posterolateral thoracotomy through the fourth or fifth intercostal space. In fact, through a 7- to 10-cm skin incision posterior to the midaxillary line, the access to the heart is excellent. The ascending aorta and the right atrium are easily exposed, and all cardiopulmonary bypass catheters can be inserted through this posterior approach, as done by the authors through a purely lateral approach. The younger the patients, in fact, the easier it is to obtain a good view, since with pericardial retraction the heart is easily moved owing to the elasticity of structures. It may seem paradoxical, but the ascending aorta becomes one of the closest structures through this posterior approach after adequate exposure. Aortic cross-clamping, cardioplegia, and deairing before releasing the crossclamp are easily performed, as is also true with the lateral approach advocated by Liu and colleagues.

Through this approach we have operated on babies under 1 year of age, as well as on young adults. Ostium secundum has been the most common indication, but ostium primum, single atrium, and ventricular septal defect (above 1 year of age without pulmonary artery hypertension) have also been repaired in this way.

This approach was introduced by the group from Marie-Lannelongue Hospital in Paris. They¹ recently reported having done 140 cases, but their recommendation, with which we agree fully, is that more left-sided structures or lesions such as left superior vena cava, pulmonary stenosis, or tetralogy of Fallot are contraindications to this approach.

In conclusion, the report by Liu and colleagues is an important paper, but we would add the following suggestions:

- The lateral approach the authors advocate for better cosmetic results can be moved even more posteriorly, thereby causing no scar whatsoever in the anterolateral aspect of the chest. Standard cardiopulmonary bypass can be applied with adequate myocardial protection through a posterior access.

- Deairing of the heart, a concern frequently arising when such approaches are reported, can be very well done, as reported by Dr. Liu, although there is no access to the apex of the heart.

- However, patients must be selected very carefully. We would question statements that a left superior vena cava and tetralogy of Fallot can be easily repaired through this route, because immediate and long-term safety cannot be sacrificed to cosmetic advantages and the operation should not become dangerous for the patient.

Great caution must be exercised in repairing all but simple congenital defects in children through the use of "minimally invasive surgery." We think, as Georges Pompidou, former President of the French Republic, said once, paraphrasing a humorist: "When the bounds are crossed there are no more limits!"

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Reply to the Editor:

My colleagues and I thank Metras and Kreitmann for their interest in our article. First we shall respond to their comment on the cosmetic approach. This approach was used not only in children, but also in adolescents and adults. About 30 adult patients, mainly young women from 18 to 38 years old, had their congenital cardiac defects corrected, including atrial and ventricular septal defects, through this approach. The follow-up showed no asymmetry or changes in sensitivity of the breasts. The follow-up for children was 4 years, and again there were no asymmetrical or sensitivity changes of the breasts.

Second, concerning the selection of patients, tetralogy of Fallot (TOF) has been corrected through this approach since January 1996. In the beginning, if pulmonary artery hypoplasia was suspected, the anomalies were corrected through a median sternotomy. With improvement in technique, the indications were increased. At this point, this approach has been used to repair congenital cardiac defects in about 560 patients, including more than 60 patients with TOF. Some patients also had coexisting patent ductus arteriosus, left superior vena cava, single coronary deformity, and maldevelopment of the pulmonary artery. However, if occlusion of systemic-pulmonary collateral vessels is needed before the operation, if the pulmonary artery is hypoplastic (aorta:pulmonary artery > 4:1), if the presence, size, and continuity of the native pulmonary arteries are not identified before the operation, or if the left pulmonary artery is abnormal as suggested by preoperative echocardiography, median sternotomy is also used. If a right thoracotomy is used in repair of TOF, a surgeon experienced in correcting TOF through a median sternotomy is needed who also has experience in repairing common congenital heart defects through this approach. Our results with this approach show that the rates of morbidity, residual defects, and residual pulmonary stenosis are almost the same as with a median sternotomy, because the exposure of the defect through the right ventricular outflow tract and the standard of correction of the pulmonary arteries are similar. About 30 TOF patients needed to have the right ventricular outflow tract and the main pulmonary artery enlarged with autologous pericardium or a homograft artery with a single valve across the pulmonary anulus. We have done 8 corrections of partial atrioventricular canal through this approach. Because of space limitations in our article, we did not describe the methods of dealing with a patent ductus arteriosus or left superior vena cava in detail. A patent ductus arteriosus can be sutured through the pulmonary artery incision with a lower body temperature and a lower rate of perfusion, and a left superior vena cava can be crossclamped intermittently if it is small or cannulated through the coronary sinus if it is large. We believe there is no difference in the procedure in correcting a patent ductus arteriosus or a left superior vena cava, whether done through a right lateral thoracotomy or through a median sternotomy.

Finally, we believe it may be easier to injure the long thoracic nerve and the thoracodorsal nerve through the posterior approach, affecting muscle development and thoracic symmetry. Thus we do not advocate using the posterior approach.

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**Anterior approach to the superior sulcus tumors:
The transmanubrial osteomuscular sparing approach**
To the Editor:

We read with great interest the brief communication by Onuki and associates¹ concerning a new modification of the anterior approach to superior sulcus tumors. The surgical treatment of cervicothoracic tumors has long been a challenge for thoracic surgeons, and the search of the "ideal" approach has influenced the development of different proposals. All the same, the treatment of apical chest tumors presents two series of problems: (1) dissection of the neoplasm from the cervicothoracic structures and (2) pulmonary hilar and lymph node dissection.

Concerning the first problem, three main approaches are available: the hemi-clamshell and Masaoka techniques, the anterior transcervical approach, and finally the transmanubrial osteomuscular sparing approach (TMA). The advantages and limits of each type have been widely reported and dis-

cussed elsewhere,²⁻⁴ and each new proposal should be compared with these documented approaches.

Theoretically, the ideal approach for the treatment of lung cancer should reach the following oncologic and functional targets: (1) wide exposure of the thoracic inlet and outlet, allowing the control of the vessels arising from the subclavian artery as well as the control of the axillary and innominate arteries in case of subclavian artery en bloc resection, (2) the possibility to dissect the brachial plexus, (3) the complete resection of cervical lymph nodes, (4) the posterior resection or disarticulation of the first and second ribs when infiltrated, (5) the possibility to preserve the muscular insertions of the cervicothoracic muscles to improve cervical and chest wall stability, and finally (6) the maintenance of the integrity of the clavicle with its articulation with the manubrium and its muscular insertions (sternocleidomastoid and major pectoral muscles).

Onuki and colleagues¹ again propose that the clavicle be sectioned, a procedure that has repeatedly been demonstrated to be unnecessary.²⁻⁴ In fact, sacrificing the clavicle contributes to shoulder instability, weakness, and deformity, mainly when a large chest wall resection or vertebrectomy is associated. In any case, even when reinstalled, fixation of the sternoclavicle articulation can lead to shoulder immobility or, more frequently, to painful pseudoarthrosis. Besides, Onuki has clearly confirmed in his series that fixing the two stumps of the clavicle with wires or plates is frequently insufficient and associated with late fracture, mainly in patients who underwent preoperative radiotherapy. The results of this series are paradigmatic; 60% (3/5) of the patients had late insufficient fixation or fracture of the reinstalled clavicle.¹ In conclusion, even reimplantation of the clavicle can be associated with important disadvantages for the patient. This is

Fig 1. Operative photograph. This patient underwent the TMA for an apical non-small cell lung carcinoma invading the anterior part of the first and second ribs.