resected through the same incision. The 5-year survival of 26.8% in 31 patients who underwent resection by various approaches³ is encouraging.

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Reply to the Editor:

We appreciate the comments of Drs. Niwa and Masaoka concerning our anterior transcervical-thoracic technique for resecting non-small-cell lung cancers (NSCLCs) involving the thoracic inlet.¹ The problem with their views is not that they are unorthodox but that, unfortunately, they add more confusion and ambiguity to the controversial management of these types of tumors than they address it. We would like to clarify certain points.

Foremost among their comments is the classification of apical NSCLC. This has been the subject of exhaustive discussions that are far from being resolved. Drs. Niwa and Masaoka classify apical lesions into anterior and superior sulcus tumors according to their location and justify this distinction on the basis of different subjects for resection. Although their classification has not been reported in the English literature,² and therefore is unavailable for review, we agree that superior sulcus tumors should be differentiated from apical tumors invading the thoracic inlet. However, it is our firm belief that the definitive distinction has already been established by Pancoast³ in 1932 and Paulson⁴ in 1973. According to these two authors, two distinct categories of apical tumors exist—those designated by Pancoast³ as superior sulcus tumors and the more common extensive lesions described by Paulson.⁴ The latter are apical chest tumors or tumors of the upper part of the thorax which, in their advanced stage, might invade the structures in the thoracic inlet. Superior sulcus tumors are situated at a definite location in the thoracic inlet,³ and evoke a characteristic clinical picture called Pancoast-Tobias syndrome.^{5,6} The combination of preoperative radiation therapy (30 Gy) followed by surgical resection performed through a posterior interscapulo-vertebral approach, as reported by Shaw, Paulson, and Kee,⁷ has

become the preferred treatment and yields long-term survival and cure for selected patients.^{3,7,8} Mediastinal lymph nodes, vertebral body, brachial plexus, and subclavian vascular involvement represent poor prognostic factors and contraindications for surgical resection.^{9,10} In defining the precise location of superior sulcus tumors, Pancoast³ found it necessary to discard the term *apical chest tumors*, which he had originally used in his article in 1924,¹¹ “because it has proved to be confusing and has permitted the inclusion of other more common tumors of the upper part of the thorax.” Thus the more common apical tumors of the upper lobes, which in their natural history invade the thoracic inlet and might cause the Pancoast-Tobias syndrome or other signs and symptoms of pulmonary, mediastinal, and inlet involvement, are different lesions, and lesions of greater extent and stage of involvement than superior sulcus tumors.⁴ Because of their locally advanced stage and tendency to invade the structures lying in the thoracic inlet, the hazards of achieving a complete resection of the tumor-bearing inlet area, and the surgical morbidity and mortality, these apical neoplasms are considered to be unresectable and to have a dismal prognosis. The standard treatment has been palliation or supportive care.

Our report¹ deals with this type of tumor and not with superior sulcus lesions. In developing our anterior transcervical-thoracic technique, our goal was not to demonstrate the superiority of the anterior over the posterior approach or vice versa, but merely to address specifically the question of whether it is possible and justified to radically resect apical lung carcinomas invading the thoracic inlet and the structures lying above this area, regardless of their tumor location. Our preoperative and surgical philosophy is that superior sulcus tumors displaying no preoperative signs or symptoms of inlet involvement should be operated on via the classic posterior approach,⁷ as we did during the past decade. Conversely, for those apical carcinomas causing signs and symptoms of inlet involvement, a complete oncologic and safe surgical clearance of the entire tumor-bearing inlet area cannot be obtained by the conventional posterior approach. It is in this last circumstance that we recommend the exploration or resection of the inlet tumor-bearing area first, followed, if necessary, by a classic posterior thoracotomy. As experience has increased, it has become evident that the posterior thoracotomy is necessary only when the tumor involves the bony structures lying below the second rib.

We thank Drs. Niwa and Masaoka for giving us the opportunity to update our early experience. Between January 1980 and December 1993, our technique was applied to a total of 40 patients with apical tumors involving the thoracic inlet. The group included 8 women and 32 men with a mean age of 55 ± 10.8 years; 12 tumors were of squamous and 28 of non-squamous histologic type. According to our anatomic classification of the thoracic inlet, which reflects the level of involvement of the first rib,^{1,12} 14 were located in the anterior, 4 in the middle, and 22 in the posterior paths of the thoracic inlet. Twenty-four (60%) tumors were radically resected through both anterior and posterior approaches and 16 (40%) through the cervical approach alone. In 17 patients (42.5%) the subclavian vessels were involved (Table I). In 9 patients the cervical phrenic nerve was involved and resected, and in 21 the first thoracic level of the lower trunk of the brachial plexus. All but 2 of the N2 lesions were either N0 ($n = 35$) or N1 ($n = 3$) at pathologic examination. The increased use of the cervical approach alone compared with our early experience¹ is clearly related to our increased surgical experience. Among the 16

Table 1. Demographic profile of the 40 patients undergoing operation for apical bronchogenic carcinomas involving the thoracic inlet

Case	Tumor type	Type of approach	Ribs resected	Vascular involvement	Type of pulmonary operation
1	Posterior	Combined	1	—	Wedge resection
2	Anterior	Cervical alone	1	—	Wedge resection
3	Posterior	Combined	1-3	—	Wedge resection
4	Posterior	Combined	1-3	—	Upper lobectomy
5	Posterior	Combined	1-2	—	Pneumonectomy
6	Middle	Combined	1-2	—	Upper lobectomy
7	Anterior	Combined	1-2	SV	Upper lobectomy
8	Posterior	Combined	1-3	—	Upper lobectomy
9	Posterior	Combined	1-4	—	Upper lobectomy
10	Posterior	Combined	1-2	—	Upper lobectomy
11	Anterior	Combined	1-3	SA/SV	Wedge resection
12	Anterior	Combined	1	SA/SV	Upper lobectomy
13	Posterior	Combined	1-4	—	Upper lobectomy
14	Posterior	Combined	1-3	—	Upper lobectomy
15	Posterior	Combined	1-5	VA	Upper lobectomy
16	Posterior	Combined	1-4	—	Wedge resection
17	Anterior	Cervical alone	1-2	SA/SV	Upper lobectomy
18	Posterior	Combined	1-4	—	Wedge resection
19	Posterior	Combined	1-3	SV/VA	Upper lobectomy
20	Posterior	Cervical alone	1-2	SA	Wedge resection
21	Posterior	Combined	1-2	SA	Wedge resection
22	Posterior	Combined	1-3	—	Wedge resection
23	Posterior	Combined	1-2	SA/VA	Wedge resection
24	Anterior	Cervical alone	1	SA/SV/VA	Upper lobectomy
25	Posterior	Cervical alone	1-2	SA	Wedge resection
26	Anterior	Cervical alone	1-2	—	Wedge resection
27	Posterior	Cervical alone	1	—	Wedge resection
28	Posterior	Cervical alone	1-3	—	Upper lobectomy
29	Anterior	Cervical alone	1-2	SA/SV/VA	Wedge resection
30	Middle	Cervical alone	1-4	—	Upper lobectomy
31	Anterior	Cervical alone	1-2	—	Wedge resection
32	Anterior	Cervical alone	1	SA/SV	Wedge resection
33	Anterior	Cervical alone	1-2	SA/SV	Upper lobectomy
34	Anterior	Combined	1-4	SA	Upper lobectomy
35	Posterior	Combined	1-3	SA/SV	Upper lobectomy
36	Anterior	Cervical alone	1-2	—	Wedge resection
37	Middle	Cervical alone	1-2	SA/SV	Wedge resection
38	Middle	Combined	1-4	—	Wedge resection
39	Anterior	Cervical alone	1-2	—	Upper lobectomy
40	Posterior	Combined	1-4	—	Upper lobectomy

Combined, Cervical plus posterior thoracotomy; SA, subclavian artery; SV, subclavian vein; VA, vertebral artery. Tumor type classified according to Darteville and Macchiarini.¹²

patients treated with a cervical approach alone, 6 (37.5%) had an upper lobectomy, which proves that major pulmonary resection, although difficult, can be performed through this anterior approach; moreover, 2 of the patients had an upper lobectomy and resection of the first 3 and 4 ribs, respectively, demonstrating that some apical tumors extending below the second rib might be resected through the anterior approach by lowering the level of the horizontal incision. It is true that only 4 (18%) of the patients with a posterior tumor had their lesion resected via the cervical approach alone. However, the bony structures lying below the second ribs were involved in 14 of the remaining 18 patients with posterior lesions; one required a pneumonectomy, 1 a lobectomy in the early stage of our experience, and in the

remaining 2 the subclavian artery was involved, with ($n = 1$) or without ($n = 1$) the subclavian vein.

These data clearly demonstrate that the comments of Dr. Niwa and Masaoka are confused at least in the sense that our reported cases were apical tumors involving in their natural history the thoracic inlet, and not superior sulcus tumors, for which the indications and treatment modalities applied in our department were as described herein. We never recommended the anterior approach for true superior sulcus tumors. The fact that major pulmonary resections can be performed through the anterior approach alone reflects our increased surgical experience, but this does not imply that the posterior incision is unnecessary, because we consider the "posterior approach" not

an alternative but a sine qua non surgical time for completing the resection.

The anterior approach of Masaoka, Ito, and Yasumitsu¹³ affords a superb anterior operative view for resecting bronchogenic tumors involving the anterior thoracic inlet, and we used their approach once.¹⁴ However, we believe that the median sternotomy and anterior intercostal thoracotomy are not necessary for resecting apical tumors, because they do not add much more exposure but do increase postoperative complications (e.g., flail chest¹³) and morbidity, especially when the phrenic nerve needs to be resected. The median sternotomy yields a transverse exposure of the mediastinal and pulmonary structures. In our opinion, this gives a more theoretical than practical surgical view to apical lesions in that it cannot afford adequate exposure and manipulation of those apical lesions involving, for instance, the anterior arches of the first ribs and surrounding structures. By contrast, our cervical approach yields a direct open window to the entire aperture of the thoracic inlet once the internal half of the clavicle has been removed; the key success of our approach is this last step of the operation, which permits a direct view and surgical management of all tumors involving the thoracic inlet. Moreover, by making the horizontal incision either immediately below the clavicle or in the bed of the second or third intercostal muscles and resecting the related chest wall, we obtain the equivalent of an anterior thoracotomy. In this sense, 10 anterior, 2 middle, and 4 posterior apical tumors were radically resected through the cervical approach alone.

Drs. Niwa and Masaoka also recommend operation for bronchogenic tumors involving the sternum or ipsilateral supraclavicular lymph nodes. We might well speculate that in Western countries the indications for resecting bronchogenic tumors are somewhat more cautious and limited, particularly in terms of N status. At any rate, the technique described by Niwa and associates¹⁵ might be an option, but we believe it simply represents an anterior prolongation above the nipple of the classic posterior approach described by Shaw, Paulson, and Kee⁷ in 1961. This technique frees the entire scapular region but has been abandoned at our institution because of its limited exposure of the upper compartments of the thoracic inlet and its excessive morbidity.

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Late management of esophageal perforation

To The Editor:

I read with interest "Management of Delayed Esophageal Perforation" by Salo and others in the December 1993 issue of the JOURNAL.¹ How should this be managed, asked the authors: "Esophagectomy or primary repair?"

To answer this question, they report their experience. Among 19 patients treated with primary repair, 13 died, which constitutes a mortality of 68.4%. The mortality for the patients in the esophagectomy group was lower, 13%, but accompanied by high morbidity because of the magnitude of the operation and long-term care necessary for esophagectomy and later reconstitution of the gastrointestinal tract. The authors recognize that the lethal factor in this group of patients is mediastinal sepsis: "Insufficient control of the mediastinal sepsis is the principal cause of death in patients with delayed esophageal perforation."

A third alternative not mentioned by the authors of this paper directs therapy directly to the treatment of mediastinitis itself. In my experience and that of others, irrigation of the mediasti-