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Uncommon Conditions of the Diaphragm

Of the vertebrates only mammals have diaphragms completely separating the body cavities. The diaphragm is an unusual muscle structurally, functionally as well as topographically. With its tendinous center it serves not only as a partition between the thoracic and abdominal cavities but also its utilitarian function is of importance in respiration, vocalization (singing, speaking), cough, hiccup, sneezing, yawning, urination, defecation and in the treatment of “cafe coronary” by the recently described Heimlich maneuver (mechanical expulsion of aspirated food from the trachea by forcing the diaphragm upward while the patient is slumped forward) (JAMA 239:746, 1974). Each of the diaphragmics is innervated by the phrenic nerve and occupies an asymmetrical position. Several ingenious but unproved theories have been offered to explain this positional discrepancy. Mandelstamm, M et al (Ergebn Inn Med Kinderheilk 34:154, 1928), Roessler J (Wien Arch Inn Med 19:505, 1930), Lichtman, S S (Arch Int Med 48:866, 1931), and Carlson, H C et al (Proc Staff Conf Mayo Clin 37:25, 1962) attributed the lower position of the left hemidiaphragm to the weight of the heart. The authoritative investigation of Wittenborg, M H et al (Brit J Radiol 36:280, 1963) led to the conclusion that there was no evidence in favor of the assertion that the mass and the activity of the heart depress the respective hemidiaphragm. It might be worthy to consider the theory that the heart reduces the volume of the lung ipsilaterally and decreases the negativity of the intrapleural pressure in relation to the opposite side; this results in decreased upward traction upon the respective hemidiaphragm. Diaphragmatic flutter is a most unusual functional disturbance. It is likely to be associated with chest pain of 1 to 3 hours duration and recur at irregular intervals. The rhythmic diaphragmatic contractions are readily visualized by fluoroscopy and audible throughout the chest. Their frequency varies from 240 to 250 per minute, with 2 to 5 second intervals. Despite the flutter, the function of the diaphragm remains normal. In some instances, the flutter was attributed to rheumatic fever or epidemic encephalitis, in others its cause remained undetermined. Scheffley, C W et al (Ann Int Med 26:129, 1947) observed a case of tonic spasm of the diaphragm, associated with knife-like pain in the lower part of the left hemithorax, which radiated to the left shoulder. In instances of incomplete embryonic descent of a hemidiaphragm which consists mostly of fibrous tissue and insufficient muscular elements, its respiratory movements are reduced or absent. Such circumstances permit a cephalad shift of some of the abdominal structures. Several authors reported instances of accessory hemidiaphragm, in which one entire lobe or a portion of it was entrapped between the true and the accessory hemidiaphragms. Dystrophia myotonica, a hereditary disease transmitted as an autosomal dominant, may be associated with atrophy, inadequate movements and high position of the diaphragm, with consequent hypventilation and basal atelectasis. Shaffer, J O (JAMA 188:1000, 1964) reported a case of congenital absence of the left hemidiaphragm, with multiple abdominal viscera filling the respective hemithorax completely. Follow-up for 27 months attested to the successful use of a knitted Dacron prosthesis hemidiaphragm. Large series of routine chest x-rays reveal an incidence of eventration of the diaphragm from 1 to 3 per 10,000. More appropriately this term should be changed to ectopia of the diaphragm. It is regarded as congenital malposition of this structure. In rare instances, it may be brought about by phrenic nerve injury during birth or caused by neoplasm or infection. Infrequently, sudden sharp increase in the intrapitoneal pressure by severe trauma or by prolonged strenuous childbearing may be the causal factor. Unilateral paralysis of the diaphragm as one of the manifestations of herpes zoster was reported first by Halpem, S L et al (Arch Int Med 84:907, 1949). Subsequent sporadic reports confirmed the occurrence of this clinical entity. Only 84 primary neoplasms of the diaphragm were reported during a hundred year period according to Olafsson, G et al (Chest 59:568, 1971). Benign tumors include angiomatosis, angiobromatosis, chondroma, fibroma, fibromyoma, fibroangioendothelioma, hemangiendothelioma, lymphangiomia, myoma, neurofibroma, rhabdomyofibroma. The following malignant tumors have been recorded: endodermal sarcoma, fibromyosarcoma, leiomyosarcoma, mesothelioma, myosarcoma, neurofibrosarcoma, polymorphous sarcoma, round cell sarcoma, rhabdomyosarcoma, undifferentiated sarcoma. No encyclopedic coverage of the subject has been contemplated within the framework of this presentation.