NEWSPAPER POST

TheSynapse
The Medical Professionals' Network

MEDICAL IMAGING

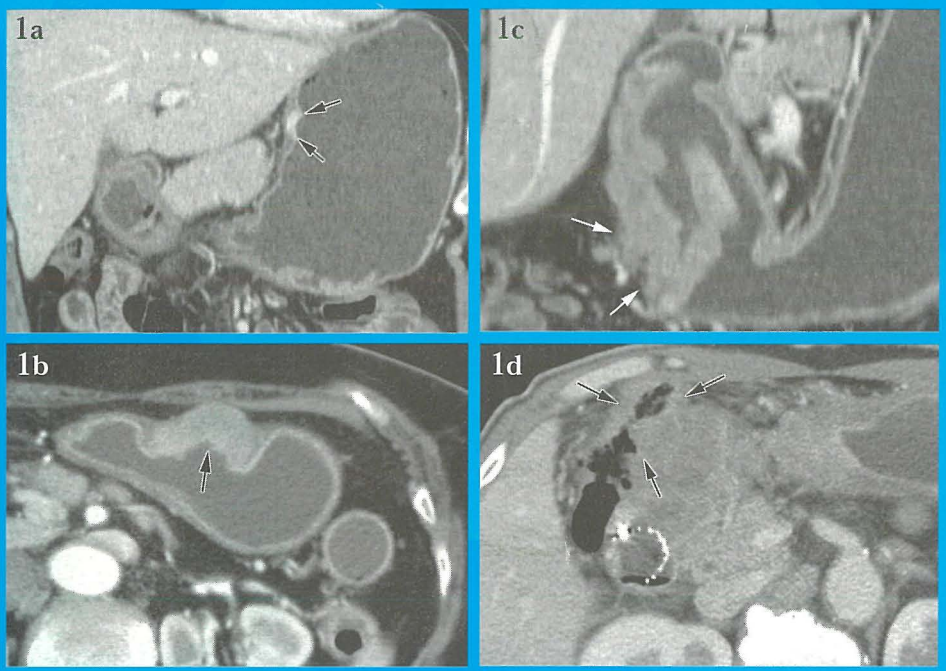

Figure 1: *Stage T1–T4 gastric tumours. (a) Coronal reformatted image shows a stage T1 tumor (arrows) with focal nontransmural enhancement in the upper body. (b) Axial CT scan shows a stage T2 tumour (arrow), a localized, transmurally enhancing ulcerative mass without perigastric extension, in the lower body. (c) Coronal reformatted image shows a stage T3 tumour (arrows), with gross infiltration of the perigastric fat tissue in the antrum. (d) Axial CT scan shows a stage T4 tumor with invasion of the colon (arrows).*

Stomach Cancer: Preoperative Staging

Stomach (or gastric) cancer is one of the leading causes of cancer mortality worldwide. Complete resection of a gastric tumour and adjacent lymph nodes represents the only potentially curative intervention.

by **Pierre Vassallo**
MD PhD FACA Artz für Radiologie
Consultant Radiologist

Spiral Computed tomography (CT) with optimal contrast enhancement and multiplanar reformatting has remained the modality of choice for the preoperative staging of gastric cancer and for follow-up. However, CT may be limited in the identification of metastases in non-enlarged lymph nodes, peritoneal dissemination, and distant blood-borne metastases.

Positron emission tomography (PET) with 2-[fluorine-18]fluoro-2-deoxy-D-glucose (FDG) is a useful diagnostic technique in clinical oncology. FDG essentially consists of glucose tagged with radioactive fluorine. Since areas of high cell turnover have higher energy (preferentially glucose) requirements, FDG will accumulate at these sites. PET detects foci of abnormally increased FDG uptake, which should correlate with areas of active tumour growth.

Although CT is reliable in detecting metastases to most locations such as the liver, lungs, adrenal glands and ovaries, FDG PET may play a role in the detection of metastases to the skeleton and to unexpected locations. In addition, FDG PET is useful in distinguishing areas of active cell growth from areas of scar tissue within CT-detected residual tumour following therapy.

Cancerous invasion of the gastric wall as visualized at CT has been classified as follows: In T1 and T2 lesions, invasion is limited to the gastric wall, whose outer border may be smooth (Figure 1a, 1b); in T3 lesions, the serosal contour becomes blurred with strand-like areas of increased attenuation extending into the perigastric fat (Figure 1c); and in T4 lesions, tumor spread frequently occurs via ligamentous and peritoneal reflections to the colon (Figure 1d), pancreas or liver.

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Editor's Word

We are proud to present the first issue of The Synapse Magazine for 2007. The content and format of this issue clearly represent the policy adopted by the editorial board for this year. Not only will you have access to articles written by fellow colleagues who are specialists in their field, but other important areas which are often overlooked have been included. These include a brand new feature consisting of interviews which will make you meet healthcare professionals hailing from various specialisations. This feature clearly shows our commitment of increasing awareness, not only of the sterling work being carried out in the medical field by peers but also of the importance of knowing colleagues in an informal way (without necessarily wearing lab coats or stethoscopes).

In this issue you will also find an article on ***Surgery for Skin Cancer*** with an accompanying contribution on ***Skin Grafting*** and Part II of ***Informed Consent***. Other articles which will surely capture your interest include Part II of ***Medics in Movies and Television*** and the first part of a series of articles discussing ***Invertebrates in the medical service of man***.

On a final note, let us thank you for your support and wish you a year ahead full of happiness and good health for yourselves and all your families.

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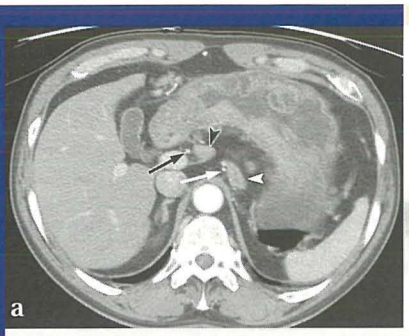
Editor: Dr Wilfred Galea
Designer: Conrad Bondin

Stomach Cancer: Preoperative Staging

Differentiation between T3 and T4 lesions is particularly important because extensive invasion of T4 lesions into adjacent structures makes surgery difficult or impossible. PET FDG is not helpful in T staging.

Several studies have confirmed the superiority of number of positive nodes in the estimation of prognosis; this can only be estimated after surgical excision: N1, metastasis in one to six regional lymph nodes; N2, metastasis in seven to 15 lymph nodes; and N3, metastasis in more than 15 lymph nodes. However, anatomic nodal location remains a valuable criterion (Figure 2) because the D classification, a description of the extent of lymphadenectomy, is determined according to the level of lymph node dissection (D1–D4). D1 lymphadenectomy involves the dissection of perigastric nodes attached directly to the stomach (compartment I or stations 1-6), whereas D2 lymphadenectomy involves complete dissection of compartments I and II (stations 1-11). The latter is the standard surgical procedure for gastric cancer in high-prevalence countries, such as Korea and Japan. D3 lymphadenectomy involves compartments I–III (stations 1-14), whereas D4 lymphadenectomy involves dissection of all four compartments (stations 1-16). In addition, the regional lymph nodes of stations 12–16 are classified as distant metastases (M1) according to the new AJCC classification system.



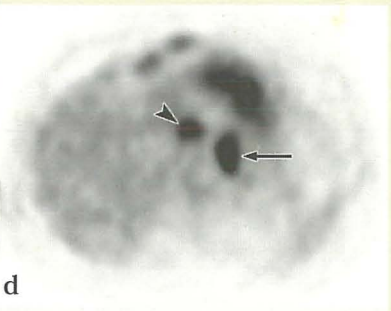


Figure 3: *Station 7 and 8 lymph node metastases in a 63-year-old man with stomach cancer. (a) Axial CT scan demonstrates a station 7 lymph node (white arrowhead) adjacent to the left gastric artery (white arrow) and a station 8 lymph node (black arrowhead) adjacent to the common hepatic artery (black arrow). The diagnosis of lymph node metastasis may be difficult if only size criteria are used. (b) Axial PET scan shows prominent FDG uptake in the corresponding station 7 (arrowhead) and station 8 (arrow) lymph nodes, a finding that suggests metastasis.*

Station	Node Location
1	Right paracardium
2	Left paracardium
3	Along the lesser curvature
4	Along the greater curvature
5	Suprapylorum
6	Infrapylorum
7	Along the left gastric artery
8	Along the common hepatic artery
9	Around the celiac artery
10	At the splenic hilum
11	Along the proximal splenic artery
12	In the hepatoduodenal ligament
12a	Along the hepatic artery
12b	Along the bile duct
12c	Behind the portal vein
13	On the posterior surface of the pancreatic head
14	Along the superior mesenteric vessels
15	Along the middle colic vessels
16	Around the abdominal aorta

Figure 2: *Lymph node stations*

At CT, cancerous nodes are identified on the basis of size, shape, and enhancement pattern (ie, more than 8–10 mm along the short axis, nearly round shape, central necrosis, and marked or heterogeneous enhancement). In addition, CT can provide anatomic information about metastatic nodes (Figure 3a). Nodal assessment of compartments III and IV is particularly important because the metastatic nodes of stations 12–16 (M1 nodes) cannot be removed with routine D2 dissection. However, CT has a major limitation in that it cannot detect metastases in normal-size nodes; FDG PET can demonstrate increased activity in such nodes (Figure 3b).

FDG PET may detect metastatic deposits in non-enlarged lymph node, but is less sensitive than CT in the detection of lymph node metastasis in compartments I-II. This is mainly due to poor spatial resolution of FDG PET, which cannot separate compartment I-II lymph nodes from the primary tumour due to close proximity (Figure 4). However, the presence of metastatic compartment I-II lymph nodes may not be important in planning surgery, since these nodes would be normally be removed by D2 surgery.

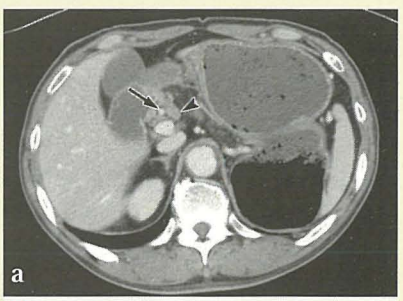


Figure 4a: *Station 12 lymph node metastases in a 65-year-old man with stomach cancer.*

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Stomach Cancer: Preoperative Staging

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Figure 4b: *Axial CT scan demonstrates an enlarged lymph node (arrowhead) in the hepatoduodenal ligament adjacent to the proper hepatic artery (arrow), which are barely visible on axial PET scans.*

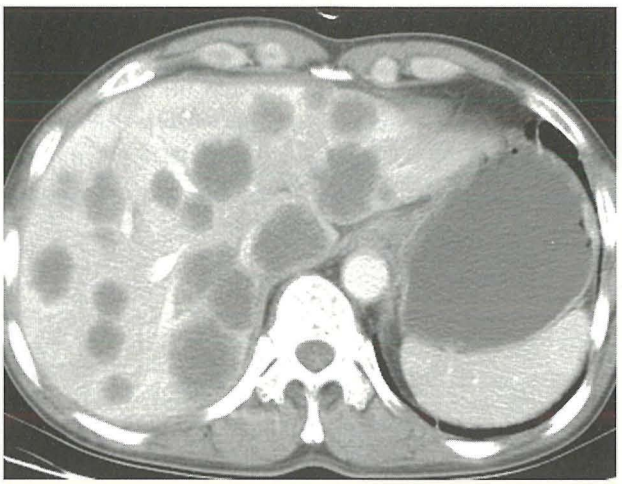

Figure 5: *Multiple hepatic metastases in a 58-year-old man with stomach cancer.*

Detection of lymph node metastases in compartments III-IV can change the extent of lymph node dissection or may preclude unnecessary surgery. Metastases at these sites would be easier to identify at PET because they are located away from the primary lesion.

Solid organ metastasis is uncommon in primary gastric cancers at the time of initial diagnosis, but its detection is important in treatment planning. Hematogenous metastases from gastric carcinoma most commonly involve the liver because the stomach is drained by the portal vein (Figure 5). Other less common sites of hematogenous spread include the lungs, adrenal glands, and skeleton. In the case of ovarian metastasis (Krukenberg tumor), three possible pathways have been considered: peritoneal dissemination, lymphatic spread, and hematogenous spread. CT readily detects distant solid organ metastasis. Peritoneal metastases are also readily seen by CT, while FDG PET is helpful when CT is equivocal.

CT is the imaging modality of choice for the preoperative staging of gastric cancer and the follow-up of affected patients. FDG PET is a useful adjunct for the detection of distant metastases and metastases in non-enlarged lymph nodes. In addition, FDG PET may play a valuable role in distinguishing residual cancer from scar tissue after therapy.

Dr Pierre Vassallo can be reached at the Medical Imaging Centre on 21 491 200 or by email on pvassallo@mic.com.mt

Skin Grafting

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Distant Flaps are constructed from areas of the body specifically containing a named blood supply.

Distant Flaps can be either **Pedicle** or **Free.**

A **Pedicle Flap** is constructed by raising the tissues needed, leaving them attached to a small pedicle containing the supplying vessels and transplanting them on to the recipient area that may have lost skin, fat, muscle and bone. The blood supply remains intact at the donor site and is not cut loose until the new blood supply has completely developed at the recipient site.

Free Flaps are used when the recipient area is further away from the donor site. Also called Microvascular Free flap, this involves detaching and reattaching the tissue and its blood vessels from one site to another. Microsurgery is used to attach the blood vessels.

Nursing care is very important in this process. Apart from helping the patient in every aspect, great care and observation is needed to prevent any undue pressure occurring over the Flap and its Pedicle. Preservation of the circulation to the Flap is vital. Such care must be continued up to at least six weeks. Afterwards, moisturizing creams are applied on both the grafted area and the donor site till need be. Both areas are protected from direct exposure to sunlight.

During the first couple of months the areas involved look a bit like a patchwork which may be depressed or raised. It is never exactly similar to surrounding normal skin, but the appearance definitely improves with time.

Acknowledgements

Mr Joseph Briffa, Consultant Plastic and Reconstructive Surgeon.

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