Middle Articles

Recent Advances in T.N.M.

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Many doctors are familiar with the clinical classification of malignant tumours published by the Union Internationale Contre le Cancer (U.I.C.C.).

Past History

It was Professor P. F. Denoix, of Paris, who first thought of the T.N.M. system, which is, in effect, a sort of shorthand notation for describing the extent of the primary tumour (T), the state of the regional lymph nodes (N), and the presence or absence of distant metastases (M). The idea germinated between 1943 and 1952, and several papers were published by Denoix in the *Bulletin de l'Institut National d'Hygiène*.¹⁻³ The first time that the T.N.M. system can be said to have impinged on the international conscience was at the Radiological Congress in Copenhagen in 1953 and at the seventh Congress of the U.I.C.C. in Brazil in 1954. The sites which were thought most suitable for staging were the breast and the larynx. In the ensuing years a great deal of work was done in Great Britain on staging the breast. The Association of Surgeons and the Faculty of Radiologists set up a joint committee to make recommendations, and between 1955 and 1958 this committee met on numerous occasions and its findings were reviewed in the *British Medical Journal*.⁴ These suggestions, after modification, were accepted by the Eighth International Congress held in London later in 1958, and a five-year trial period of the breast classification came into operation on 1 January 1960.⁵ This period finishes at the end of 1964, and it will then be the duty of the staging committee to consider criticisms of the classification before submitting definitive proposals to the World Health Organization.

Two other brochures have been published by the U.I.C.C. concerning the T.N.M. classification of tumours of the bladder, mouth, and upper air-passages,^{6 7} and these also will have five-year periods for assessment.

New Proposals

It is now proposed that a further group of sites should be considered for staging. These are the thyroid, bronchus, oesophagus, stomach, colon, rectum, and corpus uteri. With the exception of the bladder, all the sites at present staged are accessible; that is to say, the extent of the primary tumour and, for the most part, the state of the regional lymph nodes can be assessed (or, as the cynics would have it, guessed) by an examining doctor with little aid other than that of his five senses. The first principle on which the T.N.M. system was founded is that it is a clinical classification. Endoscopy and diagnostic x-ray films may be used, but operative findings

are specifically excluded on the ground that not all patients with cancer are operated upon.

The second principle is that the histological type of tumour, or, in other words, the pathological grading, must not influence the clinical staging of the disease, though proof of malignancy by biopsy is accepted.

With regard to the sites now proposed for T.N.M. staging it will be seen at once that, apart from the thyroid, all are deeply seated viscera and consequently the difficulty of accurate assessment is very great. Except in the rectum, it is usually impossible, and at best extremely difficult, to assess without operation the extent of the primary, though help may certainly be obtained by endoscopy and diagnostic x-ray films. The state of the regional lymph nodes presents an even greater problem, and it is even difficult to define which are the regional nodes of the oesophagus, stomach, colon, or rectum. In consequence some people feel a good deal of doubt about whether it is feasible at all to apply the T.N.M. system to such sites, or, alternatively, if it is worth doing, whether the "rules" should be altered to include operative findings.

The Committee on Clinical Stage Classification and Applied Statistics of the U.I.C.C. will meet in July 1965 to make recommendations regarding these new sites, and members of the committee have been asked to sound opinion in their own countries before attending this meeting. Let us therefore now consider these sites.

Thyroid Gland

There are two well-recognized groups of tumours affecting the gland—those which are anaplastic and those which are papillary. In general these tend to affect different age-groups, and the prognosis of the former is much worse than that of the latter. Consequently in any large series of thyroid neoplasms it is probable that the different groups will be reported separately. This, however, should not make any difference to the T.N.M. classification, which could apply equally to both types. Three degrees of T should suffice, and these will show a progression, thus: (1) a nodule within the gland, (2) involvement of the whole gland, and (3) involvement of structures outside the gland. In addition it will probably be necessary to have a T0 category for those cases where cancer is found in a metastatic lymph node but in which there is no palpable tumour in the gland itself. Accordingly the following definitions are proposed:

T0: No palpable tumour in gland.

T1: Single tumour confined to gland and not limiting its mobility in any way—that is, full movement on swallowing and on palpation.

T2: Multiple tumours or single tumour involving the whole gland, but with no limitation of mobility.

T3: Tumour extending beyond the gland as indicated by fixation or infiltration of surrounding structures.

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With regard to the regional nodes it would seem right to define the N categories in the same way as those for the other sites in the mouth, pharynx, and larynx, which have already been internationally agreed. Thus :

N0 : No palpable nodes.

N1 : Movable homolateral nodes.

N2 : Movable contralateral or bilateral nodes.

N3 : Fixed homolateral or bilateral nodes.

M0 indicates no known distant metastases and M the presence of such metastases. These definitions apply to all sites.

Bronchus

Radiographic and bronchoscopic findings are clearly essential in evaluating the extent of the tumour, but in view of the recognized difficulties of diagnosing cancer of the lung on clinical grounds, even when assisted by these means, it will be necessary in any reported series to separate those cases in which there is histological or cytological proof of malignancy from those in which such proof is lacking. There may be difficulty in distinguishing the primary from mediastinal nodes ; while the apparent size of the primary may be anything but accurate owing to the fact that the actual shadow seen may not be the size of the tumour, but may be due to collapse of part of the lung or to surrounding pneumonia. Certainly a simple classification is desirable for this site, and it must be largely based on radiographic findings. Therefore :

T1 : Tumour of segmental or smaller bronchus confined to the segment.

T2 : Tumour confined to the lobe and involving the lobar bronchus.

T3 : Tumour extending beyond the limits of one lobe and involving the main bronchus or adjacent lobar bronchus.

T4 : Tumour extending beyond the lung.

As regards the regional nodes the following is suggested :

N0 : No clinical, radiological, or bronchoscopic evidence of intra-thoracic or cervical lymph-node enlargement.

N1 : Radiological or bronchoscopic evidence of enlarged intra-thoracic nodes. No palpable cervical nodes.

N2 : Palpable cervical nodes or paralysis of the diaphragm or of the vocal cord.

N2 covers clinical findings which might be thought more appropriately included under M ; but with regard to carcinoma of the lung these are more likely to be caused by involved nodes than by distant metastases.

Oesophagus

Three or four regions should be distinguished : (1) cervical oesophagus ; (2) upper third of thoracic oesophagus ; (3) middle third of thoracic oesophagus ; and (4) the lower end, including growths arising at the cardia and spreading upwards. Possibly Nos. 2 and 3 might be combined in one region.

If this is to be a non-operative classification then radiography and endoscopy will be the chief means of determining both the extent of the primary and the presence of regional nodes. Size can be assessed in regard to the length of the stricture, and it can usually be ascertained whether the whole circumference of the organ is involved. Fixation or rigidity is of importance, as is the finding of any abnormality on bronchoscopic examination. The definitions of the degree of T and N for each region might then be :

T1 : Tumour can be completely assessed in length, does not involve the whole circumference, and does not affect the mobility of the organ. Bronchoscopy normal.

T2 : Tumour involving the whole circumference of the organ or producing fixation (rigidity). Bronchoscopy normal.

T3 : Tumour extending beyond the oesophagus (as shown, for example, by a soft-tissue mass on radiography, deformities of the trachea or bronchus on bronchoscopy, or inability to see more than the upper limit of the growth on oesophagoscopy).

N0 : No clinical, radiological, or endoscopic evidence of lymph-node enlargement.

N1 : Nodes present but apparently confined to the region concerned.

N2 : Nodes present in neighbouring regions.

The N definitions cannot really be considered satisfactory. For example, a growth in the middle third of the thoracic oesophagus may be found on exploration to have metastasized to nodes within the abdomen. It might indeed be better not to attempt an N assessment at all.

Stomach and Colon

However enthusiastic one may be about the principles of the T.N.M. system it is indeed difficult to support a classification which is entirely clinical. Accordingly, the suggestions made now are based on *operative* findings, or, if a tumour is considered to be inoperable, it is placed in the most advanced group.

Stomach.—A division into two regions is recommended, since growths of the cardia have been included with the lower end of the oesophagus : (1) growths of the proximal half of the stomach, and (2) growths of the pyloric half of the stomach. For each region the definitions of T and N should be :

T1 : Tumour confined to the stomach and not penetrating through the muscular coat.

T2 : As above, but tumour involving the peritoneal surface.

T3 : Tumour invading neighbouring organs.

T4 : Tumour deemed to be inoperable by virtue of local extent.

N0 : No nodes present.

N1 : Nodes present and capable of removal.

N2 : Nodes present but not removable.

Colon.—This organ can be classified in a very similar manner. The regions into which it could be divided are as many as eight—namely, caecum, ascending colon, hepatic flexure, transverse colon, splenic flexure, descending colon, pelvic colon, and pelvi-rectal junction. This is too many, and I believe that three regions are sufficient—namely, (1) right colon (caecum to mid-transverse colon), (2) left colon (mid-transverse colon to pelvic brim), and (3) pelvic colon (pelvic brim to and including the pelvi-rectal junction). The degrees of T and N as determined at operation are then identical with those for the stomach.

Rectum

Compared with the two previous sites, the rectum is at least accessible to direct examination, and it is therefore possible to make a case for a clinical (non-operative) classification. A simple division into regions could be : (1) lower rectum (growths palpable digitally) and (2) upper rectum (growths not palpable digitally). The pelvi-rectal junction is included with the pelvic colon, and the anus is a separate region of its own.

Dukes's classification based on histological examination of the resected bowel has gained world-wide acceptance, and it

is not proposed that this should be displaced by T.N.M. They can be complementary. Definitions of T might be as follows :

- T1 : Tumour confined to the mucosa, pedunculated or not, and limited to one-quarter of the circumference of the bowel.
 T2 : Tumour penetrating the muscular coat but not producing fixation of the rectum, or tumour involving more than one-quarter but less than one-half of the circumference of the bowel.
 T3 : Tumour producing fixation of the rectum but not invading other organs, or tumour involving more than half the circumference of the bowel.
 T4 : Tumour extending to other organs.

It is very seldom possible to assess clinically the state of the lymph nodes in the meso-rectum or on the lateral pelvic walls, and consequently the N category is not really applicable to this site.

Cervix Uteri

The League of Nations classification for carcinoma of the cervix was internationally recognized as long ago as 1929, has been very widely adopted, and there is no suggestion that it should be supplanted by T.N.M. Actually the four international stages would correspond to four degrees of T :

- Stage 1=T1 : The carcinoma is strictly confined to the cervix.
 Stage 2=T2 : The carcinoma extends beyond the cervix but has not reached the pelvic wall. The carcinoma involves the vagina but not the lower third.
 Stage 3=T3 : The carcinoma has reached the pelvic wall (on rectal examination no "cancer-free" space is found between the tumour and the pelvic wall).
 Stage 4=T4 : The carcinoma involves the bladder or the rectum, or both, or has extended beyond the limits previously described.

Corpus Uteri

The International Federation of Obstetrics and Gynaecology published a proposed classification of tumours of the body of the uterus in 1958. Like the stomach and colon this is not a site at which a clinical assessment of the extent of the primary or the involvement of regional nodes can be accurately made. Indeed, it may be difficult to say whether a growth arises from the cervix or the body of the uterus,

though the histology may resolve this. A simple T classification is suggested :

- T1 : Tumour confined to corpus.
 T2 : Tumour involving both corpus and cervix.
 T3 : Tumour extending outside the uterus but remaining mobile within the pelvis.
 T4 : Tumour involving neighbouring organs.

Summary and Conclusions

The evolution of the T.N.M. system of classifying malignant tumours arising in various sites is described.

Tumours occurring in five sites—breast, buccal cavity, pharynx, larynx, and bladder—have been classified and defined by the Union Internationale Contre le Cancer, who have published their recommendations.

Proposals regarding seven further sites are now outlined, namely : thyroid, bronchus, oesophagus, stomach, colon, rectum, and corpus uteri. These suggestions are a hotch-potch of proposals circulated by the British, French, American, German, Russian, and Japanese members of the Committee together with advice which I have sought from some specialists in this country and whose help I gratefully acknowledge.

A meeting of the Committee on Clinical Stage Classification and Applied Statistics of the U.I.C.C. will be held in July 1965 to consider the T.N.M. staging of these sites.

I am a member of this committee, and I hope that this article will stimulate discussion and criticism of these proposals, the ultimate purpose of which is to provide common ground on which the results of treatment and the prognosis of malignant tumours can be assessed. Comments will be willingly accepted by me. These will be put to the International Committee next year. They should be sent to the Royal Marsden Hospital, Fulham Road, London S.W.3.

REFERENCES

- ¹ *Bull. Inst. nat. Hyg. (Paris)*, 1944, 1, 69-71.
- ² *Ibid.*, 1950, 5, 82-84.
- ³ *Ibid.*, 1952, 7, 743-748.
- ⁴ Harmer, M. (1958). *Brit. med. J.*, 1, 767.
- ⁵ International Union Against Cancer. Research Commission. Committee on Clinical Stage Classification and Applied Statistics (1959). *Malignant Tumours of the Breast, 1960-1964*. U.I.C.C., Geneva.
- ⁶ — (1963). *Malignant Tumours of the Urinary Bladder, 1963-1967*, U.I.C.C., Geneva.
- ⁷ — (1963). *Malignant Tumours of the Buccal Cavity (including the lip), the Pharynx and the Larynx, 1963-1967*. U.I.C.C., Geneva.

Scottish Television Experiment *

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The first postgraduate medical programme in Great Britain was broadcast by Scottish Television in March 1963. The initiative for this programme followed an experimental television broadcast which had been carried out by Scottish Television in late 1962. This broadcast had been produced in the Western Infirmary, Glasgow, and was on an open channel with the object that it would be viewed by hospital staff in peripheral

hospitals in the West of Scotland. The Managing Director of Scottish Television had for some time been interested in the possibility of an educational television channel and felt that a series of programmes like this might demonstrate that it was possible and desirable. The Glasgow Postgraduate Medical Board was already interested in the potentialities of television in teaching, and it was decided to pursue the matter under the auspices of the Board, which is a joint body formed by the University of Glasgow and the Royal College of Physicians and Surgeons of Glasgow. The British Medical Association and the College of General Practitioners were informed of the project.

* Read at the Annual Meeting of the British Medical Association, Manchester, July 1964.

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