Non-small Cell Lung Cancer With Chest Wall Involvement

Chest wall involvement is seen in approximately 5% of patients with newly diagnosed non-small cell lung cancer (NSCLC). In the absence of metastatic spread, en bloc anatomic surgical resection of the involved lung and chest wall is the primary treatment for most of these patients. By definition, chest wall invasion is at least T3 disease (T4 when vertebral body invasion is present). Superior sulcus or Pancoast tumors also are lesions associated with chest wall involvement, but traditionally they have been discussed and treated as a separate entity because of their different presentations, the particularities of their surgical management, and possibly their prognostic features. Therefore they have not been included in this discussion.

The prognosis is determined by the completeness of resection and the patient’s lymph node status. Positive margins, whether microscopically (R1) or macroscopically (R2) are associated with essentially no survival at 5 years. The following two chest wall margins are of concern: the radial margin and the “deep” (ie, anatomically superficial) margin. It has been argued that lesions with minimal superficial parietal pleural involvement can be resected by an extrapleural approach without concomitant rib resection as long as clear margins can be obtained. Others have argued that the true depth of invasion cannot be accurately gauged by this approach and that routine en bloc resection of the underlying ribs and fascia results in higher complete resections. Unfortunately, it is often difficult to judge at surgery and to evaluate by frozen section whether an extrapleural resection suffices and achieves clear margins. Most “easy” extrapleural dissections are usually associated with minimal-to-no cancerous parietal pleural involvement (ie, T1 to T2 disease). When in doubt, it is probably more prudent to err on the side of removing adjacent ribs. Assuming complete resection, survival is linked to the N-status. T3N0 disease (ie, stage IIB) has a 5-year survival rate of 35 to 50%. Survival in the presence of N+ disease is markedly reduced, ranging from 11 to 39% for N1 disease to zero for N2 disease.

One may consider primary reconstruction of the surgical defect when concerned about having compromised the stability of the chest wall to the point of producing respiratory compromise, to prevent a potential lung herniation, when facing concerns that capular rotation may be affected by the defect and the possible cosmetic considerations including the potential for creating scoliosis. Practically, resections of three ribs or less and those resections resulting in defects of <5 cm in diameter do not require reconstruction. Similarly, the resection of any number of the second through fifth ribs posteriorly are usually left alone, as the resulting defect is covered and supported by the scapula and surrounding muscles. However, defects that may cause trapping of the tip of the scapula during motion need special considerations and can be managed by the repair of lowermost aspect of the defect or by resecting the inferior portion of the scapula.

A variety of materials and techniques have been used to repair the defect when required. These include the transfer of autogenous material such as muscle flaps and/or bone grafts, sowing in relatively flexible mesh (ie, Prolene [Ethicon; Sommerville, NJ], Marlex [CR Bard; Murray Hill, NJ], Vicryl [Ethicon], or Gortex [Gore and Associates; Flagstaff, AZ]), or the implantation of rigid struts or composite materials such as methyl methacrylate sandwiched between two pieces of Marlex mesh. When defects are relatively small, such as those that are less than the span of three contiguous ribs in width, repair with taut single-layered or double-layered mesh will result in acceptable stability. In patients who are at risk of infection (for example, after resection in the setting of postobstructive changes), repair with a bioabsorbable material such as a Vicryl mesh may be a safer alternative. The methyl methacrylate/Marlex mesh sandwich repair offers a number of potential benefits...
advantages if a large portion of the chest wall needs to be resected. It can be molded to assume the curvature of the chest wall, and it offers rigidity, which may confer some benefit in terms of respiratory function and protection of the intrathoracic structures. Complications of this type of repair are rare, and include instability of the graft and infection requiring removal. Despite its relatively higher costs of use, the simplicity and ease of using the 2-mm thick polytetrafluoroethelene patch appears to have gained wider popularity over the last few years.

The roles of induction and/or adjuvant therapy for these tumors continue to be debated. No randomized trial ever has compared the strategies of preoperative or postoperative radiotherapy in the management of NSCLC with chest wall involvement. In various retrospective reviews, groups have come to different conclusions about the possible utility of postoperative radiotherapy for these patients. A more recent experience concluded that even though adjuvant radiotherapy may reduce the local recurrence rate, it had no impact on survival. Some investigators feel that preoperative radiotherapy may be helpful in increasing resectability in a fashion akin to the role it plays in the management of superior sulcus tumors.

Similarly, there are no data that convincingly support the utility of adjuvant chemotherapy for patients with completely resected T3N0, T3N1, or T3N2 disease. There continues to be hope that when N2 disease is identified prior to resection, induction chemotherapy (with or without concurrent radiotherapy) may prove to be beneficial.

In this issue of CHEST (see page 1341), Roviaro and colleagues reviewed their experience with NSCLC invading the chest wall over a period of 3 decades. The period was divided into three 10-year intervals (ie, 1970 to 1979, 1980 to 1989, and 1990 to 1999), which encompassed some changes in practice, including the application of different imaging modalities, variations on the use of routine vs selective mediastinoscopy, videothoracoscopic staging (ie, video-assisted thoracoscopic surgery [VATS]), and adjuvant therapies. Roviaro et al have to be congratulated on an operative mortality rate of < 1% over this 30-year period of treating these often difficult patients. It is also very interesting to note that only 15% of their patients who underwent en bloc chest wall resections required some form of chest wall reconstruction, and this was clinically very well-tolerated, as attested by the low reported morbidity and mortality rates.

The authors stipulated that the routine use of VATS exploration before thoracotomy in the last reported decade allowed them to “significantly reduce our overall rate of exploratory thoracotomies.” We would suggest (and so do the numbers presented) that better imaging, not VATS staging, and the improved upfront selection of potential candidates for resection allowed this improved and commendable exploratory thoracotomy rate of < 5%. We would agree with the authors, however, that VATS staging has a role to play in evaluating these patients but probably in a more selected application, such as with patients who present with a pleural effusion; findings by CT scan suggest a more diffuse pleural process and/or mediastinal nodal enlargement located outside of the cervical mediastinoscopy range.

In general, the presence of N2 involvement in patients with T3 chest wall disease translates into no survival to very rare survival at 5 years, such as was seen in the series by Roviaro and colleagues. Considering how ominous this finding is, how unreliable imaging is in staging the mediastinum, and the potential benefits of induction therapy in these patients with N2 disease, we believe that, prior to submitting these patients to thoracotomy, one should make every effort to rule out N2 disease and, in our hands, this means that every patient with T3 chest wall disease should undergo mediastinoscopy as part of their initial evaluation. Contrary to Roviaro and colleagues, we do not believe that VATS staging has replaced cervical mediastinoscopy in the evaluation of the superior mediastinum but that it complements it in selected cases, as described above. VATS staging may be impossible to perform in those patients in whom, by definition, only a partial collapse of the lung will be achievable, and it does not allow for the assessment of contralateral N3 disease or ipsilateral station 4 disease on the left. Whether VATS allows better evaluation of stations 5 and 6 on the left than the Chamberlain procedure is likely very operator dependent. The data presented in this series actually support a more regimented use of mediastinoscopy, as was done in the earlier 1970 to 1979 era, in which the lowest incidence of resected N2 disease was reported at 9%.

Whether preoperative therapy will improve the survival of patients with T3 chest wall disease or subsets of these patients according to their nodal status remains to be seen. At this point in time, at least six phase III trials (in North America and Europe) are evaluating the role of induction chemotherapy in patients with early surgical disease, including patients with T3 disease. As mentioned above, considering how dismal the 5-year survival rate of patients with T3 chest wall N2 disease is following surgical resection alone, it is probably reasonable to consider such individuals for a preoperative strategy of some sort (ie, chemotherapy alone or combined chemoradiotherapy). The role of adjuvant therapy in these patients is even more controversial, considering that neither postoperative radia-
tion nor postoperative chemotherapy has ever been shown to improve the survival of patients following a complete resection.

As Roviaro and colleagues have demonstrated, chest wall resection can and should be performed on those patients who are candidates for complete resection. As shown, in experienced hands, chest wall resection can be performed with minimal operative mortality and morbidity. However, given the poor survival of such patients in the presence of N2 or N3 disease, we strongly advocate that mediastinoscopy be performed on all patients presenting with T3 chest wall NSCLC, regardless of the CT scan assessment. Whether positron emission tomography will obviate the need for surgical staging in these patients remains to be seen. Patients with T3 chest wall NSCLC should be encouraged to participate in the ongoing induction chemotherapy trials available in Europe and in North America.

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References

Outcome Measurements in COPD

Are We Schizophrenic?

Many lessons can be drawn from the article by Tashkin and Kesten in this issue of CHEST (see page 1441), but I will limit myself to just two. The first is that, yet again, it has been shown that patients with COPD do not have “irreversible” airways obstruction although many medical textbooks and even some guidelines continue to propagate this myth many years after it was shown to be untrue, as I argued in an editorial of 1986. What is true is that the bronchodilation that patients with COPD are capable of is less than that of asthmatics, on average. But the overlap in bronchodilator responsiveness between the two groups is so considerable that it is not possible to differentiate between them on this basis. When, as in the two studies they report on, a bronchodilator as potent as tiotropium is used in a typical COPD population (subjects were not selected on the basis of their prior response to a bronchodilator), the mean improvement in FEV1 can be as high as 25% over baseline, or roughly 250 mL (derived from Table 1 of the article by Taskin and Kesten). Moreover, half the patients in these studies, the “responder” group, obtained a mean FEV1 improvement of 400 mL. These are not small amounts; they compare quite favorably with those obtained by lung volume reduction surgery.

It cannot credibly be argued that, because of their substantial bronchodilator responses, half of these patients must have been occult asthmatics. In the first place, anticholinergic agents generally do not provide much bronchodilation in asthmatic patients. But more importantly, the patients in these trials met the current diagnostic criteria of COPD: a mean age of 65 years, a 60–pack-year smoking history, dyspnea as the dominant symptom, persistent airways obstruction, and the absence of any prior diagnosis or clinical features of asthma. Clearly, these are patients to whom any practicing physician would give an operational diagnosis of COPD, and at least half of them had a “significant” bronchodilator response the first time they were tested.

I qualify the word significant thus because the conventional requirements for a significant broncho-