

CONTRALATERAL CERVICAL NODE METASTASES IN LUNG CANCER

BY

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The importance of metastases in the cervical lymph nodes in lung cancer is now established. Long ago both Boyd (1886) and Abram (1910) referred to this diagnostic aid, and Packard (1917) stated that "if (enlarged) supraclavicular glands are present, excision should be resorted to and a specimen submitted to the microscope." However, it was Daniels (1949) who proposed biopsy of non-palpable cervical lymph nodes "on the homolateral side of the pulmonary or chest disease." This procedure has now been carried out in many centres for over a decade. The difficulties which have crystallized out are the subject of this paper.

Bignall and Moon (1955) discussed the view that a considerable portion of the lymph from the left lung drains into the right paratracheal chain. They referred, as did Borrie (1953), to cases that have shown clinical evidence of contralateral node invasion. Owing to the influence of the prevailing anatomical concept of contralateral metastasis from the left-sided tumours, the current practice (contrary to the above recommendation of Daniels) is to biopsy *right* cervical nodes not only for suspected right lung cancer but also for growths originating in the *left* lower lobe (Connar, 1955; Josephs and Woods, 1958; Rochlin and Enterline, 1958; Aikens, 1959; Umiker, 1960).

On the other hand, Shefts, Terrill, and Swindell (1953) and Ottosen, Flygenring, and Søndergaard (1956) have followed the precepts of Daniels and carried out the biopsy on the same side as the involved bronchus. So did Delarue (1958), who failed to obtain positive results in cases with left lower lobe tumours and thought that this failure was confirmatory evidence in support of the view that these tumours metastasize contralaterally to the neck. Indeed, the impression has gained ground that the right scalene nodes may have a special relationship to intrathoracic disease such as Virchow's node has to abdominal growths (Boyd, 1955). Thus, Hinshaw and Garland (1956)

said that biopsies are *usually* carried out on the right side, and Nohl (1960) was convinced that this side should be selected irrespective of the position of the pulmonary primary.

Current emphasis on right-sided biopsies has led to surprises and failures. McCort and Robbins (1951) were unable to confirm radiologically that in patients with growths in the lower two-thirds of the left lung there was a predilection towards invasion of contralateral nodes. Moreover, biopsies have yielded negative results on the side chosen in accordance with the crossed-metastasis concept, although positive results have been obtained on the other side (Jay and Hewlett, 1957; Cruze, Hoffman, Hayden, and Byron, 1958). It is necessary, in consequence, to re-examine our present views on the contralateral localization of cervical secondaries from pulmonary primaries.

INVESTIGATION

At necropsy tumours of the lung were removed in a block with the mediastinal and cervical tissues. The specimen was fixed in formalin and then dissected so as to preserve the lymph nodes *in situ*. In this way the metastatic patterns in these nodes were traceable. It has become apparent that the lymphatics of the left lower lobe and also of all the other lobes are connected with the lymph nodes on the opposite side of the neck.

Figure 1 confirms that a tumour originating in the left lower lobe may spread to the right cervical nodes. Figure 2, on the other hand, shows that a tumour arising from this lobe may spread only to the ipsilateral cervical nodes. Figure 3 reveals that the cervical nodes on the left may suffer more than those on the right side when the left lower lobe is the original seat of the tumour.

Other dissections have demonstrated that these features are equally true of tumours of the other lobes of the lungs. Figure 4 illustrates the occurrence of right cervical node metastases from a left upper lobe tumour. The orderly nature of the contralateral spread in this case is instructive. Figures 5 and 6 exemplify contralateral cervical node metastases from right-sided primaries.

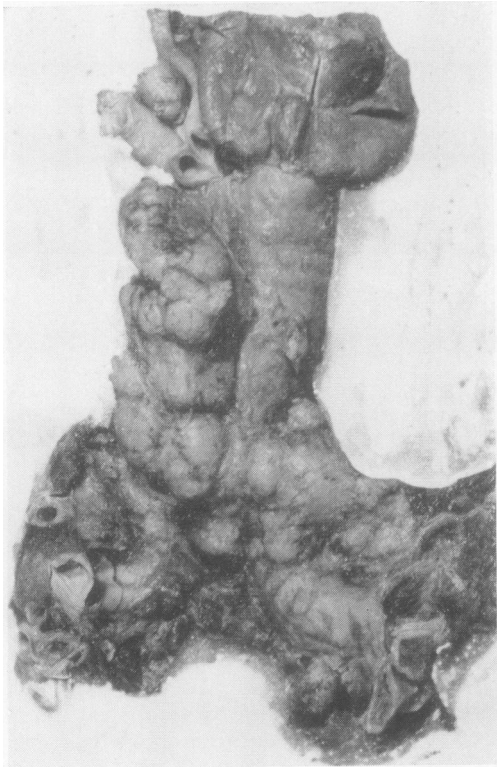


FIG. 1



FIG. 2

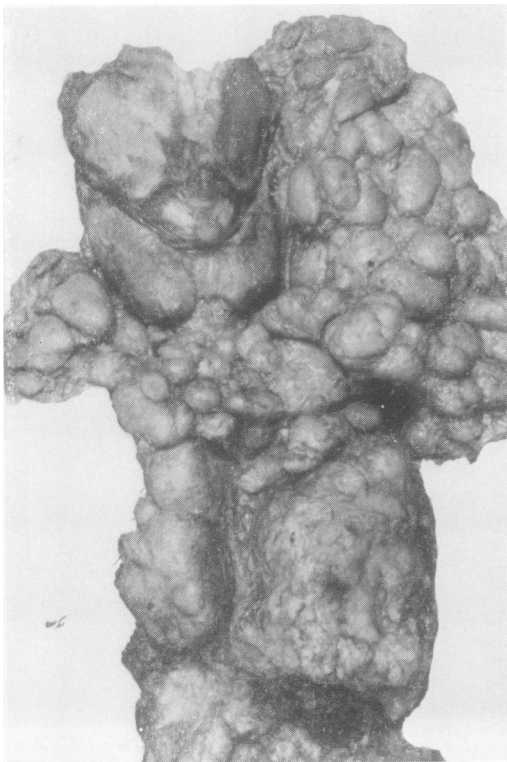


FIG. 3

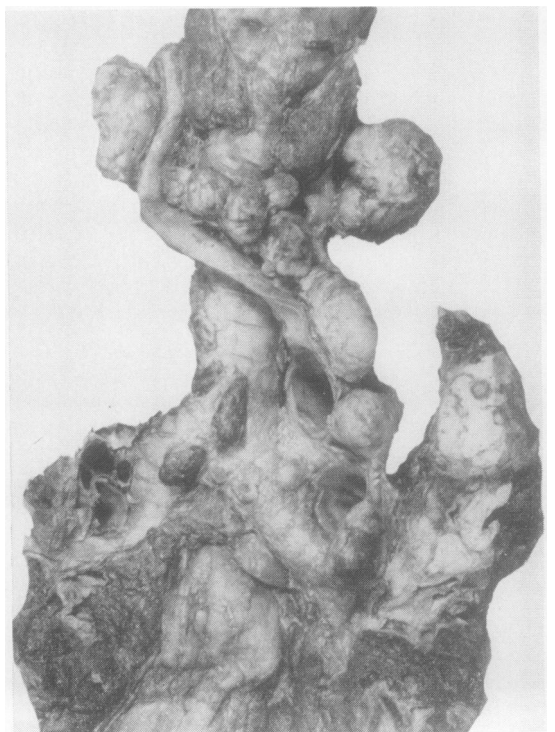


FIG. 4



FIG. 5

FIG. 1.—Left lower lobe origin. The left hilar and sub-carinal nodes are invaded. Note that from the latter a chain of invaded nodes extends into the neck on the right side.

FIG. 2.—Left lower lobe origin. The mediastinal nodes on the left side are more involved than those on the right, but only the left cervical nodes at the level of the thyroid gland are replaced by tumour.

FIG. 3.—Left lower lobe origin. Both the mediastinal and the cervical nodes contain metastases bilaterally, but in each region the deposits are larger on the left side.

FIG. 4.—Left upper lobe origin. A Y-shaped chain of metastasized nodes rises up into the neck from the left hilum. Note that the crossing zone follows the curve of the innominate artery and that the contiguous right mediastinal nodes are spared.

FIG. 5.—Right upper lobe origin. Near to the apical mass of tumour is an anthracotic lymph node that is scarcely invaded by the tumour; below the thyroid gland on the left side are lymph nodes completely replaced by tumour.

FIG. 6.—Right lower lobe origin. The chain of involved lymph nodes has been sectioned in order to reveal the continuity of infiltration up the right side of the trachea and across the midline to the left side of the neck below the thyroid gland. Note that the left mediastinal nodes are macroscopically free from invasion.

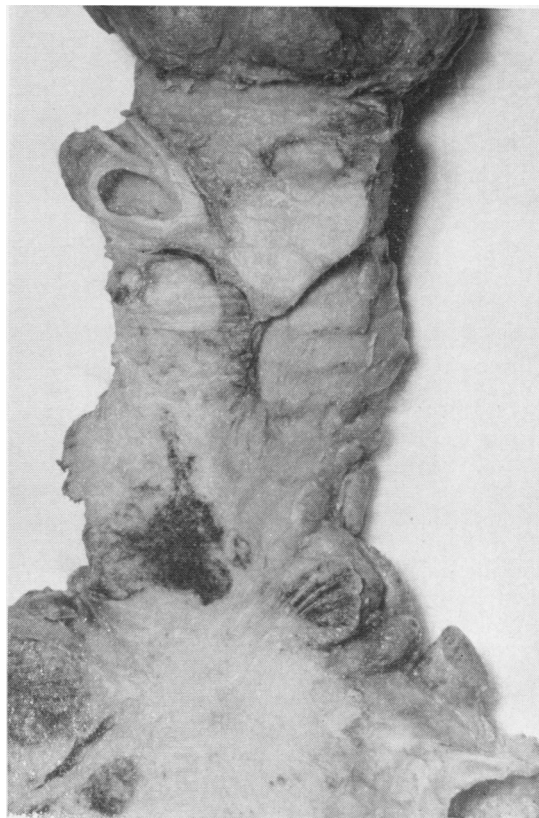


FIG. 6

common site of metastases outside the involved hemithorax. At least, it is the ipsilateral rather than the contralateral cervical nodes that usually bear the brunt of metastasis (Thomas, 1948 ; Jack, 1952 ; Spencer, 1954). This conclusion is borne out by the numerical data of Maxwell (1930), of Viacava and Pack (1944), and of Björk (1947).

It is thought that pre-existing lesions involving intrathoracic lymph nodes probably affect the distribution of lymph node metastases in lung cancer (Stirrat, 1945 ; Weinberg, 1952). This may also be influenced by the existence of some intrinsic differences in the lymphatic drainage on the two sides of the chest (Rabin, Selikoff, and Kramer, 1952 ; D'Abreu, 1953). Liebow (1956) emphasized that intensive studies of the lymph drainage of the lung are needed. My impression is that a more dynamic concept of lymph flow and its attendant effects on metastasis would emerge if patterns of distribution of cancer deposits were mapped out (Onuigbo, 1961a and b).

DISCUSSION

The illustrated dissections suggest that a tumour originating in any lobe of the lung may spread to the opposite cervical nodes. Although these contralateral metastases are a reality, I wish to emphasize, as I have done elsewhere (Onuigbo, 1959), that ipsilateral metastases are more common than contralateral ones. Thus, according to Gibbon, Stokes, and McKeown (1955), the ipsilateral cervical nodes are probably the most

We need to know more about the channels which bring about contralateral metastasis, although, as Bryson (1949) noted, lung cancer often spares the mediastinal nodes of the other side. There may be zonal anastomotic lymphatics in the body (Roberts, 1928; Parker, 1935; Tobin, 1957). Perhaps these vessels produce crossed metastases at particular points in patients with lung cancer (Weinberg, 1951; Senoo, 1956; Clegg, 1958). A study of numerous dissections should bring about a better understanding of the vagaries in metastasis.

Since it has been shown that contralateral metastases may be found in tumours arising from any part of the lung, what principle should guide us in the choice of the site for cervical node biopsy? Harken, Black, Clauss, and Farrand (1954), following the principle that left lower lobe tumours are apt to spread contralaterally, recommended bilateral biopsies for these tumours. But since tumours originating in other lobes may spread contralaterally to the neck, bilateral biopsies should be extended to other pulmonary primaries.

SUMMARY

The diagnostic importance of cervical lymph node enlargement in lung cancer has long been known, but it was not until 1949 that Daniels recommended that when the cervical nodes are not palpable they should be biopsied on the same side as the lung lesion. However, owing to the influence of the prevailing anatomical concepts on contralateral lymph flow from the lower part of the left lung, opinion has swung steadily in favour of right-sided biopsies. The failures resulting from this procedure have necessitated a reappraisal of the current concepts.

On dissecting formalin-fixed necropsy specimens of lung cancer, which were removed en bloc with mediastinal and cervical tissues, it has been found that a tumour originating in any lobe of the lung may spread to the contralateral cervical nodes. In consequence, the diagnostic procedure most likely to yield positive results in the neck is the bilateral biopsy.

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REFERENCES

- Abram, J. H. (1910). *Clin. J.*, **35**, 401.
 Aikens, R. L. (1959). *Canad. med. Ass. J.*, **81**, 891.
 Bignall, J. R., and Moon, A. J. (1955). *Thorax*, **10**, 183.
 Björk, V. O. (1947). *Acta chir. scand.*, Suppl. 123, p. 36.
 Borrie, J. (1953). *Aust. N.Z. J. Surg.*, **23**, 55.
 Boyd, M. A. (1886). *Trans. Acad. Med. Ireland*, **4**, 91.
 Boyd, W. (1955). *Pathology for the Surgeon*, 7th ed., p. 117. Saunders, London.
 Bryson, C. C. (1949). M.D. Thesis, p. 69. Cambridge University.
 Clegg, J. W. (1958). In *Cancer*, ed. by R. W. Raven, Vol. 2, p. 570. Butterworth, London.
 Connor, R. G. (1955). *Surg. Gynec. Obstet.*, **101**, 733.
 Cruze, K., Hoffman, R. F., Hayden, W. B., and Byron, F. Y. (1958). *Ann. Surg.*, **148**, 895.
 D'Abreu, A. L. (1953). *A Practice of Thoracic Surgery*, p. 267. Arnold, London.
 Daniels, A. C. (1949). *Dis. Chest*, **16**, 360.
 Delarue, N. C. (1958). *Canad. J. Surg.*, **1**, 94.
 Gibbon, J. H., Stokes, T. L., and McKeown, J. J. (1955). *Amer. J. Surg.*, **89**, 484.
 Harken, D. E., Black, H., Clauss, R., and Farrand, R. E. (1954). *New Engl. J. Med.*, **251**, 1041.
 Hinshaw, H. C., and Garland, L. H. (1956). *Diseases of the Chest*, p. 324. Saunders, London.
 Jack, G. D. (1952). *Trans. med.-chir. Soc. Edinb.*, 1952-1953. Session 132, p. 75.
 Jay, J. B., and Hewlett, T. H. (1957). *U.S. armed Forces med. J.*, **8**, 1731.
 Josephs, B. N., and Woods, F. M. (1958). *A.M.A. Arch. Surg.*, **76**, 93.
 Liebow, A. A. (1956). In *Pulmonary Carcinoma*, ed. by E. Mayer and H. C. Maier, p. 63. New York University Press, New York.
 McCort, J. J., and Robbins, L. L. (1951). *Radiology*, **57**, 339.
 Maxwell, J. (1930). *J. Path. Bact.*, **33**, 233.
 Nohl, H. C. (1960). D.M. Thesis, p. 37. Oxford University.
 Onuigbo, W. I. B. (1959). *J. thorac. Surg.*, **37**, 771.
 — (1961a). *Brit. J. Dis. Chest*, **55**, 86.
 — (1961b). *Cancer Res.*, **21**, 1077.
 Ottosen, P., Flygenring, J., and Søndergaard, T. (1956). *Acta chir. scand.*, **111**, 275.
 Packard, M. (1917). *Amer. J. med. Sci.*, **154**, 351.
 Parker, A. E. (1935). *Amer. J. Anat.*, **56**, 409.
 Rabin, C. B., Selikoff, I. J., and Kramer, R. (1952). *A.M.A. Arch. Surg.*, **65**, 822.
 Roberts, O. W. (1928). M.S. Thesis, pp. 87-92. London University.
 Rochlin, D. B., and Enterline, H. T. (1958). *Amer. J. Surg.*, **96**, 372.
 Senoo, T. (1956). *Osaka Univ. med. J.*, **7**, 515.
 Shefts, L. M., Terrill, A. R., and Swindell, H. (1953). *Amer. Rev. Tuberc.*, **68**, 505.
 Spencer, H. (1954). Ph.D. Thesis, p. 121. London University.
 Stirrat, J. H. (1945). M.D. Thesis, p. 24. Glasgow University.
 Thomas, C. Price (1948). In *British Surgical Practice*, ed. by Sir E. Rock Carling and J. Paterson Ross, Vol. 5, p. 450. Butterworth, London.
 Tobin, C. E. (1957). *Anat. Rec.*, **127**, 611.
 Umiker, W. O. (1960). *Dis. Chest*, **37**, 82.
 Viacava, E. P., and Pack, G. T. (1944). *Arch. Surg. (Chicago)*, **48**, 109.
 Weinberg, J. A. (1951). *J. thorac. Surg.*, **22**, 517.
 — (1952). *Calif. Med.*, **76**, 270.