Appendix A. Conference discussion

Dr G. Walsh (Houston, TX): A question from a technical perspective. When do you decide to do a hemivertebrectomy or a total vertebrectomy? Do you use your MRI imaging to help in the assessment, because you are obviously planning differently depending on whether you are going to do a total vertebrectomy or hemivertebrectomy.

Dr Schirren: The preoperative staging with MRI is important for us. Intra-operatively we see we have to do a resection for a T3 tumor or for a T4 tumor. This intra-operative staging by the surgeon is essential here. In my opinion, we need the moving pictures of the MRI to detect how the tumor invades the structures.

Dr W. Weder (Zurich, Switzerland): From these cases you cannot make any conclusions on the value of chemotherapy as induction or chemoradiotherapy as induction or on the value of adjuvant treatment. You presented your expert opinion based on your data, but this is not a study answering these questions. Most likely there will never be such a study, unfortunately, because these are rare, and highly selected cases.

Dr Schirren: I agree with you. If you do preoperative radiochemotherapy, then you compromise the tumor area. The dose of radiation is between 45 and 50 Gy. This radiation is not effective to the tumor. And the boost after surgery does not have the effect as in radiation with 60 Gy postoperatively. Therefore, we prefer chemotherapy first, then surgery, and after that, radiation. The role of chemotherapy is most probably to avoid micrometastases in the body. You have seen here that we reached R0 resection in 80% without preoperative radiation.

Dr Weder: I understand, but this is expert opinion not proven by data.

Dr Schirren: I know, but it is okay.

Dr A. Turna (Istanbul, Turkey): You obviously had patients with pT3 tumors. Did you perform pneumonectomy or radical lobectomy in the patients with tumor without vertebral invasion; did you make the decision before their chemoradiotherapy, because some of the patients had tumors without any vertebral invasion.

Dr Schirren: I have some problems understanding the question.

Dr Turna: Why did you have patients with pT3 tumors? By definition it must be T4.

Dr Schirren: Yes.

Dr Turna: If you have a patient with vertebral body invasion, the patients have T4 tumors, not T3. Did make the decision before neo-adjuvant therapy?

Dr Schirren: Preoperatively we classified all these tumors as T4. Therefore the strategy of resection was planned for a T4 tumor. The pathologist told us after the final examinations if we had resected a T3 or T4 tumor. In this strategy the surgeon guarantees a real en bloc resection and the risk of intra-operative tumor dissemination is very low. We have to do this because we have no frozen section for this situation during the operation.

Dr Turna: But did you do a mediastinoscopy to exclude N2 patients?

Dr Schirren: Please repeat.

Dr Turna: Did you perform a mediastinoscopy?

Dr Schirren: No. We used PET-CT scan and examination of suspicious lymph nodes by EBUS. I don’t like mediastinoscopy in this case.

Dr S. Cassivi (Rochester, MN): I applaud you for your interdisciplinary collaboration on a very tough problem. In the light of what Dr Weder spoke about in terms of this being expert opinion, this is understandable since these are small numbers and a highly selected group. But I would also encourage everyone in this room, as surgeons, not to take the comment of someone saying you have a highly selected group as being a criticism. We are surgeons. Our job is to select our patients appropriately. So I think that it is a good thing that you have shown that we can select our patients appropriately.

My question, or rather my suggestion, to you is this: Because it is such a potentially morbid operation, I would encourage you to include in your results in the survival graph of R0, R1, and R2 resections, the eight patients that you evaluated and did not bring to surgery, in order to show what their survival is. My further question to you is, if you have that data right now, what is their median survival? I would encourage you, for the publication, to include that data in that graph.

Dr Schirren: Yes. Thank you.

Dr K. Athanassiadi (Athens, Greece): All of us have faced the problem many times after a simple stabilization of the spine that we are getting empyemas operated without having patients immunocompromised due to cancer or due to chemotherapy. Did you have a special strategy with your spine surgeon? Because I have seen your morbidity, there were no empyemas. Can you tell us about that?

Dr Schirren: Yes, we had no empyemas. Intra-operatively on an interdisciplinary basis, we check that the dura is closed. In these cases, fluid from the myelon cannot leave the dura. Fluids from the thorax have to be drained well by chest tube and then the risk of infection is very low. If there is a leakage, then, together with the spine surgeon, we put a catheter into the peridural space. By this procedure, the leakage will close.

My last comment is to the audience. If we had 100 patients with this kind of surgery, then we could do an evidence-based analysis. Therefore, I will offer to do this surgery. It is an honor that Professor Dartevelle from Paris is here, one of the pioneers of this surgery. I think we have to thank him for his innovation.

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Editorial comment

En bloc vertebrectomy for lung cancer invading the spine: surgical serenity and optimism warrant innovation

Keywords: Lung cancer; Vertebrctomy; Thoracic surgery; Spine; T4 NSCLC; Pancoast tumor

Innovation in medicine increasingly becomes challenging. Ethical considerations and regulations discourage progressively skilled surgeons to develop new techniques, particularly as it pertains to extended aggressive resections. The case of en bloc vertebrectomy for lung cancer attached to the spine is a pure demonstration of surgical developments that were possible in a recent past but that would probably not be allowed today.

In the current issue of this journal, Dr Schirren and his colleagues emphasize the benefits of such surgical aggressiveness, as they report a 5-year survival rate of 47% in patients who underwent radical en bloc surgery including spinal resection [1]. Nearly one out of two patients can thus hope to survive 5 years following surgical resection of a lung cancer invading the vertebral column! These fascinating results confirm previously published data [2,3]. Such survival rates, associated with a very low postoperative mortality, support the suggestion by the Association for the Study of Lung Cancer (IASLC) Staging Committee to downstage these T4 tumors from stage IIIB to stage IIIA, provided the nodal status be limited to N0 or N1 [4]. Accordingly, in centers of excellence, a surgical resection can be offered to selected patients with such disease. Appropriately, in the study by Dr Schirren and colleagues, patients with N2 disease were precluded from resection [1].

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From a technical point of view, the authors' choice is a two-stage procedure: a primary posterior midline incision, followed by a posterosilateral thoracotomy. It differs from the technique we initially described, where an anterior cervicothoracic approach was followed by a posterosilateral thoracotomy, and then a posterior incision [5]. We preferred the posterior stage to be last to allow spinal stabilization, followed by both vertebral resection and reconstruction at the same time. Subsequently, our approach was simplified into a two-incision procedure [6]. Currently, the first stage includes an initial transmanubrial approach, allowing both the specific anatomical cervical dissection needed by these apex invading tumors, and the hiliar time of the upper lobectomy, as well as the mediastinal lymph node dissection and the thoracic wall division [7]. The second stage takes the patient in the prone position where, through a posterior approach we extract the en bloc surgical specimen, after spinal stabilization, and finally perform the vertebral reconstruction. The advantages of the transmanubrial approach, which give an outstanding access to the supraventricular area, but also to the upper mediastinum, preserving the scapular girdle function, have rendered this approach very popular [8]. Through this approach, combined use of the conventional and thoracoscopic instruments generally allows to perform the upper lobectomy, without needing an additional thoracotomy. This front then back sequence also allows a very safe anterior control of the vertebral column, before performing the spinal division.

Though using a different sequence to the approach we have popularized, Dr Schirren and colleagues' technique is an en bloc resection, and they are reporting better local control than previously described by others, who have embraced the intra-lesional philosophy to treat such tumors [9]. Traditionally, the anterior approach was proposed solely to tackle anteriorly located lesions. Our experience, however, now supports using the anterior incision in all cases, including posteriorly located superior sulcus tumors. Indeed, we now find that the direct view obtained from the front greatly facilitates the access to the anterior spinal plane. As a result, we now favor the transmanubrial approach upfront in all cases for apical tumors, without any other thoracotomy than that given by the opening of the first intercostal space.

In the current series, a few patients were found, on final pathological examination, to have had T3 tumors only [1]. The authors found no outcome differences when comparing these T3 patients to those who actually had true pathological T4 tumors, an observation we also noted out of our own experience [10]. These results could be related to the optimal local control afforded by this extended no-touch resection, including the cases where the tumor is simply adjacent to the spine, without direct invasion of the bone. Obviously, in these cases, an extratebral resection could potentially expose the patient to an early local recurrence and failure. As a matter of fact, in our series, the 5-year survival for patients with pathological T4 invasion of the vertebral body, who could benefit from a complete R0 resection, was 40%.

We strongly agree with Dr Schirren and colleagues as they emphasize the role of a multimodal therapeutic approach in these T4 tumors. Among 32 patients in our series, only 21 were treated preoperatively by induction: either chemotherapy alone (n = 16), chemoradiation (n = 4), or radiation alone (n = 1) [10]. Our retrospective analyses demonstrated better outcomes in patients, who received induction chemotherapy before surgery. As well, recent series have shown far better results in patients treated with preoperative chemoradiotherapy followed by surgery [2,3].

The authors have to be congratulated for such achievements in the treatment of these difficult cases. Including their series, nearly 130 cases of vertebrectomy for lung cancer attached to the spine have been published to date [1—3,9,10]. In trained hands, this technically demanding surgical challenge can be achieved with tolerable postoperative turbulence. To duplicate such excellent results, one needs: (1) an excellent multidisciplinary team, including spinal surgeons; (2) surgical serenity; and (3) surgeon’s and patient’s strong optimism.

In conclusion, these data support that patients, who suffer from vertebral invasion by a lung carcinoma, in particular with Pancoast tumors, should be offered to be assessed at the nearest specialized referral center, where an interdisciplinary thoracic—spinal surgical program is established.

References


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