liver and was dismissed as no more reliable than insulin.13

A new era in the testing for completeness of vagotomy dawned with the introduction of intraoperative tests. Burge14 originally proposed looking for gastric contractions after electrical vagal stimulation during vagotomy. Ulcer recurrence rates have, however, been reported variously to be the same or lower even after a modified and more precise Burge test was used.15 This is at least partly because the modified test requires high compliance in the measurement system. The Grassi test involved mucosal pH mapping using a probe passed through a gastrostomy during vagotomy.16

Though initial attempts using a transoesophageal probe were not effective, refinements in probe technology give this test a new edge. The endoscopic Congo red (Kusakari) test has recently been sufficiently simplified17 to meet the criteria for acceptability as a convenient test; its unique advantage is that it can be used both intra- and post-operatively.

In spite of all the above advances, however, as an easy, convenient, safe and yet reliable post-operative test for completeness of vagotomy, there is at present little doubt that the choice will be the modified sham feeding (MSF) test. This test uses a simple physiological fact—the sight, smell and taste of food stimulate the cephalic phase of gastric secretion, and this is mediated solely through the vagus. The precursor of this test was adequate sham feeding, which is possible only in an experimental animal or in a rare patient with gastricomium. The procedure for MSF was recently standardized in Indian subjects as well.18,19 MSF is less potent than insulin in terms of acid concentration and output response,20 but is comparable in terms of peak volume response.21 Earlier tests evaluating MSF as a test for completeness of vagotomy used criteria which were originally devised for assessing the insulin test, including an emphasis on acid output.22 However, capitalizing on the acid volume response to MSF, recent studies23,24 have shown that a simple measuring jug bedside test, ignoring factors like pyloric loss and duodenogastric reflux, would serve as a good discriminator. After having evaluated acid output response in vagotomised patients (unpublished data), studies are in progress in our laboratory to compare the relative efficacy of the endoscopic Congo red test and the volume response to MSF in determining completeness of vagotomy.

With the advent of H2 receptor antagonists in the 1970s and rapid strides in anti-ulcer medical therapy since, the role of surgery in the treatment of peptic ulcer disease stands diminished. In the fewer cases in whom surgery is warranted, some form of vagotomy with or without a drainage operation is still required. In such cases a place for a postoperative test for assessing completeness of vagotomy indeed remains. However, the availability of safer and more reliable tests should sound the death knell for potentially innocuous and worse, dangerous tests like the insulin test. To decide on completeness of vagotomy a good many surgeons still trust their eyes only, while others look for histological evidence of the 'vagus' in tissue obtained at surgery. But now dyes (Congo red) and spice (MSF).
but not sugar (insulin or 2-deoxy-D-glucose), can provide safe and reliable confirmation.

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References
6. Grossman MI. Insulin test results should be expressed as a numeric value, not as positive or negative. Gastroenterology 1972; 63: 1089.