

The role of Hypotonic Duodenography in the diagnosis of inflammatory and neoplastic lesions of the head of the Pancreas

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Introduction

THE PANCREAS is supposed to be, more or less, the tomb of radiologists. There are many direct and indirect roentgen methods for the diagnosis of pancreatic disease. These special techniques include the conventional barium meal examination, hypotonic duodenography, trans-hepatic percutaneous cholangiography, pancreatography through retro-peritoneal gas insufflation, transverse tomography, arteriography, spenoportography, venography, operative pancreatography and Magna Scan with seleno-methionine.

The large number and variety of techniques indicate that no single ideal method exists.

Among the various techniques carried out at present, hypotonic duodenography offers the unique feature of being a procedure which requires no special equipment.

Hypotonic duodenography is a method for studying the duodenum and other adjacent structures such as the region of the Ampulla of Vater, the lymph nodes draining the common bile duct and the pancreas, and most important, the head of the pancreas.

The information derived from this method is also of great help in the interpretation of pancreatic scans.

The value of hypotonic duodenography in the evaluation of diseases of the head of the pancreas is inherent to the close anatomical proximity of the two organs.

The pancreatic head, flattened from front to back, is lodged within the curve of the first three parts of the duodenum. In the region of the proximal portion of the second part of the duodenum, their anatomical relationship is extremely close but is less intimate further down. The neck of the pancreas can be explored to a certain extent by this method, but not the body and tail of the pancreas, unless the enlargement of these portions are remarkable.

Hypotonic duodenography produces a relaxed duodenum which is distended two to three times its normal size. The walls are pressed against adjacent organs, mirroring their contours. Its mucosal surface is stretched into a well-defined pattern and any small but important abnormality may be revealed.



Fig. 1

Normal Duodenum in Hypotonic Duodenography. Note the good distensibility of the walls, the normal thickness of the valvulae conniventes, the symmetry of the walls and the lack of filling defects or flattening of the mucosa.

Hypotonic duodenography was first introduced by Liotta in 1955 and refined by Mallet Guy and Jacquemet in 1963.

Equipment and Technique

The procedure is first explained to the patient and his co-operation elicited. The posterior aspect of the oro-pharynx is anaesthetised by spraying with 2% xylocaine. The walls of a Salem sump tube, which is a

double-lumen thin-walled polyethylene tube with an internal flexible guide wire, are well lubricated with xylocaine gel and passed through the mouth down to the stomach. Under fluoroscopic control and with the patient lying in the right lateral decubitus position, the tube is advanced into the duodenum and placed in the middle of the second part of the duodenum. In some cases, the patient has to be positioned in the right lateral decubitus, right anterior oblique or supine positions, when there is difficulty in passing the tip of the Salem tube into the duodenum.

After the injection, the metallic guide wire is withdrawn and, with the patient in the right lateral decubitus position, about 30 c.c. of viscous xylocaine 20% are injected into the duodenum through the Salem tube. Hypotonia of the duodenum is generally achieved after a few minutes. Then, with the patient in the same position, about 50 c.c. of barium (micro-opaque or barospense) are slowly introduced into the duodenum under fluoroscopic control, and serigraphic studies of the loop are taken in various positions, i.e. supine, right anterior oblique, left anterior oblique and right lateral positions. The purpose of various positions is to allow the radiologist to explore all the duodenal walls from different angles, especially as far as the second part of the duodenum is concerned.

Finally, an air contrast study of the duodenum is performed under fluoroscopic control by insufflation of oxygen through the Salem tube. Serial studies are then taken again.

Discussion

In this paper, we shall consider the radiological signs which are found, on hypotonic duodenography, in inflammatory and neoplastic lesions of the head of the pancreas. The diagnosis of a pancreatic lesion should be based on not only the radiological picture but also on the clinical and laboratory findings. Only by a correlation of all the findings, can the clinician reach the final diagnosis after a comprehensive differential diagnosis.

The normal appearance of the hypotonic duodenal loop is that which shows:— (Fig. 1)

1. Smooth valvulae conniventes with uniform thickness of only a few millimeters each.
2. Good distensibility of the loop and no widening of the same.
3. Symmetry between the medial and lateral aspects of the loop.



Fig. 2(a)

Typical case of changes in pancreatitis. Note the signs of irritability of the mucosa, some levelling of the medial wall of the loop, thickening of the valvulae conniventes and swelling of the mucosa folds over the medial and lateral aspect of the loop.

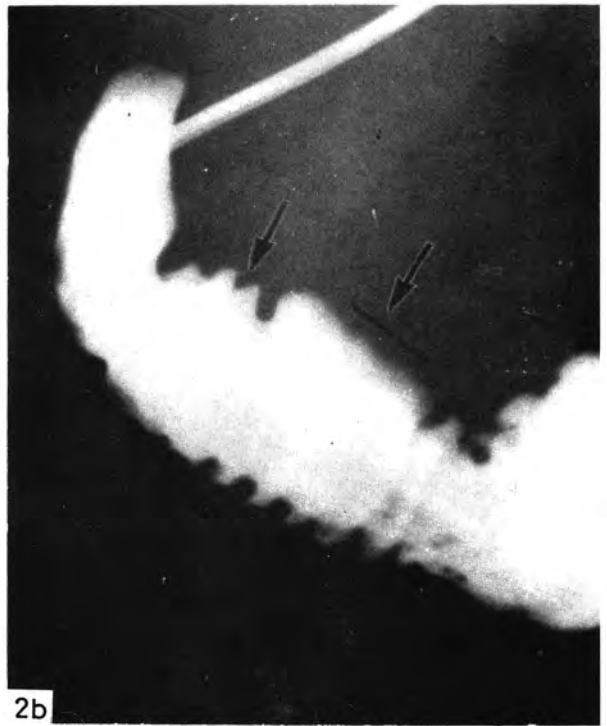


Fig. 2(b)



Fig. 2(c)

4. No flattening or filling defects of the walls.
5. Possible visualization of the Ampulla of Vater as a small notch over the medial aspect of the second or third portion of the loop.

The radiological signs that point to a diagnosis of an inflammatory lesion of the pancreas are:— (Fig. 2a, 2b & 2c)

1. Thickening of the mucosa with swelling of the mucosal folds medially and often laterally.



Fig. 3(a)



Fig. 3(b)

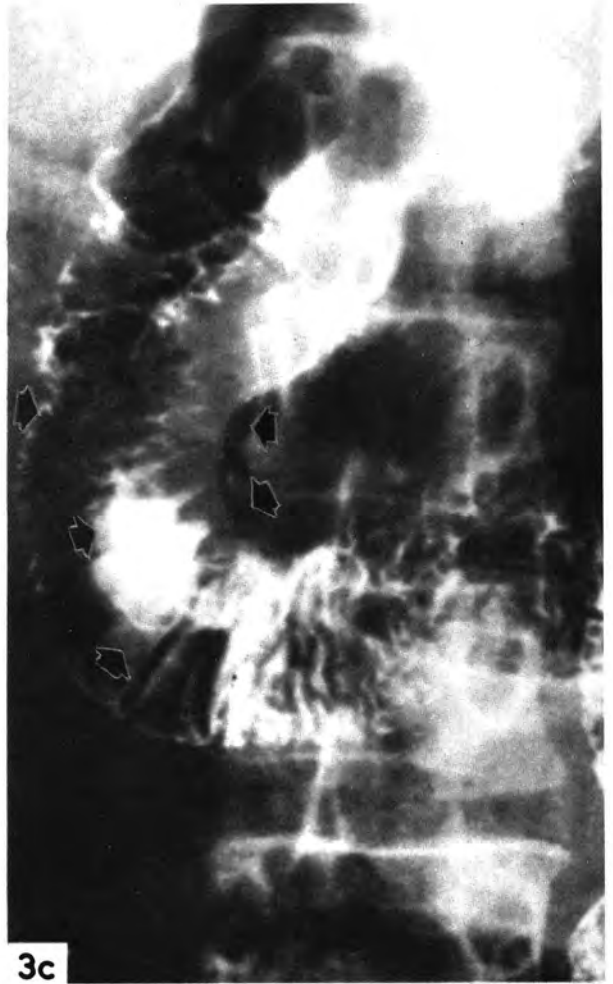


Fig. 3(c)

Case of carcinoma of head of the pancreas. The clinical symptoms and finds were in favour of an inflammatory lesion. Hypotonic duodenography instead showed a lobulated filling defect over a rigid medial wall of the loop with spicules formation only over the medial aspect of the duodenal wall and disorganisation of the mucosa relief at the same level. Some widening of the loop is also noted.

2. Signs of irritability of the mucosa.
3. Spicules formation over the medial and often over the lateral aspect of the duodenal wall.
4. Some leveling of the medial wall of the loop.
5. No destruction of the mucosa.
6. Small localised rigidity on the medial duodenal wall.

The radiological signs that are or are almost characteristic of a neoplastic lesion of the head of the pancreas are:— (Fig. 3a, 3b, 3c, 4a, 4b & 4c)



Fig. 4(a)

Case of Carcinoma of the Head of the Pancreas

Note flattening of the medial wall of the 2nd part of the duodenal loop with lack of mucosal folds at the same level. Some spicule formation over the medial aspect of the loop. Imprint over the duodenal cap.

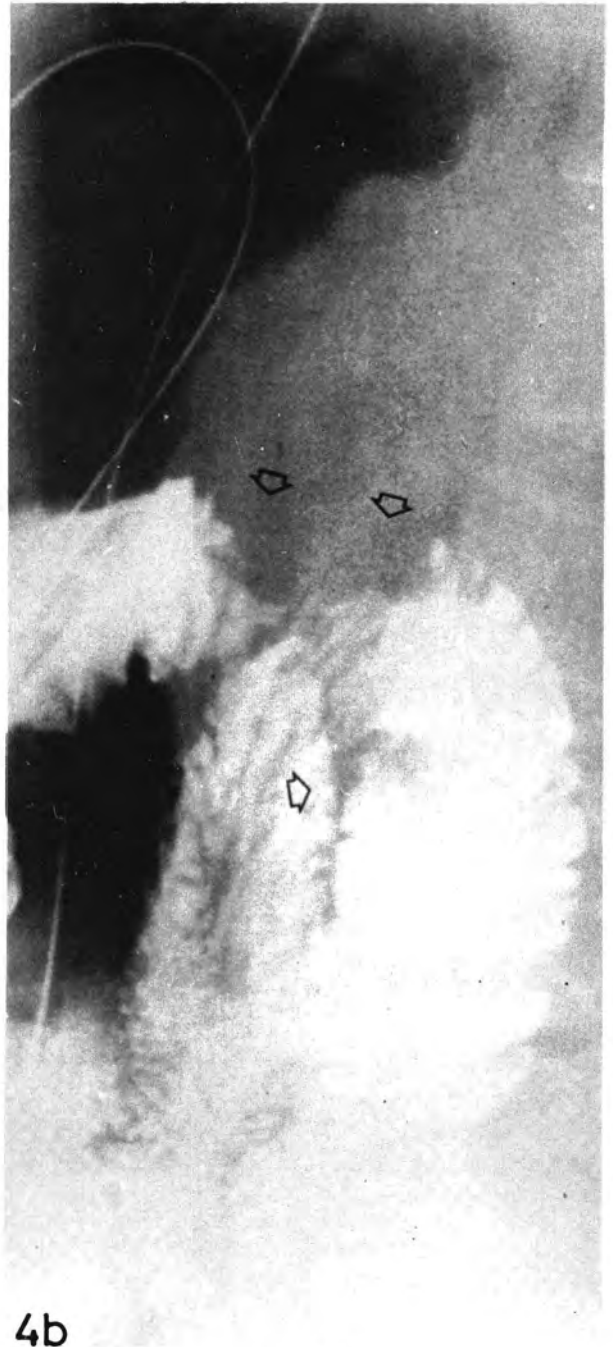


Fig. 4(b)

A right lateral decubitus projection. Note irregular narrowing over the proximal aspect of the 2nd portion of the duodenal loop and filling defect over the anterior aspect of the loop.



Fig. 4(c)

A right lateral decubitus projection. Note irregular narrowing of the proximal aspect of the 2nd portion of the duodenal loop with disorganisation of the mucosa and filling defects. External pressure over the gastric antrum and duodenal cap.

1. Constant rigidity of the duodenal wall medially.
2. No edema of the mucosa (unless the tumor is associated with inflammatory changes).
3. Destruction of the duodenal mucosa.
4. Irregular filling defect or defects of the loop, especially over the medial aspect.
5. Shortening of the folds.
6. Presence of ulcerations within the filling defect of the loop.
7. Rigid spiking of the medial aspect of the loop, especially when associated with adjacent irregular, lobulated filling defect.

It has been found that an examination with double contrast, after a moderate quantity of barium injection, constitutes the best technique since it permits a most accurate evaluation of the mucosa relief and makes the comparison of the medial and lateral wall of the duodenum much easier. Any discontinuity of the mucosa is best seen after the introduction of air or oxygen. It is best to study the duodenum in all possible projections, including the oblique and right lateral decubitus, in order to obtain complete visualisation.

Usually, numerous spot seriographic films are taken, to help better in the evaluation of questionable rigidity of the duodenal wall. Not always is the differential radiological diagnosis between inflammatory and neoplastic lesions easy, especially when there is a combination of both. However, we are of the opinion that the presence of spicules on both the medial and lateral walls is characteristic of an inflammatory lesion. The evaluation of the minor mucosal changes of the duodenum is indeed not easy. It's only with practice and careful examination of the films that a certain confidence of opinion can be obtained.

Summary

Hypotonic duodenography is a good and simple radiological tool for the diagnosis of inflammatory or neoplastic lesions of the head of the pancreas. The examination can also be carried out on out-patients and requires the minimum of instruments. It only causes a slight discomfort to the patient when the catheter is being introduced into the stomach and duodenum.

Some useful radiological signs for the differential diagnosis between inflammatory and neoplastic lesions of the head of the pancreas are described. The technique used is set forth, underlining the usefulness of the double contrast method for a better visualisa-

tion of minor changes which may lead to a better final diagnosis.

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