

# Heineke-Mikulicz Pyloroplasty – The Observer Error in the Interpretation of the Films\*

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## SUMMARY

Barium meals done before and after Heineke-Mikulicz pyloroplasty on 29 patients undergoing surgery for duodenal ulceration were studied.

Representative views of the pre- and post-pyloroplasty examinations were arranged in a random fashion on unexposed film.

Eight radiologists studied the films on 2 occasions.

Five sets of films at the first viewing and 6 sets of films at the second viewing were correctly interpreted.

This observation cannot be related to the completeness or incompleteness of the vagotomy, but does appear to be related to the experience of the radiologist.

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During the past decade vagotomy and pyloroplasty, usually according to the technique of Heineke-Mikulicz, has become the preferred operation for chronic duodenal ulceration. In a proportion of patients the operation does not cure the disease and the patients present after a year or two with symptoms similar to those they had before the operation. They are then referred for investigations to confirm the suspected recurrence of the ulcer.

Burhenne<sup>1</sup> and others,<sup>2-4</sup> and more recently Toye and his colleagues,<sup>5,6</sup> have described in detail the changes in the radiological appearances of the antrum and duodenal bulb that may follow Heineke-Mikulicz pyloroplasty.

But we have on occasion seen barium-meal films in which the appearances of the duodenum following pyloroplasty by experienced surgeons were similar to those before surgery. It was also interesting to hear how divergent the opinions of radiologists on such post-pyloroplasty films could be.

It was decided to test the impression that the radiologist cannot always be certain whether or not the films he is looking at were taken before or after Heineke-Mikulicz pyloroplasty.

## PATIENTS AND METHODS

Every patient who was referred for surgery because of duodenal ulceration during a period of 18 months was studied. There was no selection, and the patients included a 62-year-old woman who underwent vagotomy and

pyloroplasty for a duodenal ulcer in April 1966. During the period of this study she presented with pyloric stenosis and underwent partial gastrectomy. Barium meals done shortly before and 11 months after the pyloroplasty were available for review. Also included was a 26-year-old man on whom a vagotomy and pyloroplasty for a chronic duodenal ulcer was performed in December 1966. A gastrectomy was carried out for recurrent ulceration in July 1969. The barium meal examinations of 2 months before and 27 months after pyloroplasty were used for comparison.

Twenty-nine patients were studied. They varied in age from 16 to 80 years, and their ulcer symptoms had lasted between 3 months and 50 years: there were 4 women.

## Postoperative Examinations

In 22 of the 29 patients the pre-operative barium meal was performed within 2 months of the operation. The majority of these barium meals were done by radiologists in training and before the patients were referred to the Gastro-intestinal Clinic for assessment.

The effects of duodenal ulceration were confirmed at operation in every patient. The operations were not performed by one surgeon only, but all the surgeons (consultants and senior registrars) carried out vagotomy and single-layer Heineke-Mikulicz pyloroplasty.

The patients were re-examined by choice 6 weeks after operation, but in 7 patients the post-pyloroplasty barium meal was done on, or about, the 10th post-operative day because they lived too far to travel back for the investigation. The majority, but not all, of these examinations were performed by one of us (I.v.d.W.).

Tests of gastric acid secretion (pre- and post-operative augmented histamine tests, and insulin tests) were performed on the patients and in all but 3 it was possible to decide whether or not the vagotomy was complete or incomplete.

## Selection of X-rays

The names of the patients were arranged in alphabetical order and numbered 1 - 29. Representative exposures were taken from the 2 series of films and arranged next to one another on unexposed film. These exposures were designated A or B, a random pattern deciding whether the

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post-pyloroplasty example was A or B. In one instance, no. 19, the pre-operative barium meal was unsuitable for comparison and this patient was deleted from the study. In the others a careful attempt was made to select only those views in which the filling of the duodenal bulb, and the direction from which the exposure was taken, were comparable, but this was not always possible and in some instances more than one example had to be selected.

From a technical point of view, some of the barium meal examinations were, in retrospect, of a poor quality.

Eight radiologists (4 consultants and 4 senior registrars) were asked to study the films and to indicate with a tick on a prepared form which was the post-pyloroplasty example. To further test observer error the radiologists were asked to look at the films a second time, having been told that the films had been rearranged in the inter-

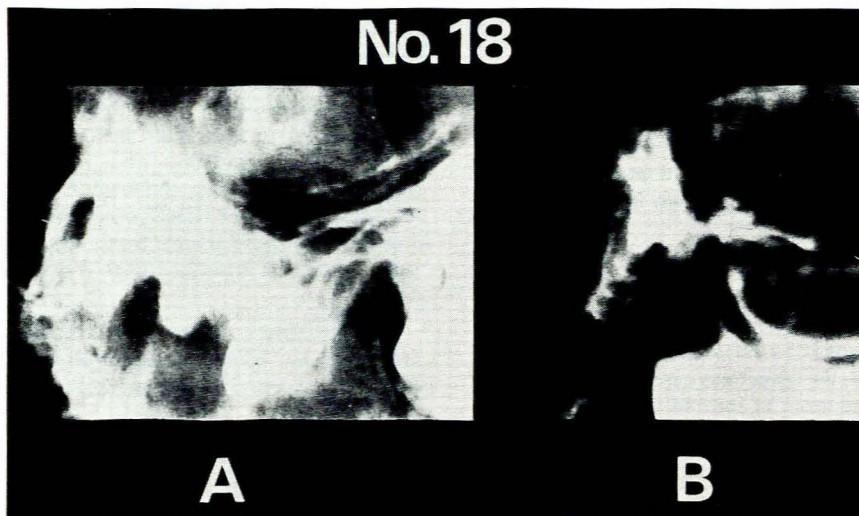


Fig. 1. Patient no. 18. 'A' is the post-pyloroplasty example. 'B' taken on 18.4.68, operation on 21.5.68 and 'A' taken on 24.6.68. Vagotomy complete.

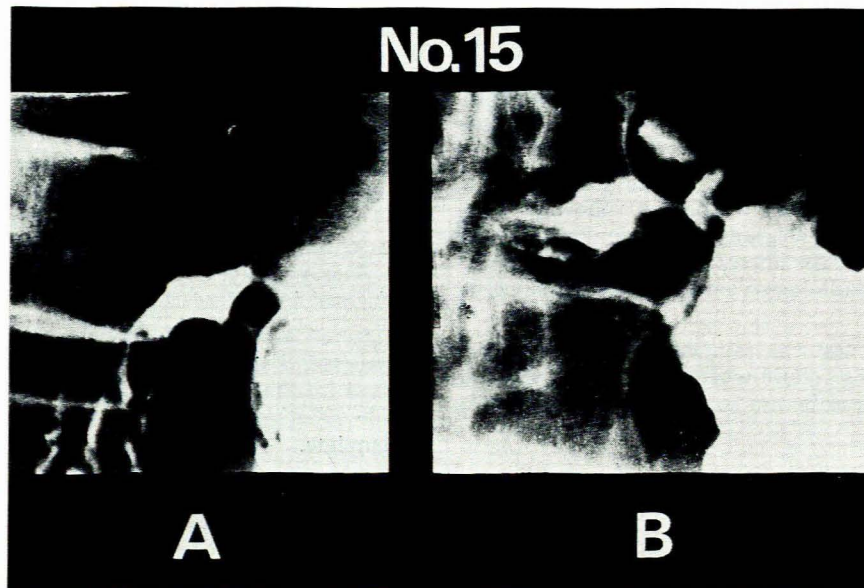


Fig. 2. Patient no. 15. 'A' is the post-pyloroplasty example. 'B' taken on 17.7.68, operation on 25.7.68 and 'A' taken on 20.9.68. Vagotomy complete. The patient, an 80-year-old man with a 50-year history of intermittent duodenal ulcer symptoms, remains well.

val, although this had in fact not been done. The period between the first and second reviews of the films varied from 2 weeks to 4 months.

## RESULTS

All the radiologists correctly interpreted only 5 of the 28 sets of films at the first viewing and only 6 of the sets of films at the second viewing and of these only 3 sets of films (Fig. 1) were correctly interpreted by all the radiologists on both occasions. In 5 sets of films, 2 at the first and 3 (Fig. 2) at the second viewing, only 3 or less than 3 of the radiologists made the correct choice.

Table I indicates the number of times each radiologist made the same choice at the second viewing as he or she did at the first viewing. When the results were considered, discounting radiologist E who made the same choice on only 13 occasions, the results were only a little better. Seven sets of films were now correctly interpreted at the first viewing and a similar number at the second viewing, and of these 4 sets of films were correctly interpreted on both occasions.

TABLE I. THE NUMBER OF TIMES EACH RADIOLOGIST MADE THE SAME CHOICE AT BOTH VIEWINGS OF THE FILMS

| Radiologist | Number of times |
|-------------|-----------------|
| A           | 26              |
| B           | 19              |
| C           | 26              |
| D           | 28              |
| E           | 13              |
| F           | 20              |
| G           | 21              |
| H           | 23              |

However, when the results were analysed considering only radiologists A, C, D and H, i.e. the 4 radiologists who on 23 or more occasions selected the same film at the second viewing as they had done at the first viewing, the

results were much better. Eighteen sets of films at the first and 16 sets of films at the second viewing were now correctly interpreted, and altogether 16 sets of films were correctly interpreted at the first and at the second viewings. These results cannot be correlated with the completeness or incompleteness of the vagotomy, because, allowing for the small numbers, the distribution of complete and incomplete vagotomies were very similar between the group of films that were correctly interpreted and the group of films that were incorrectly interpreted by radiologists A, C, D and H.

## DISCUSSION

This study does not purport to show what the observer error would be in the interpretation of barium meal examinations done before and after Heineke-Mikulicz pyloroplasty when one gastro-intestinally orientated radiologist does the barium meal examinations on patients operated upon by one specialist gastro-intestinal surgeon. The results stress the difficulty encountered in every day clinical practice where the barium meals are performed by a group of radiologists, each with a varying interest in the radiology of the stomach and duodenum, on patients who had been operated upon by a group of surgeons, each practising their individual version of the Heineke-Mikulicz pyloroplasty.

It is evident that it is difficult for the radiologist to be confident when interpreting post-Heineke-Mikulicz pyloroplasty films.

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