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## PRENATAL CLOSURE OF THE PULMONARY ARTERY.

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AFTER a normal labor at term, a male child was born. The child was of good size, and presented no external abnormality. The child's face made the contortions of one crying, but no sound was uttered. A full hour was spent in trying to restore the child. After the lungs had been inflated several times by artificial means, the heart beat vigorously, but upon ceasing the inflation the heart-beat gradually became slower and weaker. After each inflation during an hour, the heart-beat underwent the same modification, and efforts on the part of the child at crying and breathing were made with only one result, viz., the drawing inward of the lower border of the chest by the action of the diaphragm. Powerful inflations did not seem to expand the chest. The hand felt a churning sensation over the lower chest in front during systole. The child was considered non-viable, and soon died after inflation ceased.

At the autopsy, the costal pleura was found to be adherent to an underlying membrane, about as firmly as two pieces of wet newspaper adhere. The underlying membrane proved to be the pericardium, of which the cavity was largely distended, filling the whole chest. The lungs were not visible from the front. The entire contents of the chest were removed *en masse*. The lungs lay collapsed behind a fluctuating mass that proved to be the heart, the right side of which was enormously distended with blood. The right auricle and ventricle held blood estimated to be at least three ounces.

The right auricle and ventricle were both dilated, and the walls of both excentrically hypertrophied. The right auriculo-ventricular opening was dilated largely enough to admit the tips of the index and middle fingers. The tricuspid valve formed a fringe around this opening, and was covered with a papillary growth. The valve was entirely incompetent. There was absolutely no opening from the right ventricle into the pulmonary artery. The occlusion was musculo-membranous. The segments of the pulmonary valves had apparently become adherent to one another and overlaid, on the ventricular side, by a muscular band. From above, the pulmonary artery was open to the valvular surface, and was probably somewhat contracted in caliber. The papillary fringe on the right auriculo-ventricular valves may or may not have been the remains of a morbid process which closed the pulmonary orifice.

The foramen ovale admitted a large forefinger easily. The left auricle was dilated, but not largely so, and its walls were hypertrophied. The left auriculo-ventricular opening was not far from normal in caliber, and the mitral valve was normal. The left ventricle was dilated and hypertrophied to a moderate extent. The ductus arteriosus Botalli was in the usual situation, but had a caliber larger than usual. The aorta and its valves were normal. There was no defect of the interventricular septum. There was no congenital defect of the interauricular septum, the large foramen ovale being due to the enormous dilatation of the right auricle, and to the fact that it served its own function, plus that of the pulmonary orifice, which had closed. It is probable that the course of events was as follows: At a time late in fetal life, subsequent to the completion of the ventricular and other septa, a morbid process closed the pulmonary orifice of the right ventricle; the right ventricle, its auricular opening, its auricle, the foramen ovale, the left auricle, its ventricular opening, and the left ventricle, became successively dilated; the walls of the several cavities became

hypertrophied; and the caliber of the ductus arteriosus became widened.

The reason why this child could not breathe, was that the enormously distended right auricle and ventricle so completely filled the chest—even distending it—that the lungs, collapsed behind the heart, were incapable of inflation by the force at the disposal of the child. The heart was practically a neoplasm distending the chest and compressing its contents.

It seems possible that, had the pulmonary closure taken place earlier, the various compensatory arrangements might have become complete enough to have permitted a longer extra-uterine existence.

In *Pepper's System of Medicine*, vol. iii, page 695, the following statement is made: "If the pulmonary artery is obliterated or exceedingly narrowed at a later period (*i. e.* subsequent to completion of the ventricular septum in the third fetal month), the ventricle shrivels, because no blood is able to pass, and gradually more and more of the fetal current passes through the foramen ovale to the left side." The present case is satisfactory proof that it is not true that the right ventricle always shrivels under the circumstances noted. In this case the pulmonary closure was complete; the ventricular septum was complete; the right ventricle was dilated and hypertrophied. Aside from the condition of the ventricular septum, there is another factor not considered in the quotation made, and that is, the condition of the tricuspid valve and its orifice. In this specimen the tricuspid orifice was dilated, its valve diseased and incompetent, if not entirely functionless. The right auricle and ventricle thus formed practically one cavity, viz., an auricle. The right ventricle functionated in the direction of the right auricle, because no valves opposed it at the tricuspid orifice; and because it *could* functionate it *did not atrophy*.

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