

# Alternative Methods of Diagnosis and Staging of Bladder Cancer

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Summary. A survey of the conventional diagnostic measures in bladder carcinoma is given. The importance of additional methods, such as pelvic arteriography and phlebography, lymphography and lymphoscanning is evaluated.

Key words: Urinary bladder cancer - Pelvic angiography - lymphoscanning - Lymphography.

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Classification of bladder cancer according to its stage is essential since non-invasive tumours seldom develop metastases and therefore have a more favourable prognosis. Tumours invading the bladder wall and even more so penetrating the perivesical fat metastasise more frequently in proportion to their invasive growth.

Data based on the observation of 450 patients with tumours of the urinary bladder, show that in cases where the tumour penetrated the bladder wall 50% of the patients had metastases and in cases of the tumour penetrating the perivesical fat metastases developed in 71% of the patients. The possibility of such patients developing clinically silent metastases to the bones, lungs and liver is considerable.

All existing classifications of bladder cancer can be divided into 2 large groups based on either the histological appearances of the tumour or on clinical and anatomical features.

The most adequate classification, using the TNMP system, was presented by the International Cancer Union in 1973. It is based on 3 main points:

1. Invasive growth of the tumour and its stage.
2. Involvement of lymph nodes and presence of metastases.
3. Data from histological examination.

However the well known classification of Jewett and Marshall is more convenient for the clinician.

Considering that prognosis and treatment depend upon tumour stage, all available methods should be used for the most accurate assessment of the stage of the disease.

On the basis of our own experience the following procedures are suggested in order to determine the stage of the tumour.

## Conventional Diagnostic Measures

Haematuria and dysuria which are the main symptoms of a tumour of the urinary bladder serve as an imperative indication for cystoscopic examination. The cystoscopic examination shows the presence of the tumour and partly its character, size and localisation. Bimanual palpation preferably under anaesthesia, reveals penetration of tumour outside the urinary bladder. All patients undergo excretory urography demonstrating the upper urinary tract, biopsy of the tumour and cytological examination of the urine. Various modifications of cystography provide an objective picture of the size of the tumour, its localisation and to a certain degree of the depth of the invasive growth.

## Pelvic Arteriography

If there is suspicion that the tumour penetrates the bladder wall and the perivesical fat (stages T2-T4 or B1, B2, C) arteriography is indicated.

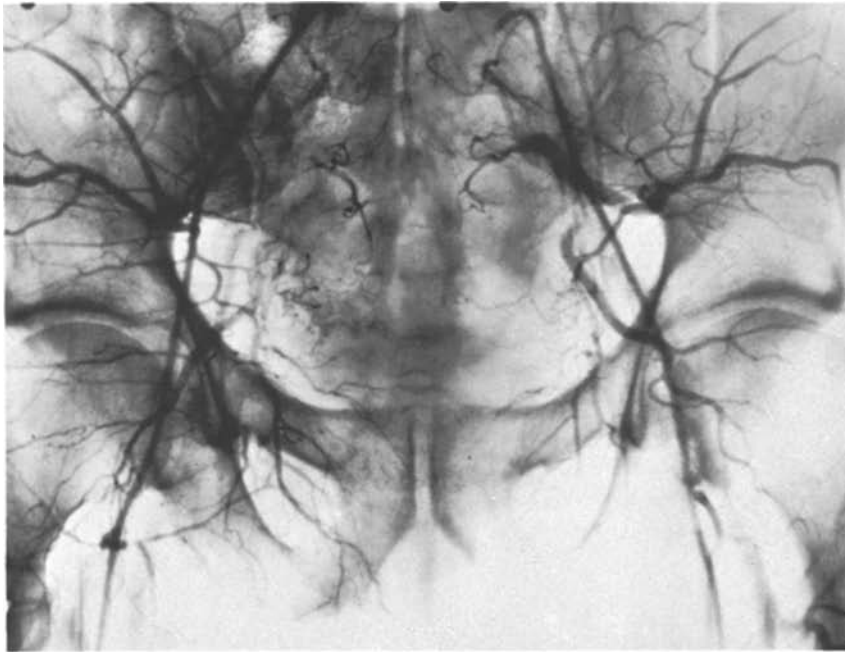


Fig. 1. Bladder cancer, stage T3NxM0. Pelvic arteriogram (arterial phase) demonstrates deformed vessels and collection of contrast medium in the tumour area on the right lateral wall



Fig. 2. Bladder cancer, stage T4N1M1. Pelvic arteriogram (capillary phase) and triple contrast cystography demonstrate total lesion; thickening of the wall to the right; numerous tumour vessels, shunts; collection of contrast medium in the tumour area

The results of this investigation are especially important when the tumour is on the base of the bladder or surrounds the bladder neck or the trigonum, and when other methods cannot give an objective picture of the degree of the invasive growth. The diagnosis is based on changes in pelvic architectonics, expressing themselves in hypervascularisation of the tumour, pathological tumour vessels in the arterial phase, the appearance of the shadow of the tumour in the capillary phase

and the premature filling of the venous channels inside the tumour.

In stages T1S - T1(O; A) there are no changes visible on arteriography. In stage T2 (B1), deformed, tortuous vessels are seen. In the capillary phase the shadow of the tumour appears as a faint shadow of the contrast medium. There are no changes in the venous phase. In stage T3 (B2) all changes in the arterial phase are more pronounced. There are numerous tortuous arteries. In the



Fig. 3. Bladder cancer, stage T4N1M1. Pelvic venogram shows tumour on the right bladder wall, stenosis and amputation of the inner pudendal and common iliac veins on the right, deformation of the prostatico-vesical plexus

capillary phase the contrast substance accumulates in the body of the tumour and the thickened wall at the base of the tumour is seen. The changes in the venous phase express themselves in the premature filling and accumulation of contrast substance in the venous pools.

In stage T4(C, D) all the above changes are seen in the arterial phase accompanied by displacement and further deformation of arteries. Tumour vessels invade perivesical fat. In the capillary phase perivesical fat appears as grey homogenous mass, pierced by small vessels. In the venous phase there is a premature appearance of veins, arterio-venous shunts are observed and the passage of contrast medium in veins is delayed.

Pelvic arteriography is performed by femoral artery puncture using Seldinger's technique with the introduction of gas into the urinary bladder and perivesical fat.

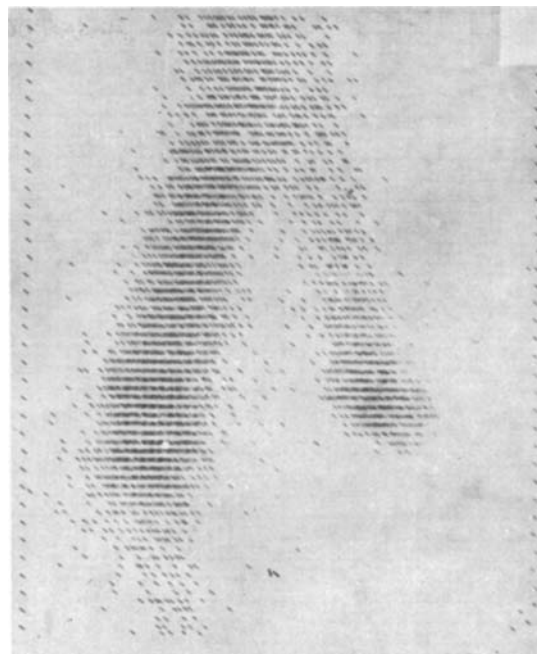


Fig. 4. Bladder cancer, stage T3N1M0. Lymphoscintigram shows tumour on the left lateral wall, collection of isotope in the area of iliac lymph nodes on the left

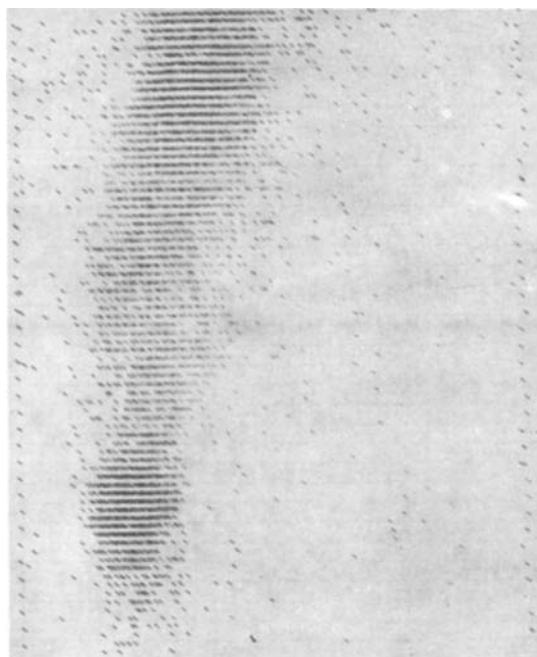


Fig. 5. Bladder cancer, stage T4N1M1. Lymphoscintigram reveals tumour in the left half of the bladder and complete block of lymph drainage and the passage of isotope on the left side, beginning with femoral lymph nodes

### Pelvic Phlebography

With the aim of obtaining additional information in the assessment of the stage of the disease pelvic phlebography has been used. Contrast substance is introduced by puncturing the pubic bones or through the deep dorsal vein of the penis. A comparison these two methods indicated that the dorsal vein technique is best for male patients and puncture of the pubic bones for female patients.

In stages T1S - T2 (O, A; B1) there were no abnormal findings on phlebograms. Characteristic changes appear in stage T3 (B2), consisting of asymmetrical filling of pudendal veins, slow flow and venous obstruction and the development of a pathological venous network on the side of the lesion. In Stage T4 (C) these changes become more pronounced and narrowing and amputation of veins is observed. Veins of the plexus Santorini may become deformed.

In some cases pelvic phlebography provides an indirect indication of the metastatic in-

volvement of the iliac lymph nodes, with semi-circular filling defects affecting the main vessels.

### Lymphoscanning and Lymphography

Lymphoscanning and lymphography are auxiliary methods of diagnosis. Lymphoscanning is a less informative method in comparison to lymphography and gives only a general impression of the lymphatic system. However lymphography does not always detect metastatic involvement of the lymph nodes. That is why the final diagnosis must be based on the whole complex of clinical and radiological data.

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