the differential diagnosis. Rothfeld and Zucker have recently compared the ECC and VCG before and after experimentally induced myocardial infarction in dogs with right ventricular pacemakers. After infarction, there was a striking change in conduction pathway and velocity of initial QRS forces. They were displaced to the right, posteriorly and superiorly and were written with considerable delay over a circuitous pathway.

ST-T wave changes can occur in recent Adams Stokes attacks, as well as in cerebrovascular accidents. Neither of our patients had these complications.

Wasserburger and Corliss reported that functional T wave inversion may be abolished by potassium therapy, but persists with organic changes. We therefore administered 10 gm of potassium chloride to our patients, and repeated the ECG, with the pacemaker turned off, at one, one and one-half and two hours. No change was observed in the ST and T wave abnormalities.

It is unlikely that these pacemaker-induced electrocardiographic alterations are of any clinical importance. However, it is important to realize that they can simulate recent myocardial infarction, and lead to a prolonged and unnecessary period of hospitalization.

**References**


**Granular Cell Myoblastoma of Trachea Associated with Pregnancy**

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The development of a tracheal granular cell myoblastoma during pregnancy is described. Its possible relationship to elevated levels of estrogenic hormones is discussed.

Granular cell myoblastomas are uncommon benign tumors first described by Abrikossoff. The development of these neoplasms in the lower respiratory tract is a rare but well known event. Most of these have been observed to arise in bronchi. This report describes a myoblastomatous tumor of the trachea which increased in size during pregnancy and ultimately caused respiratory obstruction. The development of this neoplasm during pregnancy and its possible relationship to hormonal stimulation will be discussed.

**Case Report**

A 25-year-old Negro woman developed respiratory difficulty during the first trimester of pregnancy. Treatment consisted of antibiotics and bronchodilators but because of persistent "asthma," allergy consultation was obtained. Skin testing revealed no positive reactions.

Orthopnea and paroxysmal nocturnal dyspnea increased and was partially relieved by lying on the left side. At delivery local anesthesia was used and marked inspiratory stridor noted. During the immediate postpartum period respiratory distress was noted to "decrease" but ten days later she was rushed to the emergency room because of severe dyspnea and stridor.

An endotracheal tube was inserted but adequate ventilation could not be maintained and bronchoscopy was performed. A friable, yellow mass occluding 90 percent of the upper trachea was seen 4 centimeters below the normal appearing vocal cords. After a low tracheotomy was done respiratory distress was alleviated.

Serial bronchoscopy was performed over a one month period and revealed a 50 percent decrease in tracheal tumor size. At tracheal resection the anterior wall was vertically incised and a broad base tumor was resected from the posterior trachealis muscle between the level of the second to sixth ring. The tracheostomy tube was removed four weeks later.

Fifteen months after tracheal resection, bronchoscopy revealed a normal trachea with no evidence of stricture formation or granulation tissue.

**Pathology**

The resected tumor mass measured 1.5 x 1.0 x 1.0 cm. The tumor was finely lobulated and was covered by a mucosal surface. The cut surface was yellow-white, smooth, and firm. Cartilaginous fragments were noted at the base of the lesion.

Microscopic examination revealed a tumor composed of polygonal cells with indistinct cytoplasmic membranes and which contained granular eosinophilic cytoplasm (Fig 1, 2). The cytoplasm stained pink with a Masson trichrome stain and the granules stained with the periodic acid-Schiff reaction. The basophilic nuclei were either vesicular or small and stained darkly. The base of the tumor was not well defined and interdigitated with fibers of the trachealis muscle. The pathologic diagnosis was granular cell myoblastoma.

**Discussion**

Pregnancy and other hyperestrogenic states have been implicated in the development and growth of mesenchymal as well as epithelial tumors in both man and animals. Increase in size of uterine fibromyomas has long been noted to be associated with pregnancy but...
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whether the increased estrogen levels exert a tumorigenic effect is still unresolved. Support for a tumorigenic hypothesis lies in the findings of Nelson, who produced fibromyomas in guinea pigs by estrogen administration. Recently, estrogenic stimulation has also been implicated in the pathogenesis of uterine stromal malignancies.

Granular cell myoblastomas are a morphologically distinct tumor, probably of Schwann cell origin. A tumor of identical appearance although clinically dissimilar is the congenital granular cell epulis. The vast majority of these tumors have been noted in infants who were girls. High levels of estrogen present in the developing fetus may be of significance in the development of these neoplasms. This association is particularly interesting when viewed in conjunction with Dunn and Green's studies on estrogen-treated mice. They found two cases of granular cell myoblastoma occurring at the uterine cervix. As this is a most uncommon tumor in the mouse, the possibility that estrogenic stimulation is related to the development of myoblastomatous tumors in mice is suggested. It is also of interest that recent studies of

Granular cell myoblastomas have revealed a two to one preponderance in women. This trend is strikingly exemplified by a recent review of myoblastomas of the biliary tract in which all nine cases occurred in women. In these studies there was no comment as to the presence or absence of an association with pregnancy.

This case also amply demonstrates that wheezing which initially develops during pregnancy should not be considered bronchial asthma until an obstructive airway lesion has been ruled out and that orthopnea and paroxysmal nocturnal dyspnea which are relieved or precipitated by a change in body position are frequent symptoms of tracheal obstruction. Additional diagnostic tools such as lateral neck x-ray films, chest tomograms and bronchoscopy should then be employed when these unusual respiratory symptoms are encountered.

References


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FIGURE 1. Clusters of cells with dark staining nuclei and indistinct cytoplasmic borders are apparent. Light staining collagenous tissue surrounds some groups of tumor cells. Squamous metaplasia of the tracheal mucosa is present (hematoxylin-eosin, × 100).

FIGURE 2. At higher magnification, the granular cytoplasm of the tumor cells becomes apparent (hematoxylin-eosin, × 400).