Bronchial Adenoma*

Clinicopathologic Study and Results of Treatment

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Among 1,700 primary tumors of the lung, there were 53 cases of bronchial adenoma (3.1 percent); 38 (72 percent) of the 53 were typical carcinoids, and the remaining 15 were of a higher grade of malignant neoplasm. There was a slight predominance of female patients, and the age of greatest incidence was between 30 and 50 years (31/53; 58 percent). The most frequent localization was in the main bronchi and in the left bronchial tree. In cases of higher grades of malignant neoplasm, extensive bronchopulmonary resections were performed, while in the less active and less metastatic carcinoids, partial resections were generally performed, using bronchoplastic techniques, sleeve resections, and grafts, except in those cases in which bronchial obstruction had produced extensive and irreversible lesions. Survival at five and ten years after surgery is presented.

Almost one century after Müller's first description (1882) of an autopsy with an endobronchial tumor with the characteristics of an adenoma, there is still some controversy on their degree of aggressiveness. Since the reports of Goodner et al., Zellos, and others, bronchial adenomas have been considered invasive neoplasms capable of causing metastases, whatever their histologic variety; however, it is necessary to separate the highly malignant forms from those that can be considered to have a relatively benign course.

**Materials and Methods**

In this study on 53 patients with bronchial adenoma who underwent surgery between 1961 and 1977, the following four histopathologic varieties were considered: (1) “typical” carcinoids; (2) “atypical” carcinoids; (3) “malignant” carcinoids; and (4) cylindromas.

"Typical" carcinoids are tumors made up of small regular cells with oval hyperchromatic nuclei, forming clusters, cords, or tubular structures separated by highly vascularized stroma with plentiful deposits of hyalin. There is no infiltration of the surrounding tissues, nor were any metastases to the hilar lymph nodes seen in any of the 38 cases in our series with these characteristics.

"Atypical" carcinoids are tumors with a structure very similar to the previous ones but with marked hypercellularity, polymorphism, and nuclear hyperchromatism; the stroma is scanty and frequently infiltrated with elements of tumor. There was no invasion of the surrounding tissues nor metastases to the hilar lymph nodes. Only four cases in our series had these characteristics.

"Malignant" carcinoids are tumors with the structure of typical or atypical carcinoids but with invasion of the surrounding structures and often with metastases in the hilar lymph nodes. In no case was a carcinoid with the structure and course of an "oat cell carcinoma" seen. Eight of the cases in our series had these characteristics; and in five of them, metastases to the hilar lymph nodes existed.

Cylindromas are tumors made up of pleomorphic star-shaped cells placed in intertwined tubes, the center of which is made up of tubular channels filled with a substance with the characteristics of epithelial mucin. In the three cases with these characteristics, there was invasion of the bronchial wall and the surrounding structures; and in two, there were metastases to the hilar lymph nodes.

**Results**

**Incidence**

The incidence of bronchial adenomas in series was 3.1 percent in relation to primary bronchial tumors (53 adenomas in 1,700 primary pulmonary tumors). Of these 53 cases studied, 38 were "typical" carcinoids, four were "atypical" carcinoids, eight were "malignant" carcinoids, and three were cylindromas (Table 1).

There was a slightly higher incidence in female patients (28 cases) than in male patients (25 cases), with a higher frequency of "typical" carcinoids (38/53; 72 percent) and more cases of malignant adenomas having been found among women.

**Table 1—Sex Distribution of Histologic Types of Adenomas**

<table>
<thead>
<tr>
<th>Data</th>
<th>Female</th>
<th>Male</th>
<th>Total (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical carcinoids</td>
<td>18</td>
<td>20</td>
<td>38 (72)</td>
</tr>
<tr>
<td>Atypical carcinoids</td>
<td>3</td>
<td>1</td>
<td>4 (8)</td>
</tr>
<tr>
<td>Malignant carcinoids</td>
<td>6</td>
<td>2</td>
<td>8 (15)</td>
</tr>
<tr>
<td>Cylindromas</td>
<td>1</td>
<td>2</td>
<td>3 (6)</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>25</td>
<td>53 (100)</td>
</tr>
</tbody>
</table>
Age

The age of the patients studied varied considerably, with a higher incidence occurring between the ages of 30 and 50 years (31/53; 58 percent); however, six patients were under 20 years of age, the youngest being 3 years old and the oldest 61. The average age of these patients was 35 years (38 years for the female patients and 32 years for the male patients). It is quite clear that these tumors appear at an earlier age than primary bronchial carcinoma.

Clinical Features

The symptoms of the patients are shown in Table 2 and included hemoptysis and bronchopulmonary infections caused by bronchial obstruction occurring with febrile episodes and mucopurulent sputum. The repetition of this retention syndrome caused situations of chronic pulmonary suppuration in some of our patients. These were sometimes quite severe and were associated in some cases with bronchiectasis, fibrosis, and pleural empyema.

Diagnosis was quite late in many cases, not only because some patients were asymptomatic but also due to wrong diagnoses, with the presence of hemoptysis and fever having occasioned many needless antituberculosis treatments. In one case of bronchial typical carcinoid, diagnosis was only established 24 years after the first symptoms; meanwhile, due to bronchial obstruction, the patient developed a severe pulmonary suppuration and an empyema that formed a fistula spontaneously at the axilla. After a period of drainage, a pleuropneumonectomy was performed.

Bronchoscopic and histopathologic examination of the specimen from biopsy permitted the diagnosis in more than 90 percent of the cases studied. At bronchoscopic examination (especially in the cases of typical carcinoids), rounded, well-limited smooth masses covered with reddened, highly vascular, easily bleeding mucosa were seen.

The majority of these patients did not smoke, and in no case was an influence of known agents or preexisting interstitial disease found.

Table 2—Symptoms of Bronchial Adenomas

<table>
<thead>
<tr>
<th></th>
<th>Data</th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoptysis</td>
<td>5</td>
<td>6</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>Distal infection</td>
<td>8</td>
<td>3</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>Hemoptysis plus distal infection</td>
<td>12</td>
<td>15</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>Asymptomatic subjects</td>
<td>3</td>
<td>1</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Symptoms &lt;3 yr before diagnosis</td>
<td>22</td>
<td>18</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Symptoms &gt;3 yr before diagnosis</td>
<td>3</td>
<td>6</td>
<td></td>
<td>9</td>
</tr>
</tbody>
</table>

Radiologic Aspects

Although the radiologic aspects of bronchial adenomas are variable, they can furnish important data.

In some cases, no changes are seen on the routine chest roentgenogram; this occurs mainly in endobronchial tumors. In these cases, only tomograms of the main bronchi may show the neoplasm.

The majority of adenomas develop not only within the bronchus but also out of it, forming a kind of iceberg, which appears radiologically as a dense image of variable size. The study of the radiologic limits of the image of the tumor is very important, since in some cases the limits are clear and regular (corresponding usually to the "typical" carcinoid

Figure 1. Typical carcinoid; limits are regular and clear.

Figure 2. Malignant carcinoid; limits are hazy and imprecise, showing invasion of surrounding parenchyma.
that is frequently involved by a capsule; Fig 1), while in others the limits are hazy and imprecise, showing the invasion of the surrounding parenchyma that is more frequently found in the "malignant" forms of carcinoid (Fig 2).

Other times, due to bronchial obstruction by the tumor, more or less extensive parenchymal lesions appear, according to the repetition and the severity of the retention syndromes (Fig 3 to 5). The radiologic aspects of these lesions are very variable, as they are related to the extent of chronic suppuration, bronchiectasis, fibrosis, and atelectasis, as well as to the location of the neoplasm (main or lobar bronchi).

A "lack of changes" on standard roentgenograms in the cases studied occurred in four (8 percent) of 53 cases. A predominantly central dense image was seen in 35 cases (66 percent). More or less extensive parenchymal changes due to bronchial obstruction occurred in 14 cases (27 percent).

The adenomas were more frequently localized on the left, and there was a higher incidence in the main bronchi (28/53; 53 percent) (Table 3).

Treatment

Endoscopic resections have been completely abandoned for some time. In a case in which this was done, bronchial adenoma recurred rapidly, making a thoracotomy imperative. In the cases in which preoperative bronchoscopic biopsy or intraoperative histologic examination showed a malignant carcinoid or a cylindroma, a wide resection (usually pneumonectomy) was always the procedure of choice.

In typical carcinoids, more economical procedures were preferred because of the lower degree of malign-

**Table 3—Localization of Bronchial Adenomas**

<table>
<thead>
<tr>
<th>Data</th>
<th>Female</th>
<th>Male</th>
<th>Total (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right bronchial tree</td>
<td>11</td>
<td>14</td>
<td>25 (47)</td>
</tr>
<tr>
<td>Left bronchial tree</td>
<td>17</td>
<td>11</td>
<td>28 (53)</td>
</tr>
<tr>
<td>Main bronchi</td>
<td>12</td>
<td>16</td>
<td>28 (53)</td>
</tr>
<tr>
<td>Lower lobar bronchi</td>
<td>10</td>
<td>6</td>
<td>16 (30)</td>
</tr>
<tr>
<td>Upper lobar bronchi</td>
<td>5</td>
<td>3</td>
<td>8 (15)</td>
</tr>
<tr>
<td>Segmental bronchi</td>
<td>1</td>
<td>0</td>
<td>1 (2)</td>
</tr>
</tbody>
</table>
nancy of these tumors.\textsuperscript{19,20} Therefore, in these cases, bronchoplastic procedures were frequently used (sleeve resections, and in cases of exclusively endobronchial tumors, resection of the bronchial wall at the site of implantation of the tumor, with subsequent transverse suture of the bronchial wall). In cases in which the area to be repaired was larger, a dermo-epidermal graft was used according to Gebauer’s technique.\textsuperscript{21-24}

Eighteen lobectomies, 17 pneumonectomies, 12 lobectomies with bronchoplasty, one pneumonectomy with bronchoplasty, two lobectomies with sleeve resection, and three resections of the bronchial wall followed by simple transverse suture, as well as two reconstructed with a skin graft, were performed on the 53 patients. Postoperative mortality (1.9 percent) was one case in which the diagnosis was malignant carcinoid.

\textbf{Survival}

Survival at five and ten years is shown in Table 4. It should be noted that of the two patients with typical carcinoid who died, one was killed in a road accident nine years after surgery, and the other patient died of a cerebrovascular accident at the age of 70 years (15 years after his operation). The three patients with cylindromas who survived for more than ten years are not a sufficient number to warrant any conclusion.

The late results obtained in this series are good proof of the low-grade malignancy of typical carcinoids. In none of the 53 cases studied was there any signs of the carcinoid syndrome.

\textbf{REFERENCES}

1 Müller HL: Zur Entstehungsgeschichte der Bronchialer-

\begin{table}[!h]
\centering
\begin{tabular}{|c|c|c|c|}
\hline
 & Typical Carcinoid & Atypical Carcinoid & Malignant Carcinoid & Cylindromas \\
\hline
Surgery 5 yr ago & 30 & 3 & 5 & 3 \\
Survival at 5 yr & 30 (100) & 3 (100) & 1 (20) & 3 (100) \\
(per cent) & & & & \\
Surgery 10 yr ago & 23 & 2 & 1 & 3 \\
Survival at 10 yr & 21 (91) & 2 (100) & 0 & 3 (100) \\
(per cent) & & & & \\
\hline
\end{tabular}
\caption{Survival in Bronchial Adenoma}
\end{table}

weiter ungen (inaugural dissertation). Halle, Germany, 1882


