Clinical Experience in Staging of Lung Cancer at Martin-Luther University Halle-Wittenberg

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Abstract

Staging of lung cancer needs an accurate diagnostic programme resulting in therapeutic and prognostic consequences. A modern, articulate flow-chart is presented and discussed. As a result, the rate of exploratory thoracotomy was reduced from 15.1% in 1988 to 2.1% in 1997 and the rate of resectability raised up to 30%. Preoperative overstaging was found in about 25% and the same value for understaging. Looking to the N-values, there was concordance of clinical and postoperative data in 61.9% of cases.
Key words: Lung cancer, staging, exploratory thoracotomy, N factor.

Riassunto

La corretta stadiazione del carcinoma polmonare necessita un accurato procedimento diagnostico con le conseguenti implicazioni sul piano terapeutico e prognostico. Viene presentato e discusso nei suoi vari aspetti un moderno ed articolato modello di stadiazione multistrumentale del carcinoma polmonare. L'adozione di questo protocollo ha determinato un decremento sensibile delle toracotomie esplorative che dal 15.1% del 1988 sono scese al 2.1% nel 1997. Contemporaneamente la percentuale di resecabilità è salita al 30%. In circa il 25% dei casi la stadiazione clinica è risultata sovrastadiante; in un altro 25% invece sottostadiante. Per quanto concerne la attendibilità della stadiazione delle strutture linfonodali, si è osservata una concordanza pari al 61.9% tra i dati clinici preoperatorii e le risultanze operatorie.
Parole chiave: Carcinoma del polmone, stadiazione, toracotomia esplorativa, fattore N.

Staging of lung cancer needs a modern diagnostic programme to define the local extension of the tumor and the regional and distant metastatic spread. It should take into account the resulting therapeutic consequences, in potentially resectable patients it must be fully performed in is several aspects!

Our own programme is shown at Tab. I, our indications for mediastinoscopy are consequences of the result of CT scan and histology/cytology of the tumor (Tab. II). In SCLC mediastinoscopy is obligatory. There are several reasons for this strategy of "selected" mediastinoscopy, which are listed in Tab. III. According to many authors we do not see a N2 situation as a sign of inoperability, so we think that mediastinoscopy is not necessary in many cases of operable cancers, but with the above listed exceptions. Since 2 years we are using video-thoracoscopy to clear node enlargements in certain regions (aortopulmonary window, posterior mediastinal area, inferior mediastinal region).

CT scan is nowadays the absolutely necessary noninvasive method in staging lung cancer.

The validity in an own study of 152 consecutive cases is shown in Tab. IV.

In the literature the sensitivity for correct detection of mediastinal node metastases is published between 66%-100% and the specifity between 46%-99%, respectively (Vogt-Moykopf 1991). There are different results between the node stations. At N1 status (metastasis of bronchopulmonary nodes) sensitivity was 16,6% only; at N2 status (tracheobronchial and paratracheal node metastasis) sensitivity was 33,3%. In cases with atelectasis sensitivity of CT for mediastinal nodes (N2) increased to 88,2% because of-more enlarged lymph nodes. Lewis (1990) published a sensitivity of 84,4% and a specifity of 84,1%; Ikezoe (1990) a positive predictive accuracy of 68,7% and a negative predictive accuracy of 92,9%. According to Shields (1994) our principle is that no patient should be denied a thoractomy on nodal size alone, because 15%-40% of nodes judged as enlarged by CT are negative. We do not regard mediastinal lymph node metastasis (N2) as a contraindication to surgical therapy.

Further investigations are concerned to determine metastases, and comprise the main organs of metastating spreading (liver, bone, adrenals). Since the upper abdo-

minal sonogram is not sufficient to cover the adrenal region, CT of the thorax should include this region. If considerable enlargement (3 cm) of adrenals is seen, we try to clear the cause by fine needle puncture biopsy. If diagnosis cannot be established, laparoscopic removal is performed if otherwise operability of the lung cancer can be assumed. The bone scintigram has a high sensitivity, but detects all process of remodelling. With a positive result, supplementary investigation must verify the suspicion of metastases (Xray, tomography, CT). Brain CT scan was performed in all our cases despite the widespread opinion, that this is not necessary on a routine basis, becauses brain metastase are almost always indicated by nerurological or psychological alternations. But CT scan of the brain is proposed in all cases of adenocarcinoma and known N2 disease, in resection is being considered (Shields 1994). In SCLC a cerebral CT, bone biopsy and mediastinoscopy are performed before surgery.

Tab. I – STAGING PROCEDURES – OWN STRATEGY

- X-Ray
- Bronchoscopy
- Biopsy-Histology
- Cytology

- Computertomography thorax, abdomen, (brain)
- Mediastinoscopy "selected"
- Pleural puncture
- Thoracoscopy/Anterior mediastinotomy

- Sonography and/or CT upper abdomen
- (Bone scintigraphy) -> X-ray
- Bone biopsy (SCLC onlsy)

Tab. II – OUR INDICATIONS FOR MEDIASTINOSCOPY

- Contralateral enlarged LN > 1,5 cm (N3)
- Enlarged (> 1 cm) mediastinal LN in adeno-ca or anaplastic ca
- Enlarged (> 1 cm) mediastinal LN in histologically or cytologically not verified lung tumor
- Small cell ca

Tab. III – INDICATION FOR "SELECTED" MEDIASTINOSCOPY

- Mediastinal nodes < 1 cm in diameter have low incidence of metastasis (Lewis 1990, Ikezol 1990, Daly 1993, Backer 1987) Nodes > 1 cm diameter 60-85% positive

- Whittlesey (1988):
  Only 2,7% of nodes < 1 cm are positive 93% of pts. with positive nodes < 1 cm are resectable

- Gross (1988):
  "Occult" metastasis, if all mediastinal nodes normal size, in 7%
  If "some" larger nodes, metastasis 17%

- Vogel (1990):
  Metastasis in normal size nodes more common in adeno-ca (47%) than in squamous cell ca (17%).
  Izbicki (1992)
  26% and 5%

Tab. IVa – VALUE OF CT – OWN EXPERIENCE

	Tumor size (T1-T2)	*Involvement of Pleura parietalis, chest wall*	*Involvement Aorta*	*Involvement V. cava sup.*
Sensitivity	91	67	78	57
Specificity	100	75	86	100
Accuracy	92	68	85	92

Diss, Knörgen Halle 1991

Tab. IVb – VALUE OF CT – OWN EXPERIENCE

	Involvement mediastinal LN	*Involvement hilar LN*	*Involvement mediastinal LN, obstructive pneumonia*
Sensitivity	33	17	88
Specificity	97	100	98
Accuracy	87	87	96

Diss, Knörgen Halle 1991

Own Results of Staging

The rate of exploratory thoracotomies was reduced from 15.1% in 1988 to 2.1% in 1997 as a result of improved staging. N2 cases of NSLC are operated upon primarily with postoperative radiation and/or adjuvant chemotherapy. Whit SCLC we only operate primarily T1 N0-1 with adjuvant cehmotherapy; higher stages will get neoadjuvant chemotherapy. If there is good response, the tumor seems to be locally operable and there are no signs of distant metastasis, resection is discussed. Among 493 diagnosed cases of lung cancer, 148 patients were resected (30.0%). The pTNM of the resected was Stage 0 0,7% IA 14,9%, IB 31,8%, IIA 5,4%, IIB 15,5%, IIIA 23,0%, IIIB 4,1%, IV 4,7%. In our last 81 resected patients cTNM and pTNM were compared (Tab. V). There was concordance in 50.5% only. Preoperative overstaging was found in 24,7%; the same value for understaging. In a study of 750 cases of the Thoraxklink Heidelberg-Rohrbach (Vogt-Moukopf) comparing

Tab. V – COMPARISON cTNM - pTNM 81 RESECTIONS (HALLUCA) 1996-1998

		postoperative stage (pTnm)							
		IA	*IB*	*IIA*	*IIB*	*IIIA*	*IIIB*	*IV*	*Total*
clinical	Ia	10	4	1			2		17
tumor	Ib	1	8		2	7			18
stage	IIa			2				1	3
(cTNM)	IIb		4		4	2			10
	IIIa		4		3	11	1		19
	IIIb	1	2		1		1		5
	IV			1	2	1		5	9
Total		12	22	4	12	21	4	6	81

UICC TNM Classification 1997

Similar	50,6%
Clinically understaged	24,7%
overstaged	24,7%

cTNM and pTNM their results were: 44% similar, 25% clinically understaged, 31% clinically overstaged. In our material preoperative understaging was more common in higher stages III and IV (IV were cases with additionally resected solitary brain metastase or suprarenal glands metasteses). In stage I and II clinical overstaging occured in 38% (Tab. VI) T-value and N-value shifts are given in Tab. VII and VIII. Looking to the N-values there was concordance of clinical and postoperative value

Tab. VI – COMPARISON pTNM - pTNM

	I+II	III-IV	IIIA-IIIB
Similar	48%	54,8%	48%
Clinically understaged	14%	42,0%	48%
overstaged	38%	3,2%	4%

Tab. VII – T-VALUE SHIFT ALL OPERATED PATIENTS

		T-value of pTNM				
		1	2	3	4	Total
T-value	1	22	8	1	1	32
of	2	6	41	6	2	55
cTNM	3		6	9		15
	4		1		2	3
Total		28	56	16	5	105

Tab. VIII – N- VALUE SHIFT OPERATED PATIENTS

		N-value of pTNM				
		0	1	2	3	Total
N-value	0	36	7	6	1	50
of	1	6	9	3		18
cTNM	2	6	2	14	2	24
	3	3	1		1	5
Total		51	19	23	4	97

Similar	61,9%
Clinically understaged	19,5%
Overstaged	18,6%

in 61.9%; clinical understaging in 19.5% and clinical overstaging in 18,6%. There were 15 cases in whom clinically staged positive N1-N3 were not infiltrated histologically (15.5% of 97 cases). In 3 cases (3.1%) a supposed N2 or N3 situation was reduced to N1. This confirms that even very substantially enlarged lymph nodes are not on their own a reason of inoperability. In 9 case (9.3%) of clinical N0 or N1 mediastinal lymph nodes were infiltrated (N2). In 3 cases a former clinical N0 or N1 had to be corrected as infiltration of the contralateral nodes (-> N3). There was a lobectomy/bilobectomy (includ. Bronchoplasty) in 71.4%, pneumonectomy in 23.8% and atypical resection in 4.8%.

The procedure of investigation can be varied individually, bust must obatain a clinical TNM formula as a basis for therapeutic consequences. Because all imaging methods are subject to uncertainties in negative and positive sense, in the individual case further invasive methods like mediastinoscopy etc. must support the diagnosis recognizing the fact of local tumor operability or inoperability and/or multimodality treatment.

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