

CLINICAL-PATHOLOGIC CONFERENCE

CLINICAL-PATHOLOGIC CONFERENCE IN THORACIC SURGERY: BASALOID SQUAMOUS CARCINOMA OF THE TRACHEA

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This case, with added links and enhanced graphics, is available for further study on the Web at: <http://www.ctsnet.org/doc/3196>.

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Case study

Dr Carias De Oliveira: The patient is a 48-year-old man who had a 2-year history of hemoptysis. Initially his symptoms were minimal, consisting of very small amounts of blood-streaked sputum. In September 1999, he had a significant episode of hemoptysis that lasted for several hours. In recent months the patient had minimal progressive dyspnea and stridor. His medical and surgical history are not significant. He had a 66 pack-year smoking habit. On examination, he was an apparently healthy man. He had minimal stridor but no cer-

vical adenopathy. Coarse breath sounds were noted on auscultation. The patient had an x-ray film and computed tomographic (CT) scan of the chest. Dr Glazer will review these images.

Dr Glazer: The frontal chest radiograph (Fig 1, A) shows a soft tissue opacity projecting over the mid portion of the trachea. On the lateral projection (Fig 1, B) the opacity extends from the anterior tracheal wall toward the posterior tracheal wall. The CT scan of the chest (Fig 1, C) demonstrates a large soft tissue mass that almost totally obliterates the tracheal lumen. There may be subtle extension of the mass outside the anterior tracheal wall. Retrospective review of a lateral chest radiograph performed in another institution in 1997 reveals that the mass was visible but smaller.

Dr Carias De Oliveira: The patient's investigation included pulmonary function tests. He had a forced expiratory volume in 1 second of 29% of predicted. The diffusing capacity for carbon monoxide was 79% of predicted. The flow volume loop revealed significant upper airway obstruction. In summary, this is a 48-year-old, otherwise healthy man who has a 2-year history of progressive stridor, dyspnea, and hemoptysis.

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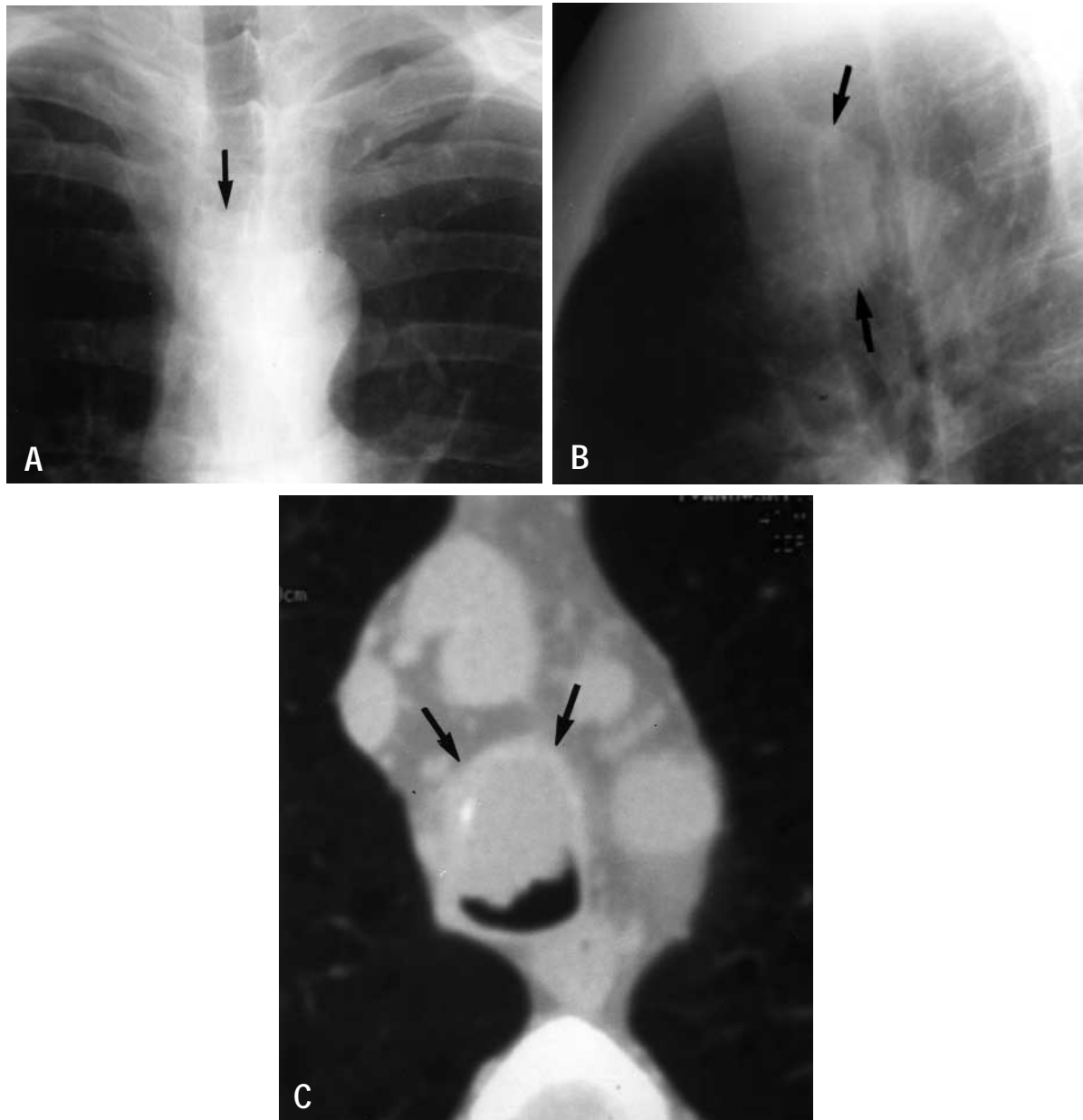


Fig 1. **A** and **B**, Chest radiographs demonstrate a soft tissue mass (*arrows*) within the trachea. **C**, CT scan of the chest shows a large soft tissue mass (*arrows*) that almost totally obliterates the tracheal lumen. There may be subtle extension outside the anterior wall.

Imaging studies were consistent with a tracheal tumor. The patient was scheduled for bronchoscopy. Because the patient had minimal stridor and the posterior airway wall seemed to be uninvolved, we used general anesthesia to conduct the bronchoscopic examination. After orotracheal intubation, examination with a flexible bronchoscope revealed an endobronchial mass fixed to the right anterolateral wall of the trachea (Fig 2). The

left lateral and posterior membranous walls were uninvolved. At this point the patient was extubated and a rigid bronchoscope was introduced. With the use of the sharp leading edge of the bronchoscope, the bulk of the tumor was amputated and immediately retrieved from the airway lumen with large-caliber biopsy forceps. The specimen was submitted for pathologic examination. Subsequent examination revealed a satisfactory



Fig 2. Endoscopic view of the tracheal lesion fixed to the right anterolateral tracheal wall.

lumen. The inferior margin of the tumor was measured 2 cm proximal to the tracheal carina. The lesion extended cephalad a distance of 4.5 cm. The airway was completely normal proximal to the tumor. The patient was discharged pending final pathologic interpretation. Dr Ritter will review the pathologic material submitted at bronchoscopy.

Dr Ritter: Histologic examination of the specimen submitted from the biopsy procedure revealed a papillary growth pattern with finger-like projections (Fig 3). At a higher power, these cells were really quite atypical. The final pathologic diagnosis was that of a moderately differentiated papillary squamous carcinoma.

Dr Carias De Oliveira: After bronchoscopic tumor debridement, the patient had a dramatic improvement in his symptoms of dyspnea and stridor. In addition, for several days after bronchoscopy he had copious production of purulent bloody sputum. This resolved over the few days before his planned resection.

We concluded that the patient had a primary squamous carcinoma of the trachea. We planned to complete staging the disease by mediastinoscopy to be followed by immediate resection if the results of mediastinoscopy proved negative.

At mediastinoscopy, there was no evidence of tumor extension outside the tracheal wall. The examination was negative for nodal metastasis. Subsequently, the anterior aspect of the trachea was mobilized through the cervical mediastinoscopy incision from the thyroid

cartilage to the tracheal carina. A bronchial blocking balloon was passed through the endotracheal tube into the bronchus intermedius and, when inflated, completely occluded the right main bronchus.

The resection was conducted through a posterolateral thoracotomy in the fourth right intercostal space. The azygous vein was divided. The superior vena cava was reflected anteriorly and the peritracheal node packet resected and submitted as a separate specimen. The trachea was then divided distal to the tumor and ventilation was established by cross-field ventilation of the left main bronchus. The endotracheal tube and blocker were withdrawn into the proximal airway. A 4.5-cm segment of trachea was resected (Fig 4), and frozen section assessment of proximal and distal margins showed no disease. A right inferior hilar release was performed. The proximal left main bronchus was mobilized anteriorly and posteriorly. The neck was flexed and the anastomosis commenced. The left side of the cartilaginous trachea was opposed with interrupted sutures with knots placed on the inside of the airway. The anterior and right lateral cartilage walls were approximated with interrupted sutures with knots on the outside. The membranous wall was apposed with a continuous suture. The entire anastomosis was constructed with 3-0 polyglactin 910 (Vicryl; Ethicon, Inc, Somerville, NJ). Mediastinal fat and nodal tissue were used to bury the anastomosis. After chest closure, a "guardian" stitch of heavy polypropylene was placed

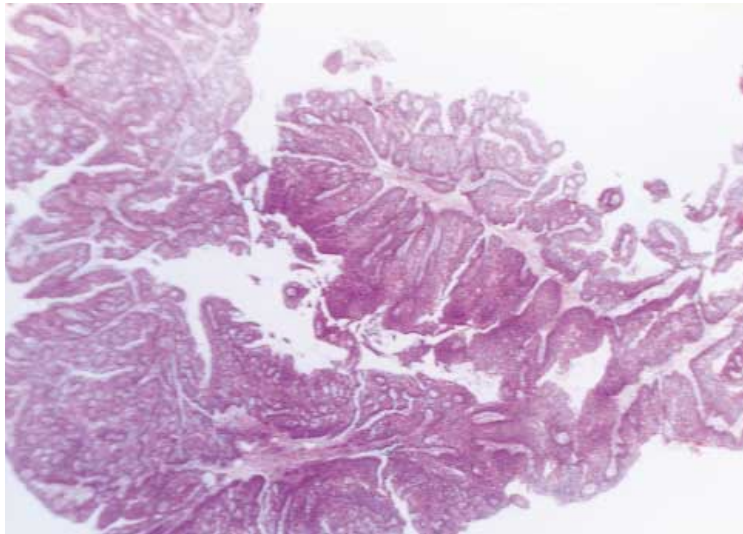


Fig 3. Tracheal biopsy demonstrating a papillary growth pattern, with constituent atypical squamous cells. (Original magnification $\times 40$.)

between the chin and anterior chest wall to maintain the neck in a neutral position. The patient made an uneventful recovery and was discharged on the fourth postoperative day. On the seventh postoperative day the esophagus was examined with a flexible bronchoscope with the aid of topical anesthesia. The anastomosis was healing well, and the chin stitch was removed.

Dr Cooper: Perhaps we could discuss the approach for resection. After the results of mediastinoscopy were negative, I would have thought that a median sternotomy would have provided the best exposure. The entire upper part of the airway could have been mobilized. A laryngeal release maneuver could have been easily performed if necessary. In addition, the right inferior hilar release is easily accomplished through a median sternotomy. Endotracheal tube management would have been simple because right lung deflation would not have been necessary.

Dr Patterson: I cannot disagree with a median sternotomy approach. However, after fully mobilizing the upper part of the airway through the mediastinoscopy incision, we concluded that a laryngeal release would not be necessary. We also knew that the tumor had not extended beyond the airway wall. Finally, I thought that the exposure for resection of this distal trachea lesion and subsequent reconstruction would be best accomplished through a high right posterolateral thoracotomy.

Dr Cooper: Why was high-frequency ventilation not used during resection and reconstruction?

Dr Patterson: That is a good question. We had excellent access to the proximal left main bronchus through the divided distal trachea. A small-caliber armored tube was easily placed and, although it traversed the field, it was not really in the way. It was periodically removed for a few minutes to enable accurate suture placement on the left lateral tracheal wall. After the cartilaginous portion of the airway anastomosis was completed, the oral endotracheal tube was advanced and did not impede closure of the membranous airway. High-frequency jet ventilation is not ideal. If the open airway contains blood, an annoying spray of blood can hamper exposure. In addition, I find the constant noise of the jet ventilator rather annoying.

Dr Carias De Oliveira: We estimate that approximately 4.5 to 5 cm of trachea was resected. How effective is the guardian stitching in eliminating anastomotic tension?

Dr Patterson: The stitch maintains the neck in a neutral position and prevents neck extension. After the stitch has been cut, I think it takes an additional week or two before the patient regains normal neck motion. The guardian stitch is an effective way to reduce tension on the tracheal anastomosis.

Dr Carias De Oliveira: Dr Ritter will review the final pathologic findings.

Dr Ritter: The resection specimen is visible in Fig 4. It is growing mainly within the lumen and on the luminal side, although at one point it has disrupted the cartilage and popped through, growing out into the adven-



Fig 4. Cross section through the tracheal neoplasm. The bulk of the mass is endoluminal, with focal growth through the tracheal cartilage and into the adventitial soft tissue.

titial soft tissue of the airway. Fig 5 shows that same area of tumor growing in nests and sheets, extending away from the airway lumen. Even at this power one can see the lining up or palisading of basaloid neoplastic cells around the edges of these tumor nests. In these large nests or sheetlike collections of cells, there is not much evidence of overt keratinization. The papillary appearance of the biopsy is not a substantial component of the resection specimen. When the specimen is viewed at high power, a high mitotic rate is evident (Fig 6). There is only a bit of central necrosis in some of the tumor nests and focal keratinization, but again this tendency for palisading is very characteristic of a basaloid squamous carcinoma. The margins of a resection in this case were free of tumor. Several lymph nodes were submitted at mediastinoscopy and with the resection, and all were negative for carcinoma. I think this designation of a basaloid squamous carcinoma, if we can draw analogies from a number of series in other anatomic sites, implies a more aggressive variant of a non-small cell carcinoma.

Dr Carias De Oliveira: This is a rare tumor. The most common malignant tracheal tumors are squamous cell carcinoma and adenoid cystic carcinoma. Squamous cancers are more common in the distal third of the trachea. Tracheal resection is indicated for localized lesions without evidence of nodal or distant metas-

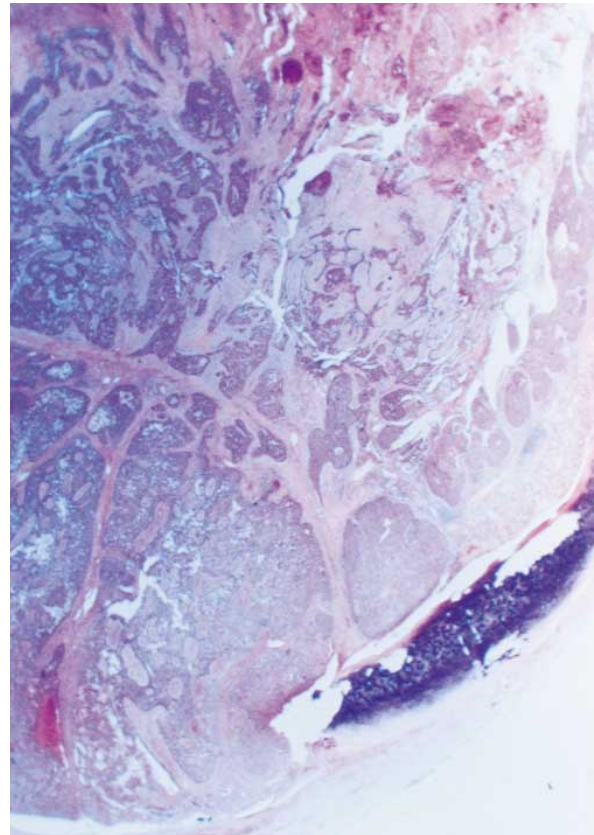


Fig 5. Low-power photomicrograph detailing nests and sheets of small dark cells. There is focal extension beyond the cartilage. (Original magnification $\times 40$).

tases. In the largest reported series, median survival after resection of this tumor is 34 months and 5-year survival is 30%.

Dr Patterson: I would like to make a comment regarding the biologic features of this particular lesion. The lesion had been symptomatic and radiographically visible for 2 years. It occupied a large percentage of the airway lumen and a significant length of tracheal wall. Yet there were no nodal metastases. The extramural involvement was minimal or nonexistent. This particular lesion does not seem to be behaving like a very aggressive carcinoma.

Dr Ritter: I agree that there seems to be some sort of disconnection between this case and the behavior of basaloid squamous cancer in most sites. Obviously very little experience with these lesions in the trachea has been reported. However, again, projecting from results with squamous cancer at most other sites, one would guess that the prognosis of this lesion would have been worse. Another interesting point about this

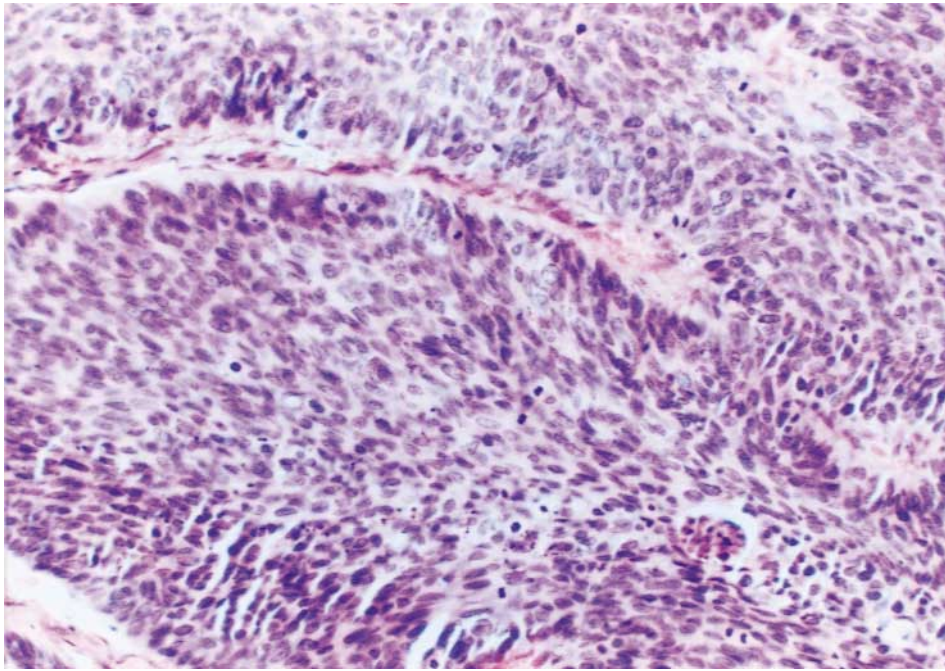


Fig 6. Basaloid squamous carcinoma demonstrating small, dark “basaloid cells,” peripheral palisading in the tumor cell nests, a brisk mitotic rate, and a minimal amount of keratinization. (Original magnification $\times 400$.)

variety of tumor, related to histology, is that the cells are small and basal-like. In cytologic preparations or small biopsy specimens, this entity has been misdiagnosed as small cell carcinoma. The fact that it may be confused with a small cell carcinoma on biopsy may account in part for the poor prognosis in some reports.

Dr Bradley: Circumferential margins are as important as longitudinal margins. How certain can we be that the circumferential margins are not diseased (ie, negative)?

Dr Ritter: The margins as sampled appear disease free. We have sections in which the complete cross section of the tracheal wall was intact, including the adventitial layer a good distance from microscopic tumor. In just one small area does the tumor appear to grow through the adventitia.

Dr Patterson: From our mediastinoscopy dissection, we knew that the tumor did not extend into the mediastinum. The soft tissue of the mediastinum was easily mobilized off the airway right over the tumor. At the time of thoracotomy, we removed the lateral mediastinal fat and lymph node packet and submitted it as a separate specimen. The subsequent airway resection encompassed full-thickness airway wall. I am certain the radial margins are far greater than those shown in Fig 5.

Dr Roper: If local nodal metastases had been identified adjacent to the tumor at the time of mediastinoscopy, would you have canceled the resection and opted for radiation or proceeded with resection and postoperative radiation?

Dr Patterson: I certainly would have sought additional opinions in the operating room. This is a very young man. If nodal metastases had been identified immediately adjacent to the tumor, I would have done the resection primarily. If we had done the mediastinoscopy, then conducted a course of neoadjuvant therapy including radiation, and subsequently attempted a tracheal resection, we would have had a very difficult time mobilizing the trachea amid the mediastinal fibrosis from a previous mediastinoscopy and radiation. If I had concluded that resection was going to be necessary ultimately, I would have done it immediately.

Dr Safdar: If there is any doubt about the resection margins, this patient should receive postoperative radiation.

Dr Patterson: The proximal and distal margins are fine. The issue is the radial margin. It appears that the radial margin of the submitted specimen is free of disease, and a much wider margin of mediastinal tissue was separately submitted to pathologic analysis and comprises a much wider true radial margin.

Dr Cooper: Perhaps if the lesion extends to the tracheal adventitia, postoperative radiotherapy may be warranted even if the radial margin is histologically free of disease.

Dr Bradley: This is a difficult dilemma, and there are no reports in the literature to provide guidance. If the margins are negative, my sense is not to give postoperative radiation.

Dr Safdar: There is no right answer. I believe that the disadvantage of radiation is not great. The field would be limited and surrounding structures not placed at great risk. Radiation would optimize the chance of local control.

Dr Patterson: If we opt for no radiation, then we are going to have to implement a close postoperative surveillance program of periodic bronchoscopy and CT imaging.

Dr Bradley: If this lesion recurs, the prospects of cure are not good. Radiation as isolated therapy for primary tracheal tumors provides dismal results. Perhaps the physicians should meet with the patient and discuss the risks and potential benefits of postoperative radiation.

Dr Patterson: Dr Ritter's comments regarding the prognosis have proven prophetic since, within 4 months of tracheal resection, this patient developed metastatic disease in the lumbar spine and required a course of palliative irradiation.