Demonstration – Post-Mortem Arteriography of the Normal Stomach

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A study by dissection of the arterial pattern of :-

(1) the mucous and submucous coat

(2) the sero-muscular layer

in relation to the distribution of ulcers causing severe haemorrhage.

In a series of 56 consecutive cases of severe haemorrhage from gastric ulcer the lesions were all judged to be situated within a few centimetres of the lesser curvature; only five of them had ulcers contiguous with its lower third, and all five were chronic lesions.

The 51 ulcers related to the upper two-thirds of the lesser curvature comprised an approximately equal proportion of chronic and shallow lesions. Of these shallow lesions the records of 20 gave their position in relation to the lesser curvature; 18 of them were considered to be placed posteriorly.

The distribution of these 56 ulcers differs markedly from that found for the gastric ulcer group as a whole (Ivy et al., 1950a). I therefore undertook this arteriographic study of the normal stomach to see whether the large arterial branches conform to any standard pattern, which could account for this distribution of bleeding ulcers.

Method

Within a few hours of death the oesophagus, stomach, duodenum, spleen, pancreas and abdominal aorta are excised en masse. Where tissues which contain vessels anastomosing with branches of the coeliac axis have to be divided to remove the specimen, ligatures are applied as far away from the stomach as is possible. The specimen is then immersed in normal saline at 37° C and injected with a suspension of:- Barium sulphate paste 62-64% – Laporte Ltd.

- (particle size 1-2 microns) 50 G.

Rice starch – (particle size 6–8 microns) 5 G.

10% solution of gelatin ad 100 ml. at a pressure of 120 mm. Hg.

The specimen is cooled, and after the gelatin has set the pancreas, spleen, omentum, abdominal aorta and the proximal branches of the

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coeliac axis are dissected off. The stomach is then opened along its anterior wall close to the greater curvature and radiographed.

In nine of the 22 specimens thus injected, the whole sub mucous and mucous layer was dissected off the sero-muscular coat and the resulting two portions were radiographed separately.

Observations

In all 22 specimens the arterial branches related to the upper two-thirds of the lesser curvature and its adjoining walls are larger and tend to form a closer network than those in the pyloric region. This affords an explanation for my finding that bleeding ulcers are commonly situated in the upper two-thirds of the stomach.

Examination of the nine dissected specimens shows that the mu-cosa in the region of the lesser curvature is supplied by short, slender branches of the left and right gastric arteries, which run straight through the muscular and submucosal layers without forming any plexus of large vessels such as is seen on the anterior and posterior walls. The strip of mucosa thus supplied is clearly demarcated on the radiographs; it has an average width of 6-8 cm. but tends to narrow towards the cardia and the pylorus. A shallow ulcer on this strip may erode one of these small vessels but they are unlikely to cause severe haemorrhage.

In these nine specimens the larger branches of the left gastric artery run laterally in the sero-muscular layer for distances of 1-5 cm. before perforating the muscle to gain the submucosa. Thus it would seem that for a shallow ulcer to erode these large branches it must be situated several centimetres away from the lesser curvature. Whilst this finding could account for the majority of my shallow ulcers being placed off the lesser curvature, it does not explain why the bulk of them were on the posterior wall; it is, however, recognised that ulcers as a whole have a predilection for the posterior as compared with the anterior wall (Ivy et al., 1950b).

The practical value of these observations may be realised in cases of shallow gastric ulcer which come to operation because of severe and recurrent haemorrhage. According to my experience the lesion should first be sought on the posterior wall adjoining the upper two-thirds of the lesser curvature.

Bibliography

Ivy, A. C, M, I. Grossman and W. H. Bachrach: Peptic Ulcer, London 1950, (a) p. 506, (b) p. 511.